Age Differences in Affective Decision Making as Indexed by Performance on the Iowa Gambling Task

Elizabeth Cauffman and Elizabeth P. Shulman
University of California, Irvine

Eric Claus and Marie T. Banich
University of Colorado at Boulder

Laurence Steinberg
Temple University

Sandra Graham
University of California, Los Angeles

Jennifer Woolard
Georgetown University

Contemporary perspectives on age differences in risk taking, informed by advances in developmental neuroscience, have emphasized the need to examine the ways in which emotional and cognitive factors interact to influence decision making. In the present study, a diverse sample of 901 individuals between the ages of 10 and 30 were administered a modified version of the Iowa Gambling Task, which is designed to measure affective decision making. Results indicate that approach behaviors (operationalized as the tendency to play increasingly from the advantageous decks over the course of the task) display an inverted U-shape relation to age, peaking in mid- to late adolescence. In contrast, avoidance behaviors (operationalized as the tendency to refrain from playing from the disadvantageous decks) increase linearly with age, with adults avoiding disadvantageous decks at higher rates than both preadolescents and adolescents. The finding that adolescents, compared to adults, are relatively more approach oriented in response to positive feedback and less avoidant in response to negative feedback is consistent with recent studies of brain development, as well as epidemiological data on various types of risky behavior, and may have important practical implications for the prevention of adolescent risk taking.

Keywords: decision making, risk taking, adolescent development, reward sensitivity, avoidance behavior

Public health experts agree that the most significant threats to the mental and physical well-being of adolescents arise not from natural causes but from dangerous activities in which youth willingly engage (Ozer, Macdonald, & Irwin, 2002). Although children and adults also behave dangerously at times, mid- and late adolescents (i.e., ages 15–19) are disproportionately more likely than younger or older individuals to engage in many high-risk behaviors, including reckless driving (National Research Council, 2007), illicit drug use (Substance Abuse and Mental Health Services Administration, 2007), attempted suicide (Mościcki, 2001), unsafe sexual practices (Finer & Henshaw, 2006), and both violent and nonviolent crime (Piquero, Farrington, & Blumstein, 2003). Although some of these age differences, especially those between children and adolescents, are undoubtedly due to differential access to potentially risky situations, others may be attributable to developmental differences between age groups (Arnett, 1992). One key area of development that may underlie risky behavior in mid- to late adolescence is decision making, particularly under conditions of emotional engagement and uncertain outcome.

Some theorists have tried to explain adolescents’ greater affinity for risky activities in terms of deficiencies in the cognitive skills necessary to make good choices (Furby & Beyth-Marom, 1992), but this proposition has not been supported empirically (Steinberg, 2007). Specifically, adolescents are no worse than adults at perceiving risk or estimating their vulnerability to it (and, like adults, adolescents overestimate the dangerousness associated with various risky behaviors; Fischhoff et al., 2000), and increasing the salience of the risks associated with making a poor or potentially dangerous decision has comparable effects on adolescents and adults (Müller & Halpern-Felsher, 2002; Reyna & Farley, 2006). Indeed, most studies find few, if any, differences between adolescents’ and adults’ evaluations of the risks inherent in a wide range of dangerous behaviors (e.g., driving while drunk, having unprotected sex), in their judgments about the seriousness of the consequences that might result from risky behaviors, or in the ways that they evaluate the relative costs and benefits of

Elizabeth Cauffman and Elizabeth P. Shulman, Department of Psychology and Social Behavior, University of California, Irvine; Laurence Steinberg, Department of Psychology, Temple University; Eric Claus and Marie T. Banich, Department of Cognitive Psychology and Cognitive Neuroscience, University of Colorado at Boulder; Sandra Graham, Department of Education, University of California, Los Angeles; Jennifer Woolard, Department of Psychology, Georgetown University.

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Correspondence concerning this article should be addressed to Elizabeth Cauffman, Department of Psychology and Social Behavior, School of Social Ecology, University of California, Irvine, 3340 Social Ecology II, Irvine, CA 92687. E-mail: cauffman@uci.edu
these activities (Beyth-Marom, Austin, Fischhoff, Palmgren, & Jacobs-Quadrel, 1993). In other words, adolescents’ greater involvement in risk taking, compared with adults’, does not appear to stem from youthful ignorance, irrationality, delusions of invulnerability, or misperceptions of risk (Cauffman & Steinberg, 2000b; Reyna & Farley, 2006; Steinberg, 2007). These findings have led many to suggest that age differences in risk taking are more likely due to emotional and social, rather than cognitive, factors (Cauffman & Steinberg, 2000a; Scott, Reppucci, & Woolard, 1995; Steinberg & Cauffman, 1996). Indeed, when decision-making tasks involve emotional stimuli, such as risk and reward, differences between adolescents and adults emerge, even in laboratory settings (e.g., Ernst, Jazbec, et al., 2005; Galvan et al., 2006; Gardner & Steinberg, 2005). Thus, differences in risk taking between adolescents and adults may not be due to differences in decision making in general but to differences in affective decision making in particular.

Recent advances in developmental neuroscience provide some evidence consistent with this view. In particular, a growing body of work suggests that a temporal disjunction between the heightened arousal of brain systems implicated in reward-seeking, which occurs around the time of puberty, and the more gradual maturation of self-regulatory brain systems, which unfolds over the course of adolescence and young adulthood, creates a period of special vulnerability to suboptimal decision making in middle adolescence, when sensation-seeking is high and self-control is still maturing (Casey, Getz, & Galvan, 2008; Steinberg, 2008). Consistent with this account, a recent study of age differences in sensation-seeking and impulsivity found that the former increases between ages 10 and 15 and then declines, whereas the latter drops linearly from preadolescence through young adulthood (Steinberg et al., 2008). Similarly, compared to individuals 17 and older, when offered the choice between a smaller immediate reward and a larger delayed one, younger adolescents evince a relatively stronger preference for the former (Steinberg et al., 2009). The notion that adolescents, relative to children or adults, may be especially sensitive to the possible positive consequences of risk taking is consistent with functional magnetic resonance imaging (fMRI) studies of activation of the nucleus accumbens, a subcortical brain structure known to play a central role in reward processing. For example, in a recent study in which participants learned to associate a visual stimulus with a monetary reward, Galvan et al. (2006) found that adolescents (ages 13–17) showed a more vigorous nucleus accumbens response to reward compared to children (ages 7–11) or adults (ages 23–29). Thus there is good reason to hypothesize that adolescents engage in more risky behavior than do younger or older individuals in part because adolescents’ decision making is more influenced than adults’ by the potential immediate rewards of the risky activity (Millstein & Halpern-Felsher, 2002).

Risk taking is influenced not only by reward-seeking, however. In any situation in which an individual is contemplating a risky activity, the decision also may be influenced by its potential costs. Although less is known about age differences in sensitivity to costs than about age differences in sensitivity to rewards, there is some evidence that the brain systems that govern harm avoidance in anticipation of adverse outcomes mature later than those that subserve reward-seeking (Ernst, Pine, & Hardin, 2005). In a study comparing adolescents’ (ages 9–17) and adults’ (ages 20–40) neural responses to reward receipt and omission, Ernst, Jazbec, et al. (2005) found that adults, but not adolescents, exhibited significant suppression of the amygdala, part of the harm avoidance system, in response to reward omission. In a different study comparing adolescents to adults, Bjork et al. (2004) found that adults activated more brain areas than did adolescents when notified of a monetary loss; it is important to note that adults, but not adolescents, responded to loss in the medial prefrontal cortex, an area involved in guiding affective decision making (Bechara, Damasio, & Damasio, 2000). It appears, then, that whereas adolescents are more likely than adults to engage in reward-seeking in response to the anticipated benefits of a decision with an uncertain outcome, adults have a greater propensity than adolescents to evince harm avoidance in response to nonreceipt of reward or the prospect of punishment. The possibility that age-related changes in sensitivity to potential costs and benefits may follow different developmental trajectories is consistent with an extensive body of work showing that these processes are subserved by overlapping but distinct neural circuitry, with the ventral striatum (and especially, the nucleus accumbens) playing a more important role in reward processing and the amygdala playing a more central role in punishment processing (Ernst & Spear, 2009). The orbitofrontal cortex, which has a protracted developmental timeline (Giedd et al., 1999; Gogtay et al., 2004; Sowell et al., 2003; Sowell, Thompson, Holmes, Jernigan, & Toga, 1999), serves to modulate responses in these subcortical regions and organize emotional inputs to determine a behavioral response (Bechara et al., 2000).

Studying age differences in decision making under conditions of uncertainty poses a considerable challenge for psychologists, for several reasons. First, because there are age differences in exposure to situations in which decisions must be made (e.g., young adolescents are not permitted to drive or purchase alcohol, which limits their opportunity to decide to drive recklessly or binge drink), it is not enough to merely ask individuals if they have ever engaged in specific risky behaviors. Second, because individuals often gain experience with various risky activities with age and may base their subsequent decisions on personal experiences (e.g., a young adult who has had unprotected sex multiple times but never contracted a sexually transmitted disease, or who has driven while drunk and not had an accident, may come to view these activities as only minimally risky), simply asking individuals whether they believe an activity is risky may yield misleading conclusions about risk perception more generally. Finally, and most important for the present article, most measures of decision making that involve uncertainty are not able to distinguish between the influence of attentiveness to potential rewards and that of inattentiveness to potential costs, either of which would lead to greater risk taking (but see Bjork et al., 2004, and Levin, Weller, Pederson, & Harshman, 2007, for examples of research that has examined age differences in sensitivity to reward and punishment as separate constructs). In order to overcome these challenges, one must employ a task in which the decision-making activity under conditions of uncertainty is equally unfamiliar to people of different ages and that yields independent measures of sensitivity to reward and sensitivity to cost. The variant of the Iowa Gambling Task used in the present study is one such instrument.
The Iowa Gambling Task

In the present article, we examine age differences in affective decision making using a version of the Iowa Gambling Task (IGT; Bechara, Damasio, Damasio, & Anderson, 1994) that was modified to allow for the separate assessment of decisions in response to positive versus negative feedback. The IGT was designed to approximate real-life decision making under conditions of uncertainty. In the IGT (both the original version and the modification used in the present study), a participant is presented with four decks of cards, each of which contains cards that reward or punish the player by adding or subtracting points or amounts of money from his or her account. Two of the decks lead to net increases over the course of repeated play (the advantageous decks) while the other two lead to net losses (the disadvantageous decks). The player is instructed to maximize his or her winnings, which requires determining which decks will lead to long-term gains and which to long-term losses. In most studies, researchers track the net difference between the number of draws from advantageous decks and the number of draws from disadvantageous decks over time and view an increase in this net score as evidence of improved performance.

The IGT was initially developed as a way of assessing cognitive–affective deficits in adults with lesions of the medial prefrontal cortex, who tend to exhibit normal cognitive functioning in some respects but who are highly impaired in their decision making in social and emotional contexts (Anderson, Bechara, Damasio, Tranel, & Damasio, 1999). Whereas normal adults learn over time which decks are advantageous and shift toward playing preferentially from those decks, adults with lesions in the ventromedial region persist in drawing from disadvantageous decks, a pattern that is generally interpreted as favoring immediate gratification at the expense of longer term adverse consequences (Anderson et al., 1999; Bechara et al., 1994; Damasio, 1994). Importantly, the deck payoff schedules in the IGT are intended to be too complicated for participants to readily discern them. Consequently, participants must rely, at least in part, on emotion-based signals to guide their decision making (Bechara, Damasio, Tranel, & Damasio, 1997). The failure of patients with ventromedial brain damage to shift toward decks that yield long-term gains suggests that this prefrontal region plays a critical role in utilizing emotional information to guide decision making, although it is likely that other cortical and subcortical brain regions influence IGT performance as well.

In light of compelling evidence that the prefrontal cortex continues to mature throughout adolescence and well into young adulthood (Giedd et al., 1999; Gogtay et al., 2004; Sowell et al., 1999, 2003), one would expect to find age-related improvement during adolescence in performance on tasks, such as the IGT, that rely (at least in part) on prefrontal regions. A handful of studies have investigated developmental differences on the IGT and their results, so far, support this conjecture. For example, Crone and van der Molen (2004), using a child-friendly variant of the IGT, found that advantageous decision making on the IGT increased with age, such that adults (ages 18–25) learned to distinguish advantageous and disadvantageous choices more readily than did adolescents (ages 13–15) who, in turn, outperformed younger children (ages 6–9 and 10–12). Notably, however, this study did not include participants between the ages of 15 and 18, which, as we mentioned earlier, is the period during which real-world risk taking is generally highest. The relation between age and IGT performance does not appear to be mediated by age-related differences in other cognitive abilities such as working memory, inhibitory control, or inductive reasoning. Hooper, Luciana, Conklin, and Yarger (2004) investigated the relation of response inhibition (on a go/no-go task) and working memory capabilities (using digit-span recall) to IGT performance in 9- to 17-year-olds. In addition to replicating the finding that IGT performance improves with age, this study found that IGT performance was unrelated to response inhibition or working memory, even after controlling for age, gender, and intelligence. Similarly, Crone and van der Molen (2004) found that age predicted task performance on their version of the IGT, even when covarying scores on Raven’s Standard Progressive Matrices, which assesses working memory and inductive reasoning skills. Thus, decision making on the IGT appears to activate prefrontal processes distinct from other aspects of executive function, and observed age differences in task performance are consistent with the notion that age differences in risk taking, which is often preceded in real life by affective decision making, may have emotional and social, rather than cognitive, underpinnings.

Focus of the Current Study

The current study extends the existing literature on age differences in IGT performance in several ways. First, in contrast to samples in previous studies, our sample includes a continuous range of ages that spans preadolescence through the entire decade of the 20s. Because prefrontal regions of the brain, including the ventromedial area, continue to develop into the third decade of life, it is important to include a sample that extends beyond late adolescence in studies employing tasks designed to index frontal lobe functioning. As such, the results of our study may provide a more complete picture of the developmental course of affective decision making.

Second, there is evidence from at least one IGT study (Crone, Bunge, Latenstein, & van der Molen, 2005) and several fMRI studies (e.g., Ernst, Jazbec, et al., 2005) that sensitivity to variations in reward develops earlier than sensitivity to variations in punishment. In the IGT, the advantageous decks yield greater net rewards and the disadvantageous decks yield greater net costs. Most versions of the IGT are designed so that the selection of advantageous decks and the avoidance of disadvantageous decks are not independent, however. Typically, performance is measured only in terms of changes in individuals’ net scores (i.e., changes in the difference between the number of plays from advantageous decks and the number from disadvantageous decks) or in terms of the absolute number of selections from advantageous decks. Such measures cannot distinguish between improvements that are attributable to an increase in the attractiveness of advantageous decks versus those that are attributable to an increase in the aversiveness of disadvantageous ones, either of which will lead to better performance over time. In contrast, because our adaptation of the IGT permits independent quantification of these two processes (see below), we are able to operationalize changes in task performance in three distinct ways: net score (advantageous choices minus disadvantageous choices), approach behavior (i.e., changes in the percentage of plays from just the advantageous decks over the course of the task), and avoidance behavior (i.e., changes in the
percentage of plays from just the disadvantageous decks over the course of the task). Specifically, we predict that adolescents will learn more quickly to play from the advantageous decks (i.e., approach) whereas that adults will learn more quickly to eschew playing from the disadvantageous decks (i.e., avoidance).

Finally, our version of the IGT also ensures that age differences in performance are not driven simply by age differences in willingness to explore the four different decks. In the standard version of the IGT, individuals can chose any of the four decks on every trial. A potential problem with this approach is that age differences in performance could result from younger children playing perseveratively from the same deck, instead of sampling more broadly. Past research has not ruled out the possibility that observed age differences in IGT performance might be at least partially mediated by age-related search strategies rather than being attributable to age-related differences in responses to the information presented on the cards. To address this issue, we used a modified version of the IGT, modeled on that of Peters and Slovic (2000), in which an individual is given the opportunity to play or pass from each deck equally often. This play/pass modification prevents groups of participants from differentially ignoring certain decks while attending to others.

Method

Participants

To enhance ethnic and geographic diversity, the study employed five data collection sites: Denver, CO; Irvine, CA; Los Angeles, CA; Philadelphia, PA; and Washington, DC. The original sample included 935 individuals between the ages of 10 and 30 years, recruited to yield an age distribution designed both to facilitate the examination of age differences within the adolescent decade and to compare adolescents of different ages with three specific groups of young adults: (a) individuals of traditional college age (who in some studies of risk taking behave in ways similar to adolescents; Gardner & Steinberg, 2005), (b) individuals who are no longer adolescents but who still are at an age during which brain maturation is continuing, presumably in regions that subserve risk processing (Giedd et al., 1999), and (c) individuals who are older than this putatively still-maturing group. Of the original 935 participants, 34 were dropped due to missing data on one or more of the study variables. In order to have cells with sufficiently large and comparably sized subsamples for purposes of some data analyses, age groups were created as follows: 10–11 years (n = 108), 12–13 years (n = 129), 14–15 years (n = 122), 16–17 years (n = 139), 18–21 years (n = 147), 22–25 years (n = 135), and 26–30 years (n = 121).

The sample was evenly split between males (49%) and females (51%) and was ethnically diverse, with 29% African American, 24% White, 22% Hispanic, 15% Asian, and 10% other. Participants were predominantly working- and middle-class. Each site contributed an approximately equal number of participants, although site contributions to ethnic groups were disproportionate, reflecting the ethnic composition of each site. Table 1 shows the demographic characteristics of the sample as a whole, as well as within each site.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total sample (N = 901)</th>
<th>Denver, CO (n = 102)</th>
<th>Washington, DC (n = 186)</th>
<th>Irvine, CA (n = 206)</th>
<th>Los Angeles, CA (n = 198)</th>
<th>Philadelphia, PA (n = 209)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex, %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>49.1</td>
<td>52.9</td>
<td>50.8</td>
<td>48.5</td>
<td>55.1</td>
<td>48.3</td>
</tr>
<tr>
<td>Females</td>
<td>50.9</td>
<td>47.1</td>
<td>49.2</td>
<td>51.5</td>
<td>44.9</td>
<td>51.7</td>
</tr>
<tr>
<td>Age, M (SD)</td>
<td>17.9 (5.6)</td>
<td>18.3 (5.7)</td>
<td>18.0 (5.8)</td>
<td>18.1 (5.8)</td>
<td>17.8 (5.6)</td>
<td>17.7 (5.2)</td>
</tr>
<tr>
<td>Age, n</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10–11 years</td>
<td>108</td>
<td>11</td>
<td>24</td>
<td>27</td>
<td>31</td>
<td>15</td>
</tr>
<tr>
<td>12–13 years</td>
<td>129</td>
<td>14</td>
<td>28</td>
<td>32</td>
<td>21</td>
<td>34</td>
</tr>
<tr>
<td>14–15 years</td>
<td>122</td>
<td>14</td>
<td>26</td>
<td>26</td>
<td>21</td>
<td>35</td>
</tr>
<tr>
<td>16–17 years</td>
<td>139</td>
<td>16</td>
<td>21</td>
<td>24</td>
<td>37</td>
<td>41</td>
</tr>
<tr>
<td>18–21 years</td>
<td>147</td>
<td>17</td>
<td>29</td>
<td>34</td>
<td>35</td>
<td>32</td>
</tr>
<tr>
<td>22–25 years</td>
<td>135</td>
<td>16</td>
<td>31</td>
<td>33</td>
<td>26</td>
<td>29</td>
</tr>
<tr>
<td>26–30 years</td>
<td>121</td>
<td>14</td>
<td>27</td>
<td>30</td>
<td>27</td>
<td>23</td>
</tr>
<tr>
<td>Race/ethnicity, %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>29.2</td>
<td>23.5</td>
<td>43.5</td>
<td>1.5</td>
<td>21.7</td>
<td>53.6</td>
</tr>
<tr>
<td>Asian</td>
<td>15.4</td>
<td>2.0</td>
<td>5.9</td>
<td>24.8</td>
<td>30.8</td>
<td>6.7</td>
</tr>
<tr>
<td>Hispanic</td>
<td>21.6</td>
<td>13.7</td>
<td>5.4</td>
<td>42.7</td>
<td>38.4</td>
<td>3.3</td>
</tr>
<tr>
<td>White</td>
<td>24.1</td>
<td>45.1</td>
<td>30.6</td>
<td>20.9</td>
<td>6.1</td>
<td>28.2</td>
</tr>
<tr>
<td>Other</td>
<td>9.7</td>
<td>15.7</td>
<td>14.5</td>
<td>10.2</td>
<td>3.0</td>
<td>8.1</td>
</tr>
<tr>
<td>Socioeconomic status, M (SD)a</td>
<td>12.6 (2.0)</td>
<td>12.6 (1.7)</td>
<td>13.3 (1.5)</td>
<td>12.5 (2.5)</td>
<td>12.0 (2.3)</td>
<td>12.8 (1.1)</td>
</tr>
</tbody>
</table>

Note. Due to rounding error, the race/ethnicity columns do not total perfectly to 100.
aEducational attainment was used as a proxy for socioeconomic status, where 13 = some college.
neighborhoods targeted to have an average household education level of “some college” according to 2000 U.S. Census data. Individuals who were interested in the study were asked to call the research office listed on the flyer. Members of the research team described the nature of the study to the participant over the telephone and invited those who were able to read and understand English to participate. Given this recruitment strategy, it was not possible to know how many participants saw the advertisements, what proportion responded, and whether those who responded are different from those who did not.

Data collection took place either at one of the participating university’s offices or at a convenient location in the community. Before beginning, participants were provided verbal and written explanations of the study, their confidentiality was assured, and their written consent or assent was obtained. For participants who were under the age of 18, informed consent was obtained from either a parent or guardian.

Participants completed a 2-hr assessment that consisted of a series of computerized tasks, a set of computer-administered self-report measures, a demographic questionnaire, several computerized tests of general intellectual function (e.g., digit span, working memory), and an assessment of IQ. The tasks were administered in individual interviews. Research assistants were present to monitor the participant’s progress, read aloud the instructions as each new task was presented, and provide assistance as needed. To keep participants engaged in the assessment, participants were told that they would receive $35 for participating in the study and that they could obtain up to a total of $50 (or, for the participants under 14, an additional prize of approximately $15 in value) based on their performance on the video tasks. In actuality, we paid all participants ages 14–30 the full $50, and all participants ages 10–13 received $35 plus the prize. This strategy was used to increase the motivation to perform well on the tasks but ensure that no participants were penalized for their performance. All procedures were approved by the institutional review board of the university associated with each data collection site.

Measures

Of central interest in the present analyses are our demographic questionnaire, the assessment of IQ, and a modified version of the Iowa Gambling Task.

Demographics. Participants reported their age, gender, ethnicity, and household education. Individuals under 18 reported their parents’ education, whereas participants 18 and older reported their own educational attainment (used as a proxy for socioeconomic status [SES]). The age groups did not differ with respect to gender or ethnicity but did differ (modestly) with respect to household education, with older participants reporting slightly higher levels of education ($r = .11, p < .01$). Accordingly, all analyses controlled for SES.

Intelligence. The Wechsler Abbreviated Scale of Intelligence (WASI) Full-Scale IQ Two-Subtest (Psychological Corporation, 1999) was used to produce an estimate of general intellectual ability based on two (Vocabulary and Matrix Reasoning) out of the four subtests. The WASI can be administered in approximately 15 min and is correlated with the Wechsler Intelligence Scale for Children ($r = .81$) and the Wechsler Adult Intelligence Scale ($r = .87$). It has been normed for individuals between the ages of 6 and 89 years. Because there were small but significant differences between the age groups in IQ, this variable was controlled in all subsequent analyses.

Modified Iowa Gambling Task. The Iowa Gambling Task (Bechara et al., 1994) was modified such that participants made a play/pass decision with regard to one of four decks preselected on each trial, rather than choosing to draw from any of four decks on any trial, as in the original task. This type of modification has been shown to be more sensitive to individual differences in performance because of the ability to determine the independent effects of gains and losses on subsequent card selection (Peters & Slovic, 2000). Also, as noted earlier, forcing participants to make decisions about each deck in a pseudorandom order eliminates the possibility that individuals will employ different search strategies across the decks, as is possible with the original version of the task. In addition to modifying the response option (i.e., play/pass), we also modified the outcome feedback, such that participants received information on the net gain or loss associated with a card, rather than information on both a gain and the loss separately (Bechara et al., 1994). For example, if in the original IGT the choice of Deck A led to a card indicating (simultaneously) a $100 gain and a $250 loss, the outcome shown in our modified version of the task would be a $150 loss. This modification was made to equate working memory loads across age groups during feedback and also to ensure that participants did not unequally weight the rewards and punishments within a given trial.

In our modification of the IGT, individuals attempt to earn pretend money by playing or passing cards from four different decks, presented on the computer screen. (Although the money is not real, recall that participants are told that they will receive a bonus payment that is real at the end of the experiment on the basis of their performance.) For each trial, one of the four decks was highlighted with an arrow, and participants were given 4 s in which to decide to play or pass that card. A running total of the participant’s “earnings” appeared on each screen. If participants passed on a given card, the image of the card on the screen displayed the message “Pass” and the total amount of money earned did not change. If participants chose to play, a monetary outcome was displayed on the current card and the total amount of money earned was updated. The payoff schedules for each deck reflected the net outcomes of the original IGT. As in the original task, two of the decks are advantageous and result in a monetary gain over repeated play. The other two decks are disadvantageous and produce a net loss over repeated play. In addition, within each type of deck (advantageous vs. disadvantageous), there is one deck in which the losses experienced are infrequent but relatively large, and one in which they are consistent and relatively small. See Table 2 for a complete description of the deck characteristics. The task was administered in six blocks of 20 trials each.

Performance on the IGT was operationalized in three ways: percentage good plays, percentage bad plays, and net score. In order to gauge participants’ tendency to shift toward playing (rather than passing) when presented with an advantageous deck, we created an outcome measure called “percentage good plays” that was calculated by dividing the number of times a person played from advantageous decks during a given task block by the total number of times they were presented with advantageous decks during that block. The quotient was then multiplied by 100.
Table 2

<table>
<thead>
<tr>
<th>Payoff variable</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payoff range</td>
<td>−$250 to $100</td>
<td>−$1,150 to $100</td>
<td>−$25 to $50</td>
<td>−$200 to $50</td>
</tr>
<tr>
<td>Probability of gain</td>
<td>.50</td>
<td>.90</td>
<td>.50</td>
<td>.90</td>
</tr>
<tr>
<td>Probability of loss</td>
<td>.50</td>
<td>.10</td>
<td>.25</td>
<td>.10</td>
</tr>
<tr>
<td>Probability of $0 payoff</td>
<td>.00</td>
<td>.00</td>
<td>.25</td>
<td>.00</td>
</tr>
<tr>
<td>First trial where loss (potentially) occurs</td>
<td>3rd</td>
<td>10th</td>
<td>13th</td>
<td>10th</td>
</tr>
<tr>
<td>Expected value*</td>
<td>−$25</td>
<td>−$25</td>
<td>$18.75</td>
<td>$25</td>
</tr>
</tbody>
</table>

a The expected value of a deck is equivalent to its average payoff.

Results

Because we were interested in examining how performance on the IGT changed over the course of the six blocks, data were analyzed with multilevel modeling (using PROC MIXED in SAS Version 9 for Windows). This approach allows us to examine both how an individual’s performance (within-subject) changes between the beginning and end of the task and how different groups’ performance trajectories differ from one another (between subjects)—for example, whether the performance of 21-year-olds improves more rapidly than that of 14-year-olds. To our knowledge, only one other study (of 30 undergraduate students) has used this approach to analyze IGT performance (Zermatten, Van der Linden, d’Acremont, Jermann, & Bechara, 2005).

Before conducting analyses, the raw data were examined to evaluate the response patterns for each of the four decks separately. As expected, the patterns in the data revealed that the majority of participants learned over time to play from the advantageous decks and to stop playing from the disadvantageous decks (see Figure 1). Based on these findings, the remaining analyses collapsed across same-type decks. In addition, the means and standard deviations were examined for each of the variables by age (see Table 3), and correlations among the predictor variable (age), the control variables (IQ and SES), and the outcome variables measured at Block 6 (the final task block) were computed (see Table 4). Interestingly, age was linearly related to net score and percentage bad plays (inversely) but not to percentage good plays (although, as we report in a later section, there was a significant curvilinear relation between age and percentage good plays). IQ was related to all three outcomes in the anticipated direction, whereas SES (like age) was related only to net score and percentage bad plays, with higher SES predicting higher net score and fewer bad plays on Block 6.

Building the Multilevel Model of Change in Net Score

As a first step in examining performance (in terms of net score) on the IGT, we estimated an unconditional means model wherein net score was constrained to be constant over time and people were allowed to differ only in their overall performance, averaged across task block. This model allowed us to calculate the intraclass correlation, \( p \), which is the proportion of total variability in the outcome that is between (versus within) subjects. If none of the variability observed in net score were attributable to between-subjects variation, there would be no point in asking whether subjects of different ages evinced different trajectories of performance. We found that 22% of the variability in net score was between subjects and 78% was within

---

Footnote: 1 Models estimating the percentage of plays for Decks A and B separately reveal that age is linearly associated with slope for both decks; however, the association is greater for Deck B \( (B = -0.28, CI = -0.37, -0.20, p < .001) \) than for Deck A \( (B = -0.09, CI = -0.17, -0.00, p < .05) \). Because Deck B is characterized by $100 wins punctuated by large ($1,150) but low-probability losses, this finding is consistent with the notion that sensitivity to magnitude of punishment increases with age, a finding that has emerged in other research as well (e.g., Crone et al., 2005; Levin et al., 2007).
subjects, and as such we proceeded with examining differences in performance based on age.

Next, to determine how much of the within-subject portion of the variability in net score could be attributed to learning from experience, we added time, in the form of task blocks (1–6), to the model predicting net score. Inclusion of time in the model resulted in substantially improved model fit, $\Delta -2LL(3) = -944.7$, $p < .001$. Comparison of the within-subject variability in the current model to that of the prior model (excluding time) revealed that linear change in net score over the course of the task accounted for 25% of within-subject variability in net score. Because we were more interested in individual differences in net score at the end of the task than at the beginning of the task, we centered the time variable such that the intercept for the models corresponded to Block 6. The Level 1 and 2 equations for the unconditional growth model, predicting net score for individual $i$ at task block $j$, were

Level 1: $\text{NET SCORE}_{ij} = \pi_{i0} + \pi_{i1}(\text{TASK BLOCK}_{ij}) + \epsilon_{ij}$

Level 2: $\pi_{i0} = \gamma_{00} + \zeta_{i0}$

$\pi_{i1} = \gamma_{10} + \zeta_{i1}$

where $\pi_{i0}$ is the estimated intercept (net score on Block 6), $\pi_{i1}$ is the estimated linear rate of change in net score (slope) across the task for individual $i$, and $\epsilon_{ij}$ represents random error for individual $i$ at a given time point $j$. In the unconditional growth model, $\gamma_{00}$ is the population average initial status (or intercept)—the average net score on Block 6 of the IGT—and $\gamma_{10}$ is the population average rate of change (or slope)—the average rate of change in net score across the six blocks of the IGT; $\zeta_{i0}$ and $\zeta_{i1}$ represent individual $i$’s discrepancy in initial status and slope, respectively, from the population average values of these growth parameters.

In this model, with time (i.e., task block) as the only predictor of net score, the mean intercept was 18.32 ($SE = 0.84$, $p < .001$), which was significantly greater than zero. Thus, by the end of the task, participants were more likely to play when presented with an advantageous deck than when presented with a disadvantageous deck. Rate of change in net score across the six blocks of the task was 3.47 ($SE = 0.20$, $p < .001$), meaning that there was improvement in net score over the course of the task. Next, our control variables, IQ and SES, were added to the model, and this resulted in further improvement in the model’s global fit, $\Delta -2LL(4) = -118.3$, $p < .001$.

### Age Trends in Net Score

To determine whether age had a significant impact on performance (controlling for IQ and SES), we added age (as a continuous variable) to our model. Thus, our equation for this model was as follows:

![Figure 1. Percentage of trials on which participants played (rather than passed) on each block for each deck by age group.](image-url)
Level 1: \[ \text{NET SCORE}_{ij} = \pi_{0i} + \pi_{1i}(\text{TASK BLOCK}_i) + \epsilon_{ij} \quad (4) \]

Level 2: \[ \pi_{0i} = \gamma_{00} + \gamma_{01}(\text{IQ}_i) + \gamma_{02}(\text{SES}_i) + \gamma_{03}(\text{AGE}_i) + \xi_{0i} \quad (5) \]
\[ \pi_{1i} = \gamma_{10} + \gamma_{11}(\text{IQ}_i) + \gamma_{12}(\text{SES}_i) + \gamma_{13}(\text{AGE}_i) + \xi_{1i} \quad (6) \]

Table 3
Age Differences in IQ, SES, and Iowa Gambling Task Performance

<table>
<thead>
<tr>
<th>Age group</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ages 10–11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Bad plays</td>
<td>74%</td>
<td>21%</td>
</tr>
<tr>
<td>% Good plays</td>
<td>84%</td>
<td>18%</td>
</tr>
<tr>
<td>IQ</td>
<td>101.61</td>
<td>14.53</td>
</tr>
<tr>
<td>Net score</td>
<td>0.10</td>
<td>0.22</td>
</tr>
<tr>
<td>SES*</td>
<td>12.42</td>
<td>2.68</td>
</tr>
<tr>
<td>Ages 12–13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Bad plays</td>
<td>73%</td>
<td>19%</td>
</tr>
<tr>
<td>% Good plays</td>
<td>84%</td>
<td>18%</td>
</tr>
<tr>
<td>IQ</td>
<td>98.11</td>
<td>13.35</td>
</tr>
<tr>
<td>Net score</td>
<td>0.11</td>
<td>0.22</td>
</tr>
<tr>
<td>SES</td>
<td>12.50</td>
<td>2.19</td>
</tr>
<tr>
<td>Ages 14–15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Bad plays</td>
<td>70%</td>
<td>21%</td>
</tr>
<tr>
<td>% Good plays</td>
<td>87%</td>
<td>16%</td>
</tr>
<tr>
<td>IQ</td>
<td>96.20</td>
<td>11.94</td>
</tr>
<tr>
<td>Net score</td>
<td>0.17</td>
<td>0.24</td>
</tr>
<tr>
<td>SES</td>
<td>12.44</td>
<td>2.20</td>
</tr>
<tr>
<td>Ages 16–17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Bad plays</td>
<td>68%</td>
<td>21%</td>
</tr>
<tr>
<td>% Good plays</td>
<td>87%</td>
<td>18%</td>
</tr>
<tr>
<td>IQ</td>
<td>95.71</td>
<td>12.36</td>
</tr>
<tr>
<td>Net score</td>
<td>0.20</td>
<td>0.24</td>
</tr>
<tr>
<td>SES</td>
<td>12.61</td>
<td>1.86</td>
</tr>
<tr>
<td>Ages 18–21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Bad plays</td>
<td>65%</td>
<td>24%</td>
</tr>
<tr>
<td>% Good plays</td>
<td>89%</td>
<td>14%</td>
</tr>
<tr>
<td>IQ</td>
<td>98.34</td>
<td>12.00</td>
</tr>
<tr>
<td>Net score</td>
<td>0.23</td>
<td>0.27</td>
</tr>
<tr>
<td>SES</td>
<td>12.50</td>
<td>1.70</td>
</tr>
<tr>
<td>Ages 22–25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Bad plays</td>
<td>64%</td>
<td>28%</td>
</tr>
<tr>
<td>% Good plays</td>
<td>85%</td>
<td>19%</td>
</tr>
<tr>
<td>IQ</td>
<td>100.86</td>
<td>13.40</td>
</tr>
<tr>
<td>Net score</td>
<td>0.20</td>
<td>0.31</td>
</tr>
<tr>
<td>SES</td>
<td>12.95</td>
<td>1.17</td>
</tr>
<tr>
<td>Ages 26–30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Bad plays</td>
<td>64%</td>
<td>26%</td>
</tr>
<tr>
<td>% Good plays</td>
<td>88%</td>
<td>17%</td>
</tr>
<tr>
<td>IQ</td>
<td>101.11</td>
<td>14.87</td>
</tr>
<tr>
<td>Net score</td>
<td>0.24</td>
<td>0.29</td>
</tr>
<tr>
<td>SES</td>
<td>13.11</td>
<td>1.72</td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Bad plays</td>
<td>68%</td>
<td>23%</td>
</tr>
<tr>
<td>% Good plays</td>
<td>86%</td>
<td>17%</td>
</tr>
<tr>
<td>IQ</td>
<td>98.75</td>
<td>13.32</td>
</tr>
<tr>
<td>Net score</td>
<td>0.18</td>
<td>0.26</td>
</tr>
<tr>
<td>SES</td>
<td>12.65</td>
<td>1.96</td>
</tr>
</tbody>
</table>

Note. The performance variables were measured on the final task block (Block 6).
*Educational attainment was used as a proxy for socioeconomic status (SES), where 13 = some college.

The model represented by Equations 4, 5, and 6 tested whether the intercept (\( \pi_{0i} \)) and rate of change (\( \pi_{1i} \)) of net score varied as a linear function of IQ, SES, and age.

Adding age to the model revealed that being older was associated with higher net scores at Block 6 as well as faster rates of improvement over time. Every year increase in age (between 10 and 30 years) corresponded, on average, to a 0.75 (confidence interval [CI] = 0.48, 1.03, \( p < .001 \)) increase in net score on Block 6 and a 0.13 (CI = 0.06, 0.20, \( p < .001 \)) increase in the slope. Overall, model fit was improved with the inclusion of the linear age term, \( \Delta -2\text{LL}(2) = -33.8, p < .001 \), which suggests that performance on the IGT is substantially influenced by age.

To test whether age might be related in a curvilinear fashion to net score, we fitted quadratic age terms to the model (accomplished by adding \( \gamma_{0i}(\text{AGE}_i^2) \) to Equation 5 and \( \gamma_{1i}(\text{AGE}_i^2) \) to Equation 6 above); doing so significantly improved the model’s fit, \( \Delta -2\text{LL}(2) = -23.1, p < .001 \). Age had significant quadratic associations with both net score at Block 6 (\( B = -0.11, CI = -0.16, -0.06, p < .001 \)) and with the rate of change in net score across the task (\( B = -0.02, CI = -0.03, -0.01, p < .01 \)). This finding suggests that, while performance (in terms of net score) improves with age, it does so at a faster rate during the early adolescent years compared to later adolescence and young adulthood. Results of the final model are reported in Table 5. To visualize the nature of the curvilinear relationship between age and net score, we graphed the results from the prior model split by the different age groups (see Figure 2). This figure reveals that performance, in terms of net score, peaked in the 18- to 21-year-old age group.

Because we were primarily interested in the slopes for different age groups, it was necessary to ensure that people of different ages did not differ dramatically in performance on the first task block. If, for example, 30-year-olds performed much better than younger participants on the first task block, this would limit the older participants’ ability to improve over the task (i.e., a ceiling effect). To test whether this was the case, we reran the previous model (including the age and age\(^2\) terms) with the intercept set at Block 1. This model revealed only a nonsignificant trend toward net score improving linearly with

\[ \text{To further ensure that search strategy did not drive any age-related differences in performance, we tested whether the tendency to pass (rather than play) during the first block of the task (when the reward and punishment schedules of the decks are still unknown to the participant) accounted for age differences in performance. Including passing during Block 1 and its interaction with age in the model did not eliminate any of the significant linear or quadratic effects of age on net score. The effects of Block 1 passing and its interaction with age were tested in the models for the other two outcome variables as well. Including these terms did not substantively affect the relations between age and performance. Thus, the observed effects of age on IGT performance cannot be explained by differences in search strategy on Block 1. In addition, because we had no theory regarding the effects of ethnicity on IGT performance, we examined all pairwise comparisons among the four main ethnic groups for main effects and Ethnicity \times Age interactions (controlling for IQ and SES) and adjusted our alpha level accordingly. None of the main effects was significant. We did find three significant Ethnicity \times Age interactions, but considered together they did not form a consistent pattern. As a consequence, we did not include ethnicity in any of the models we tested.} \]
Age at Block 1 ($B = 0.17$, CI $=-0.02$, 0.35, $p < .10$). There was no quadratic relation between age and net score on Block 1. Thus, it does not appear that older participants were substantially limited in their capacity to improve their performance over the course of the task compared to younger participants.

**Age Trends in Approach Behavior**

One of the unique advantages of the design of our IGT task is that it permits us to investigate whether there are different age patterns with regard to performance on two aspects of the task—learning to play from the advantageous decks and learning to refrain from playing from the disadvantageous decks. As noted in the introduction, there is evidence that different neural pathways and brain structures may be involved in approach behaviors versus avoidance, so it is possible that these abilities develop at different rates, reaching maturity at distinct ages. To analyze age differences in approach behavior, we built a multilevel model of change analogous to that for net score, but with percentage good plays (i.e., plays from advantageous decks) as the outcome (with IQ and SES controlled). For this outcome, steeper positive slopes indicate better performance with regard to detecting which decks are advantageous.

The results of this model revealed a curvilinear relationship between age and the rate of change in percentage good plays, such that approach behavior peaked in mid- to late adolescence (see Figure 3). The unconditional means and growth models revealed that 37% of variability in percentage good plays was due to between-subjects factors and 19% of within-subject variability was due to the linear effects of task block. As expected, in the model including linear and quadratic age terms (in addition to IQ and SES), the average slope was estimated to be significant and positive ($B = 2.25$, CI $=1.88$, 2.62, $p < .001$), suggesting that participants learned to play (rather than pass) on advantageous decks as the task progressed. Age had significant linear and quadratic effects on the intercept at Block 6 ($B = 0.34$, CI $=0.14$, 0.54, $p < .001$ for linear age; $B = -0.06$, CI $=-0.09$, -0.03, $p < .001$ for quadratic age). Age also had a significant quadratic effect on the rate of change in percentage good plays ($B = -0.02$, CI $=-0.03$, -0.01, $p < .001$), consistent with performance peaking and then declining, rather than increasing steadily with age. Results are reported in Table 5.

To examine whether a ceiling effect for approach behavior was observed for the oldest participants, we reran the previous model with the intercept set at Block 1. This model revealed that older participants were slightly more likely than younger participants to play from advantageous decks in the first task block ($B = 0.34$, CI $=0.15$, 0.53, $p < .001$), which has the potential to create a small ceiling effect on older individuals’ performance. A more definitive sign of a ceiling effect would be nearly perfect performance on Block 6 (the final task block) among the oldest participants. Rerunning the model with age centered at 30 years—the oldest age in the sample—reveals that when presented with an advantageous deck on Block 6, 30-year-olds played 84.56% of the time (on average and controlling for IQ and SES; CI $=81.03$, 88.10); a percentage that differs substantially from 100%. Finally, on Blocks 2 through 6, older participants (ages 22–25 and 26–30) were never more likely than 18- to 21-year-olds (the age range with the steepest slope) to play on 100% of advantageous trials in a block (controlling for IQ and SES; odds ratios ranged from 1.48 [CI $=0.89$, 2.47] for 26- to 30-year-olds on Block 3 to 0.73 [CI $=0.44$, 1.42] for 26- to 30-year-olds on Block 4). Overall, then, it does not appear that older adults’ learning was artificially limited by a ceiling effect.

**Age Trends in Avoidant Behavior**

To analyze age patterns related to avoidant behavior, we built multilevel models of change analogous to those described above, but with percentage bad plays as the outcome (again, with IQ and SES controlled). Here we would expect slopes for rate of change to be negative, as downward slopes indicate increasing reluctance to play from the disadvantageous decks as the task progresses. The estimates for this model (reported in Table 5) revealed a linear age pattern with respect to rate of change in percentage bad plays, such that older participants had steeper slopes, suggesting greater avoidant behavior compared to younger participants (see Figure 3). The unconditional means and growth models revealed that 35% of variability in percentage bad plays was due to between-subjects factors and 27% of within-subject variability was due to the linear effects of task block. As expected, the model including linear and quadratic age terms (in addition to IQ and SES) showed the average slope to be significant and negative ($B = -2.01$, SE $=0.24$, $p < .001$), suggesting that participants learned to avoid playing on the disadvantageous decks as the task progressed. Age had significant linear and quadratic effects on the intercept at Block 6 ($B = -0.72$, SE $=0.14$, $p < .001$ for linear age; $B = 0.05$, SE $=0.02$, $p < .05$ for quadratic age), but, unlike the analysis of change in percentage good plays, the quadratic age term was not significantly related to rate of change in percentage bad plays. Age had only a linear

---

**Table 4**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Net score</th>
<th>% Good plays</th>
<th>% Bad plays</th>
<th>Age</th>
<th>IQ</th>
<th>SES</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Good plays</td>
<td>.48***</td>
<td>—</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Bad plays</td>
<td>-.78***</td>
<td>.18***</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>.17***</td>
<td>.05</td>
<td>-.15***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IQ</td>
<td>.27***</td>
<td>.20***</td>
<td>-.16***</td>
<td>.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SES</td>
<td>.13***</td>
<td>.04</td>
<td>-.11***</td>
<td>.11</td>
<td>.29***</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* The performance variables were measured on the final task block (Block 6). SES = socioeconomic status.

**"** $p < .01$. **"** $p < .001$. 

---
relation to slope in this model (B = −0.18, SE = 0.03, p < .001), with older participants being increasingly less likely than younger participants to play from the disadvantageous decks as the task progressed (B = −0.18, SE = 0.03, p < .001).

Examining Sex Differences in IGT Performance

Because previous research has produced mixed results with regard to sex effects on IGT performance, we were interested in examining whether sex influenced the level or slope of performance and whether sex interacted with age (linearly or curvilinearly) to predict the intercept or slope of performance for each of our three IGT outcomes. To test this, we added six terms—sex, Sex × Age, Sex × Age², Sex × Block, Sex × Age × Block, and Sex × Age² × Block—to each of the models used to examine age effects on net score, approach behavior, and avoidant behavior. As before, the intercepts for the models were centered at Block 6. Females served as the reference group.

Net score. Results revealed no significant sex differences in the intercept of net score (B = −0.69, CI = −5.06, 3.69, p = ns) or in slope (B = 0.00, CI = −1.10, 1.10, p = ns). Nor did sex moderate the

Table 5
Results of Fitting Final Models Predicting Net Score, Percentage Good Plays, and Percentage Bad Plays, Controlling SES and IQ

<table>
<thead>
<tr>
<th>Fixed effects</th>
<th>Net score</th>
<th>Percentage good plays</th>
<th>Percentage bad plays</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coeff.</td>
<td>95% CI</td>
<td>Coeff.</td>
</tr>
<tr>
<td>Level (Block 6, πᵦ)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>γ₀₀</td>
<td>22.9***</td>
<td>20.67, 25.12</td>
</tr>
<tr>
<td>IQ</td>
<td>γ₀₁</td>
<td>0.55***</td>
<td>0.43, 0.67</td>
</tr>
<tr>
<td>SES</td>
<td>γ₀₂</td>
<td>0.72</td>
<td>−0.10, 1.53</td>
</tr>
<tr>
<td>Age</td>
<td>γ₀₃</td>
<td>1.06***</td>
<td>0.76, 1.37</td>
</tr>
<tr>
<td>Age²</td>
<td>γ₀₄</td>
<td>−0.11***</td>
<td>−0.16, −0.06</td>
</tr>
<tr>
<td>Rate of change, π₁,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>γ₁₀</td>
<td>4.25***</td>
<td>3.70, 4.81</td>
</tr>
<tr>
<td>IQ</td>
<td>γ₁₁</td>
<td>0.08***</td>
<td>0.05, 0.11</td>
</tr>
<tr>
<td>SES</td>
<td>γ₁₂</td>
<td>0.16</td>
<td>−0.04, 0.37</td>
</tr>
<tr>
<td>Age</td>
<td>γ₁₃</td>
<td>0.18***</td>
<td>0.10, 0.26</td>
</tr>
<tr>
<td>Age²</td>
<td>γ₁₄</td>
<td>−0.02**</td>
<td>−0.03, −0.01</td>
</tr>
<tr>
<td>Variance components</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within-subject</td>
<td>σ₂</td>
<td>322.44***</td>
<td>307.54, 337.34</td>
</tr>
<tr>
<td>In initial status</td>
<td>σ₀</td>
<td>373.17***</td>
<td>322.50, 423.84</td>
</tr>
<tr>
<td>In rate of change</td>
<td>σ₁</td>
<td>15.77***</td>
<td>12.50, 19.04</td>
</tr>
<tr>
<td>Covariance</td>
<td>σ₀₁</td>
<td>73.87***</td>
<td>61.84, 85.90</td>
</tr>
<tr>
<td>ΔPseudo R² for addition of age variables</td>
<td>0.023</td>
<td>0.013</td>
<td>0.014</td>
</tr>
<tr>
<td>Pseudo R² for the model</td>
<td>0.115</td>
<td>0.074</td>
<td>0.055</td>
</tr>
</tbody>
</table>

Note. N = 901. Age was centered at 18, IQ at 100, and socioeconomic status (SES) at 13 (some college, where educational attainment is used as a proxy for SES). Coeff. = coefficient; CI = confidence interval.
* p < .05. ** p < .01. *** p < .001.
linear or quadratic relations between age and the intercept or slope of net score.

**Approach behavior.** There was a significant effect of sex on the intercept of percentage good plays, such that male participants played more often than female participants when presented with advantageous decks ($B = 3.01, CI = 0.14, 5.89, p < .05$). There was no significant effect of sex on slope, however ($B = 0.30, CI = -0.43, 1.03, p = ns$), suggesting that male participants’ greater tendency to play on advantageous decks remained consistent throughout the task. Sex did not moderate the linear or curvilinear relations between age and the intercept or slope of percentage good plays.

**Avoidant behavior.** Results revealed no significant main effect of sex on percentage bad plays, although there was a trend toward male participants playing more often than female participants when presented with disadvantageous decks ($B = 3.70, CI = -0.31, 7.71, p < .10$). Although this finding is significant only at a trend level, the greater tendency of males to play on both advantageous and disadvantageous decks likely explains why no significant sex differences were found in net score. There was a trend toward sex moderating the effect of age on the intercept of percentage bad plays ($B = 0.50, CI = -0.06, 1.06, p < .10$); age tended to be a better predictor of passing on disadvantageous decks among females than among males. Sex had no significant effect on the slope ($B = 0.30, CI = -0.63, 1.23, p = ns$) nor did sex moderate the linear or curvilinear relation between age and the intercept or slope of percentage bad plays.

In summary, of the 18 terms tested to examine the direct or moderating impact of sex on IGT performance, only one (males playing more often on advantageous decks) explained significant variance in the outcome, and only three more approached significance. More important, none of these terms substantially altered the relation between age and IGT performance.

**Comparing Adolescents’ Performance to Adults’**

Whereas the final models for net score, percentage good plays, and percentage bad plays reveal the overall relation between age and performance on the IGT, we were also interested in determining the age at which adolescents’ performance would be indistinguishable from adults’ performance on these outcomes. Re-estimating the models using age as a categorical variable (with seven levels, ages 10–11, 12–13, 14–15, 16–17, 18–21, 22–25, and 26–30), we conducted four planned contrasts for each outcome variable comparing the performance (operationalized as rate of change) of 10- to 11-year-olds, 12- to 13-year-olds, 14- to 15-year-olds, and 16- to 17-year-olds to the average performance of adults ages 18–30. The results of these contrasts (reported in Table 6) reveal that, in terms of net score, there is no significant age-related improvement in performance after age 13. Thus, if we were to conceptualize IGT performance only with respect to net score, it would appear that by age 14, adolescents’ IGT performance is indistinguishable from that of adults. However, this interpretation obscures significant differences between adults and adolescents in their approach and avoidance behavior.

By examining changes in the percentage of good plays independent of changes in the percentage of bad plays, we were able to chart separate developmental patterns of approach and avoidance behavior. In theory, the more prone a person is to approach behavior, the quicker he or she will be to trust that the advantageous decks are safe, resulting in steeper slopes for these decks. Interestingly, only the middle-to-older adolescents (ages 14–15...
and 16–17) had slopes that differed significantly from adults’ (see Table 6). This indicates that the 14- to 17-year-olds learned faster than both older and younger participants to play from the advantageous decks. To analyze age patterns related to avoidant behavior, we conducted an analysis analogous to the one just described, but with the percentage of bad plays as the outcome. Here we would expect slopes for rate of change to be negative, as downward slopes indicate increasing reluctance to play from the disadvantageous decks as the task progresses. Results indicate that with respect to avoidance, each adolescent age group differed significantly from the adult participants in how quickly they learned to refrain from playing from the disadvantageous decks. The estimated differences in slope between the adolescent age groups and adults mirrors the finding that age is linearly related to the rate of change in percentage bad plays, with the gap in performance between adolescents and adults narrowing with each successively older adolescent age group.

To better understand the relation between age and performance in terms of percentage good versus bad plays, we graphed the slopes for each age group in Figure 3. This figure clearly depicts the curvilinear relation of age to percentage good plays in contrast to the linear relation between age and percentage bad plays. The sum of the slopes is shown as well to help visualize the shift to the linear relation between age and percentage bad plays. The curvilinear relation of age to percentage good plays in contrast to the linear relation between age and percentage bad plays is evident in Figure 3. The difference (Diff.) is in estimated average slope and is calculated as the adult estimate (pooled for 18- to 30-year-olds) minus the adolescent group estimate. Thus, positive estimates indicate that the adults had a more positive (upward) slope and negative estimates indicate that the adolescent group had a more positive slope. CI = confidence interval.

### Discussion

Although middle adolescents engage in many types of risky behaviors more frequently than do adults, laboratory tasks measuring the reasoning skills and cognitive capabilities presumed to affect risky decision making have not found age differences in these abilities after age 15 (Steinberg, 2007). In the present study, we hypothesized that, in contrast to the absence of age differences observed in studies explicitly asking individuals to reason about risk, age differences would be apparent when the outcome of interest is derived from a measure of decision making that is influenced by emotional as well as cognitive factors. In support of this hypothesis, we find that adolescents and adults evince significantly different patterns of approach and avoidance behavior on the Iowa Gambling Task (IGT), a widely used measure of affective decision making.

As expected, we found age differences in performance on the IGT, with younger participants making proportionally more disadvantageous choices relative to older participants. Around 14 years of age, a shift in decision-making strategies was observed, with middle adolescents, late adolescents, and adults, but not younger adolescents (ages 10–13), showing similar overall performance by the final task block. These results replicate the findings of previous studies demonstrating a positive relation between age and IGT performance between childhood and adolescence (Crone et al., 2005; Crone & van der Molen, 2004; Crone, Vendel, & van der Molen, 2003; Hooper et al., 2004). Importantly, our modified IGT task ensures that this age pattern is not due to age-related differences in search strategy.

Our findings extended previous research by demonstrating that adolescents and adults respond to the feedback provided during the IGT in different ways—over time, adolescents played increasingly from the advantageous decks (shifting to these at a faster rate than adults), whereas adults were faster than adolescents to decrease playing from the disadvantageous decks. Affinity for the advantageous decks (approach behavior) peaked in the late adolescent years, and then declined, whereas avoidance of the disadvantageous decks increased linearly with age. These findings suggest that discrete developmental processes may underlie the inclination to play from advantageous decks and the inclination to stop playing from the disadvantageous decks, with the latter process not being fully mature until well after adolescence. Because the oldest participants in our sample were 30, we are unable to determine whether there are further increases in avoidant behavior, or declines in approach behavior, after this age.

One way to interpret affinity for the advantageous decks is as reward sensitivity: when participants play consistently from the advantageous decks, the size of their total winnings increases, which should activate reward-sensitive brain systems. Evidence from fMRI studies indicates that reward processing (e.g., anticipating a reward, gauging the magnitude of a reward, and responding to reward receipt) appears to involve regions known to mature

### Table 6

<table>
<thead>
<tr>
<th>Adolescent age group</th>
<th>Net score Diff.</th>
<th>95% CI</th>
<th>Cohen’s d</th>
<th>Percentage good plays Diff.</th>
<th>95% CI</th>
<th>Cohen’s d</th>
<th>Percentage bad plays Diff.</th>
<th>95% CI</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td>10–11 years</td>
<td>2.81***</td>
<td>1.56, 4.06</td>
<td>0.48</td>
<td>0.18</td>
<td>−0.65, 1.01</td>
<td>0.05</td>
<td>−2.63***</td>
<td>−3.69, −1.57</td>
<td>0.53</td>
</tr>
<tr>
<td>12–13 years</td>
<td>1.60**</td>
<td>0.44, 2.76</td>
<td>0.27</td>
<td>−0.19</td>
<td>−0.96, 0.59</td>
<td>0.05</td>
<td>−1.76**</td>
<td>−2.76, −0.77</td>
<td>0.35</td>
</tr>
<tr>
<td>14–15 years</td>
<td>0.53</td>
<td>−0.66, 1.72</td>
<td>0.09</td>
<td>−0.83*</td>
<td>−1.62, −0.04</td>
<td>0.21</td>
<td>−1.36**</td>
<td>−2.37, −0.34</td>
<td>0.27</td>
</tr>
<tr>
<td>16–17 years</td>
<td>0.32</td>
<td>−0.82, 1.45</td>
<td>0.05</td>
<td>−0.93*</td>
<td>−1.69, −0.18</td>
<td>0.24</td>
<td>−1.25</td>
<td>−2.22, −0.28</td>
<td>0.25</td>
</tr>
</tbody>
</table>

Note. The difference (Diff.) is in estimated average slope and is calculated as the adult estimate (pooled for 18- to 30-year-olds) minus the adolescent group estimate. Thus, positive estimates indicate that the adults had a more positive (upward) slope and negative estimates indicate that the adolescent group had a more positive slope. CI = confidence interval.

* p < .05. ** p < .01. *** p < .001.
during the age period studied here—the ventral striatum (especially the nucleus accumbens) as well as the orbitofrontal cortex (Bjork et al., 2004; Delgado, Nystrom, Fissell, Noll, & Fiez, 2000; Ernst, Jazbec, et al., 2005; Knutson, Adams, Fong, & Hommer, 2001; May et al., 2004)—although maturation of these regions may follow slightly different timetables. In the Galvan et al. (2006) reward processing study discussed earlier, although adolescents showed more nucleus accumbens activation than did children, adolescents’ overall level of orbitofrontal cortex activity was more child-like than adult-like. The maturation in adolescence of the nucleus accumbens-driven “appetitive system” prior to the full development of the orbitofrontal “control system” (Galvan et al., 2006) may account for our finding of a peak in reward sensitivity during adolescence, at least as evidenced on the IGT.

Another possible interpretation of learned preference for the advantageous decks is that it reflects approach behavior; when participants play repeatedly from the advantageous decks, they are demonstrating confidence that they are not likely to sustain a large loss. In addition to playing a role in anticipating, acknowledging, and gauging the magnitude of reward, the nucleus accumbens has been theorized to affect approach behavior by motivating individuals to act (Cardinal, Parkinson, Hall, & Everitt, 2002; Ernst, Jazbec, et al., 2005); thus, the findings of greater nucleus accumbens response in adolescents reported by Galvan et al. (2006) could indicate that adolescents have stronger approach tendencies than do adults. Taken together with the finding that adults, but not adolescents, evince an amygdala response to the nonreceipt of an anticipated reward (Ernst, Jazbec, et al., 2005), it may be that adults are initially more wary than adolescents of the advantageous decks, whose payoffs are smaller on most trials than payoffs on the disadvantageous decks. The amygdala is thought to play an important role in the processing of potential threats, such as monetary punishment, and in initiating avoidant behavioral responses (LeDoux, 2000). Through this interpretive lens, our findings may reflect both a relatively greater propensity for approach behavior among adolescents than adults as well as a weaker response to nonreceipt of an anticipated reward. This pattern could be due to the relatively late development of the prefrontal cortex and its connections with the amygdala that inhibit or modulate the approach response triggered by the nucleus accumbens (Ernst, Pine, & Hardin, 2005).

The relative immaturity during adolescence of systems involved in harm avoidance may also account for our finding that adults learned faster than adolescents to stop playing from disadvantageous decks in the IGT. For example, Bjork et al. (2004) found that adults, but not adolescents, depress medial prefrontal cortical activity in anticipation of a monetary loss. As noted previously, this region is responsible for translating emotional cues into appropriate behavioral responses. In the IGT, translation of negative emotional cues into decision-making behavior is critical to the ability to cease playing from the disadvantageous decks (Bechara et al., 2000). Thus, adults’ more mature prefrontal cortices and the connections of these regions with the amygdala may explain adults’ greater sensitivity to negative feedback, indexed in this study by disistance from playing on the disadvantageous decks.

Some of our results were inconsistent with previous research on the development of affective decision making. In contrast to Crone and van der Molen’s (2004) finding that adults (ages 18–25) perform significantly better than adolescents (ages 13–15) on the IGT, we did not find differences between adolescents (ages 14–17) and adults (ages 18–30) in net scores. This discrepancy could be due to Crone and van der Molen’s use of a somewhat different gambling task paradigm, their inclusion of a condition wherein reward and punishment schedules were reversed, and/or age categories that differed from our own; with respect to this latter point, it would appear from our results that the period between ages 15 and 17, which was not included in the Crone and van der Molen study, is an exceedingly important one for the development of capacities indexed by the IGT. Also, whereas Hooper et al. (2004) found that cognitive ability was unrelated to choosing advantageously on the IGT, our study found that IQ was significantly related to both initial level of net score and rate of improvement in performance across the course of the task. This difference may be due to the greater diversity (and hence, variability in IQ) of our sample in comparison to that studied by Hooper et al. We also found less pronounced sex differences in IGT performance than some prior research has shown (Bolla, Eldreth, Matosich, & Cadet, 2004; Crone et al., 2005; Overman et al., 2004; Reavis & Overman, 2001). Although our analyses revealed no effect of sex on net score, male participants were more likely than female participants to play from advantageous decks and, to a lesser extent, from disadvantageous decks. This reflects the fact that male participants were, in general, more likely than female participants to play rather than pass, irrespective of the advantageousness of the deck; males played on 79% of trials, whereas females played on 77% of trials ($r_{pb} = .10, p < .01$).

One possible reason for the lack of consistency between our findings and that of previous research is that our sample, unlike the samples used by Overman and colleagues (Overman et al., 2004; Reavis & Overman, 2001), drew on noncollege populations. There is some evidence that college women may perform worse on the IGT than nonundergraduate women (Evans, Kemish, & Turnbull, 2004). Another potential reason for discrepancies between our findings and those of other studies is that the version of the IGT used in this study was different. The fact that gains and losses for each trial were presented as one amount indicating a net gain or loss rather than as distinct gains and losses (e.g., our participants saw “$-50$” rather than “+$200$, $-250$”) makes our findings less comparable to findings from studies using versions of the task where gain and loss information is presented separately on each trial. However, this modification to the task was also a strength of the present study in that it leveled the playing field for younger participants, for whom subtraction of loss amounts from gain amounts would be less facile; by calculating the net gain or loss for the participants, we removed a complexity confound that would have conferred an advantage to older participants. The fact that age differences emerge even with the easier version of task used here provides stronger support for the notion that affective decision making, and not just mathematical competence, improves during early adolescence.

Another benefit of our modification is that it made explicit discrimination among the decks a little more difficult than in the original version. Some have argued that IGT performance is the result of conscious learning of the deck payoff schedules rather than development of affective cues guiding behavior based on nonconscious learning (Dunn, Dalgleish, & Lawrence, 2006; Evans, Bowman, & Turnbull, 2005; Maia & McClelland, 2004). In the original IGT, but not in the version used in the present study,
every card in the disadvantageous decks bore a $100 win (paired with a loss of varying degree) and every card in the advantageous decks bore a $50 win (paired with a loss of varying degree). Removal of this heuristic for consciously distinguishing the advantageous and disadvantageous decks may have encouraged greater reliance on emotional cues for optimal decision making. This provides added support for our position that the study results genuinely reflect age differences in affective decision making. In addition, because the ability to consciously discern the payoff schedules for the decks is likely related to intelligence, controlling for IQ should have diminished the effects of explicit knowledge about the deck payoffs in our models.

A final caveat about our findings is that, although this is one of the first studies to examine age-related changes on the IGT from preadolescence through adulthood, our conclusions are based on cross-sectional comparisons of subjects in different age groups, rather than observations of change as individuals grow older; whether similar patterns would be discerned in a longitudinal study remains to be seen. Also, because our study did not involve brain imaging, we are unable to make actual comparisons between adolescents and adults with respect to activity in different brain regions thought to undergird reward and punishment processing. Future research on age differences in IGT performance should include fMRI imaging so that more direct comparisons with regard to age differences in brain function can be made.

Despite these limitations, the present study makes several significant contributions to our understanding of decision making under conditions of uncertainty as it evolves from childhood through adulthood. As noted earlier, accounts of adolescent risk taking that emphasize the putative cognitive deficiencies of young people have not received empirical support. The present study, as well as previous work, demonstrates that decision making, which frequently precedes engaging in risk-taking behavior, indeed improves throughout adolescence and into young adulthood but that this improvement may be due not to cognitive maturation but to changes in affective processing. Whereas adolescents may attend more to the potential rewards of a risky decision than to the potential costs, adults tend to consider both, even weighing costs more than rewards.

This higher level of approach behavior during adolescence coupled with the lesser inclination toward harm avoidance may help explain increased novelty-seeking in adolescence, which can lead to various types of risk taking, including experimentation with drugs, unprotected sex, and delinquent activity. The finding that when adolescents make a decision under conditions of uncertainty they may be relatively more inclined to approach and relatively less likely to avoid also may have important implications for the design of interventions to reduce youthful risk taking. For example, if adolescents are more attentive to positive than negative outcomes, perhaps an effective alternative to advertisement campaigns showing the negative outcomes associated with drug use would be a campaign highlighting the benefits of abstaining from drug use, such as greater self-control, more respect and trust from parents, and superior athletic performance. Thus, if parents and policymakers wish to reduce adolescents’ risk-taking behavior (or improve their decision making in general), strategies that employ positive reinforcement of desirable behavior may be more effective than those that emphasize the costs of the risky activity. By understanding the types of information to which adolescents are most—and least—sensitive, we may be able to improve intervention strategies intended to help adolescents make better and healthier choices.

References


Adolescent Development and Juvenile Justice

Laurence Steinberg

Department of Psychology, Temple University, Philadelphia, Pennsylvania 19122; email: lds@temple.edu

Key Words
adolescence, crime, neuroscience, law, policy

Abstract
Although justice system policy and practice cannot, and should not, be dictated solely by studies of adolescent development, the ways in which we respond to juvenile offending should be informed by the lessons of developmental science. This review begins with a brief overview of the history, rationale, and workings of the American juvenile justice system. Following this, I summarize findings from studies of brain, cognitive, and psychosocial development in adolescence that have implications for the treatment of juveniles in the justice system. The utility of developmental science in this context is illustrated by the application of these research findings to three fundamental issues in contemporary justice policy: the criminal culpability of adolescents, adolescents’ competence to stand trial, and the impact of punitive sanctions on adolescents’ development and behavior. Taken together, the lessons of developmental science offer strong support for the maintenance of a separate juvenile justice system in which adolescents are judged, tried, and sanctioned in developmentally appropriate ways.
INTRODUCTION

Few issues challenge a society's ideas about both the nature of human development and the nature of justice as much as serious juvenile crime. Because we neither expect children to be criminals nor expect crimes to be committed by children, the unexpected intersection between childhood and criminality creates a dilemma that most people find difficult to resolve. Indeed, the only ways out of this problem are either to redefine the offense as something less serious than a crime or to redefine the offender as someone who is not really a child (Zimring 1998).

For most of the twentieth century, American society has most often chosen the first approach—redefining the offense—and has treated most juvenile infractions as matters to be adjudicated as delinquent acts within a separate juvenile justice system designed, at least in theory, to recognize the special needs and immature status of young people and to therefore emphasize rehabilitation over punishment. Indeed, for much of the past century, states believed that the juvenile justice system was a vehicle to protect the public by providing a system that responds to children who are maturing into adulthood. States recognized that conduct alone—that is, the alleged criminal act—should not be dispositive in deciding when to invoke the heavy hand of the adult criminal justice system. They recognized that by providing for accountability, treatment, and supervision in the juvenile justice system—and in the community whenever possible—they promoted short-term and long-term public safety.

During the last two decades of the twentieth century, there was a dramatic shift in the way juvenile crime was viewed by policy makers and the public. Rather than choosing to define offenses committed by youth as delinquent, society increasingly opted to deal with young offenders more punitively in the juvenile justice system or to redefine them as adults and try them in adult criminal court. This trend was reflected in the growing number of juvenile offenses adjudicated in adult criminal court, where adolescents are exposed to a far more adversarial proceeding than in juvenile court; in the increasingly punitive response of the criminal justice system to juvenile offenders who are found guilty; and in what some observers have referred to as the “criminalization” of the juvenile justice system itself through increased use of punishment, rather than rehabilitation, as a legitimate juvenile justice goal (Feld 1993).

This transformation of juvenile justice policy and practice raises difficult, but important, questions for psychologists interested in the development and well-being of young people.
These questions are variations of the more general question of whether adolescents are fundamentally different from adults in ways that warrant the differential treatment of juveniles who break the law. In particular:

- Do adolescents have the psychological capabilities necessary to function as competent defendants in adult court?
- Should juveniles accused of crimes be held to the same standards of blameworthiness as adults and punished in the same ways as adult criminals who have committed similar crimes?
- How does exposing juveniles to especially punitive sanctions affect their behavior, development, and mental health?

These questions provide this review’s focus. More broadly, the purpose of this review is to integrate developmental psychological considerations into moral, legal, political, and practical analyses of juvenile crime. Because addressing this issue necessitates at least a rudimentary understanding of the rationale and workings of the juvenile justice system, I begin not with a discussion of the science of adolescent development, but rather with a short history of juvenile justice in America and a brief overview of the process through which individuals are adjudicated within the system.

Following this brief introduction to American juvenile justice, I then summarize findings from recent studies of adolescent development that bear on whether adolescents differ from adults in ways that have implications for justice system policy and practice. Because not all aspects of adolescent development are pertinent to how young people are, or should be, treated in the justice system, I limit my discussion to studies that are especially relevant to these issues. Readers interested in a broader and more comprehensive treatment of adolescent development are encouraged to consult several recent reviews of this literature (Collins & Steinberg 2006, Smetana et al. 2006) as well as a recently updated handbook on adolescent psychology (Lerner & Steinberg 2009). I then look specifically at what we know about adolescents’ competence to stand trial, criminal culpability, and response to various types of sanctions and interventions.

**JUVENILE JUSTICE IN AMERICA: AN OVERVIEW**

**The Origins of the Juvenile Justice System**

Economic recessions in the early nineteenth century pushed children out of work in America’s new factory system during the industrial revolution. Concerns about poor children on the street led to the creation of institutional care for children. In New York City, the Society for Prevention of Pauperism in 1824 became the Society for the Reformation of Juvenile Delinquents, and in 1825 opened the nation’s first House of Refuge. Boston followed a year later and Philadelphia in 1828. These Houses of Refuge were designed to maintain class status and prevent unrest (Krisberg & Austin 1993, Platt 1977).

In 1899, Jane Addams and her Hull House colleagues established what is generally accepted as the nation’s first juvenile court. Juvenile court judges, in the early part of the twentieth century, were authorized to investigate the character and social background of both predelinquent and delinquent children. They examined personal motivation as well as criminal intent, seeking to identify the moral reputation of problematic children (Platt 1977). Ben Lindsey, of Denver, was the juvenile court judge whose practice most closely matched the rhetoric of the emerging juvenile court:

> We should make it our business to study and know each particular case, because it will generally demand treatment in some little respect different from any other case. . . . (a) Is the child simply mischievous or criminal in its tendencies? (b) Is the case simply an exceptional or isolated instance in which a really good boy or girl has gone wrong for the first time because too weak to resist a strong temptation? (c) Is the child a victim of incompetent...
Transfer: one mechanism through which juveniles' cases are referred to criminal (adult) court.

Disposition: in the juvenile justice system, the outcome of an adjudication; comparable to a sentence in criminal court.

Julian Mack, Chicago’s second juvenile court judge, similarly described the ideal juvenile court proceeding:

The problem for determination by the judge is not Has this boy or girl committed a specific wrong but What is he, how has he become what he is, and what had best be done in his interest and in the interest of the state to save him from a downward career. It is apparent at once that the ordinary legal evidence in a criminal court is not the sort of evidence to be heard in such a proceeding. (Mack 1909)

It is beyond the scope of this article to discuss the likely causes of the transformation of the juvenile justice system away from the rehabilitative ideal espoused by its founders and toward the more punitive regime that exists today (but see Scott & Steinberg 2008 for a discussion). However, it is worth noting that the early rhetoric on the rationale and purpose of the juvenile court is significant in two ways that bear on contemporary debates about justice system policy and practice. First, it is clear that the founders of the juvenile justice system began from the premise that adolescents are developmentally different from adults in ways that should affect our interpretation and assessment of their criminal acts. The questions raised by Judges Lindsey and Mack are relevant to the most vexing challenges that practitioners face today in determining (a) whether an adolescent’s antisocial behavior is due to transient immaturity or contextual disadvantage, as opposed to deep-seated criminal character and (b) how best to construct a response to a juvenile’s delinquent or criminal acts that will decrease the likelihood of recidivism. The difference between now and then, however, is that at the time of the court’s founding, there was no science available to inform consideration of either issue. Owing to the dramatic increase in empirical research on normative and nonnormative adolescent development that began in the late 1970s, there has been a remarkable expansion of the scientific knowledge relevant to each of these matters.

Critical Decision Points Along the Juvenile Justice Pipeline

Juvenile justice is regulated mainly by state law, which makes it difficult to generalize about the system in ways that apply universally. Despite whatever differences exist across jurisdictions in policies and practices, however, the points of decision are essentially similar: referral, intake, detention, transfer, adjudication, disposition, and release (see Steinberg & Schwartz 2000).

Referral. Entrance into the pipeline begins with a referral to the juvenile justice system or a police arrest. Depending upon the state, a child may be too young or too old for the juvenile justice system. Children who are too young are most often diverted from the system or sent to the branch of juvenile court that has jurisdiction over neglected and abused children. Children who are too old are tried as adults. A juvenile may also be charged with an offense that results automatically in adult prosecution. If the juvenile is charged as an adult, most states allow for judges, after a hearing, to decide that the case should be transferred to juvenile court if the public interest requires it, or if the juvenile can prove that he or she is amenable to treatment in the juvenile justice system.
Intake. If the child enters the juvenile justice system after being arrested, referred by a private petitioner (such as a school or next-door neighbor), or transferred from criminal court, there will be an intake decision. Should the case proceed, or should the juvenile be diverted? If the latter, should it be an informal diversion, without further involvement by the juvenile court, or should the child be sent to a program, such as a community panel or teen court (and returned to juvenile court if he or she fails to obey a community-ordered disposition)? Some cases are diverted to other systems, such as the mental health system. Some cases are dropped entirely because intake officers decide that this particular combination of youth and offense does not belong in the juvenile justice system. Many factors thus enter into the decision to divert a case: The youth’s age, prior history, the seriousness of the offense, and the youth’s explanation or attitude will affect the intake decision.

Detention. If the intake officer decides that the case should proceed to a hearing, the officer must decide whether the child should be sent home (with or without supervision) or should be detained, either in a maximum-security detention center or in a detention alternative. Juveniles and their parents will need to explain to an intake officer how pretrial supervision will occur, and they will have to convince the officer that the juvenile will appear for trial. If the child is detained, there will be a court appearance within 24–72 hours. Most states call this first court appearance a detention hearing. Here a judge or referee will decide whether to continue the detention status. This is usually the first time that the child meets his or her attorney. Here the child must be able to discuss with counsel the circumstances of the arrest and out-of-court issues related to the detention decision (such as school attendance or the presence of an interested adult in the juvenile’s life).

Transfer. Most persons under the age of 18 who are tried as adults are done so because of statutory exclusion of their case from the juvenile justice system. State law may exclude them because of their age—in New York, for example, a 16-year-old will be tried as an adult for any offense. Every state excludes some offenses from juvenile court jurisdiction if a child is of a certain age (for example, a state can decide that 15-year-olds who are charged with armed robbery will have their cases begin in adult criminal court). Some states permit prosecutors to file the juvenile’s case directly in the adult system, where the juvenile may or may not have an opportunity to have the case transferred to juvenile court. Every state also allows judges to transfer children of a certain age—usually 14, but in some instances, even younger—to criminal court if they are charged with an offense as serious as a felony. States usually must prove that the juvenile is “not amenable to treatment” in the juvenile justice system. At transfer hearings, it is important that the juvenile is able, for example, to discuss with counsel his or her recent placement history and its reason for failure. He or she should be able to understand options, such as proposed placements, counseling programs, or plea agreements.

Adjudication. If the child continues to be detained within the juvenile justice system, an adjudicatory hearing (comparable to the trial in criminal court) must be held within 10–30 days. (Although this is the general rule, in some states juveniles charged with high-profile crimes such as murder will have a longer time to wait until their trials.) Demands on juveniles at adjudicatory hearings are many. They will include the need to understand the nature of the charges against them and to consult with counsel. They will have to weigh the costs and benefits of entering an admission (guilty plea). They should be able to help counsel identify potential witnesses, know whether an alibi or other defenses are available, and consult with counsel during cross-examination of state witnesses.

Disposition. If the juvenile admits to the offense, or if the juvenile court finds by proof beyond a reasonable doubt that the child has committed the offense, the court will proceed to disposition (sentence). Juveniles are
expected to assist counsel in presenting disposition options to the juvenile court. Assistance might include suggesting dispositions or helping the attorney and experts develop client-specific dispositions. Juvenile dispositions historically have been aimed at providing treatment, rehabilitation, or supervision in a way that best serves the needs of the juvenile, although in recent years some legislatures also have included incapacitation for public safety as a valid rationale. Under any of the models, the juvenile court will have a range of discretion. In some states, the juvenile court has wide latitude, from ordering that a child return home under supervision (probation) to placing a child in maximum-security institutions, known as training schools, reform schools, or youth development centers. In other states, which use a “youth authority” model, the court will either order probation or, if placement is warranted, transfer custody of the child to the youth authority, which will then determine the appropriate level of care.

**Release.** Most juvenile court dispositions are for indeterminate periods of time. However, dispositions cannot be for a longer period than an adult would serve for a similar crime in the criminal justice system. The court will usually review the juvenile’s case every six to nine months. Sometimes the reviews are formal hearings, whereas in other instances they are informal reviews of reports provided by probation officers or institutional staff. Many juveniles in placement, particularly those with mental health needs or who have been placed in inappropriate placements, end up being returned to juvenile court for a new disposition. Most often, those juveniles are placed in detention pending a new placement plan. When juveniles are released from institutions, they are placed on aftercare probation, which is analogous to parole. A juvenile who is on probation or on aftercare probation status can have that status revoked, or “violated,” for new offenses or for violating the terms of probation, such as associating with gang members, truancy, or missing curfew. A violation of probation may lead to rearrest, detention, and another hearing, the outcome of which may be a new disposition.

**The Relevance of Developmental Science to Decision Making in the Justice System**

Although there are few decision points in the pipeline where the developmental status of the juvenile is taken into account explicitly, at each decision juncture, information about the juvenile’s stage of development should play an important role in the outcome of the decision. A juvenile’s developmental status is relevant with respect to the adjudication process because a just and fair hearing requires the competent participation of the individual in his or her defense. As noted earlier, at both the adjudication and transfer hearings, certain competencies are expected to be in place, including those that potentially affect the juvenile’s ability to understand the charges, assist counsel, and enter pleas (Scott & Grisso 2005). To the extent that these competencies are based on capabilities that develop over the course of childhood and adolescence, an accurate understanding of how and along what timetable these capabilities develop is crucial to deciding whether an individual possesses the skills necessary to participate in the process.

Under the law, characteristics of the offender and the circumstances of the offense can mitigate criminal responsibility and lessen the punishment that is ordered by the court. A crime that is committed impulsively is punished less severely than one that is premeditated, as is a crime that is committed under coercive pressure from others. Familiarity with the expected developmental timetables of phenomena such as self-control, foresight, and susceptibility to peer pressure is therefore important for making determinations of culpability. In theory at least, an offender who, by virtue of developmental immaturity, is impulsive, shortsighted, and easily influenced by peers should be punished less harshly than one who is better able to control himself, anticipate the future consequences of his behavior, and resist the
antisocial urgings of his friends (Steinberg & Scott 2003).

Finally, decision makers in the system often must assess the youngster’s potential for change and risk for future offending when making transfer or disposition decisions (Mulvey & Leistico 2008). Such determinations of developmental plasticity are especially important at transfer hearings, because a youngster who is or seems hardened and unlikely to profit from rehabilitation is more likely to be charged as an adult than is one who is or is seen as malleable and amenable to intervention. Similarly, a juvenile who is deemed to be at high risk of recidivism, either because of a long prior record of offending or other characteristics associated with continued and/or dangerous criminal behavior (e.g., failure to respond to prior attempts at rehabilitation, a history of uncontrollable violence, or likelihood of inadequate adult supervision in the community) will be more likely to be sent to institutional placement.

In order to make well-informed decisions about the treatment of juveniles who have entered the juvenile justice pipeline, therefore, policy makers, practitioners, and mental health professionals need to be familiar with the developmental changes that occur during childhood and adolescence in the capabilities and characteristics that are relevant to competence, culpability, and likely response to treatment. Legislators need this information in order to create age-related laws and statutes that are developmentally appropriate and scientifically reasonable; if, for example, we know that the ability to understand charges or enter pleas does not generally develop until a certain age, it makes little sense to draw age boundaries that would subject developmentally incompetent individuals to court proceedings that necessitate their participation in order to satisfy ordinary due process requirements. Judges need this information in order to make wise and fair decisions in the courtroom; if we know that the capacity to regulate one’s own behavior is unlikely to be present before a certain age, it is important that this information be taken into account at the time of sentencing or disposition. Mental health professionals need this information in order to perform accurate assessments and make appropriate treatment recommendations; individuals at different stages of development may need very different sorts of interventions. And attorneys need this information in order to practice law more effectively; prosecutors may consider a juvenile’s developmental status in deciding when it is appropriate to charge an individual as an adult, and defense attorneys need to know how best to interact with clients who may not fully understand their situation. Understanding the nature of psychological development during adolescence, therefore, will likely improve policymaking, judicial decision making, forensic evaluation, and legal practice.

BRAIN, COGNITIVE, AND PSYCHOSOCIAL DEVELOPMENT IN ADOLESCENCE

When lawmakers focus on juvenile justice policy, the distinction between adolescence and adulthood, rather than that between childhood and adolescence, is of primary interest. However, most studies of adolescent development have compared adolescents with children, and only in recent years has scientific interest focused intensely on the psychological transition between adolescence and adulthood, largely in response to new research showing continued brain maturation through the end of the adolescent period. This work has provided support for the uniqueness of adolescence as a stage of life that is also distinct from adulthood with respect to several aspects of brain and psychosocial development.

Adolescent Brain Development

Although most of the developmental research on cognitive and psychosocial functioning during adolescence involves psychological studies, recent work in developmental neuroscience is beginning to shed light on the neural underpinnings of psychological development across adolescence and adulthood. In the past several years, a new perspective on risk taking
A socioemotional system: the brain system governing the processing of social and emotional information and the experience of reward and punishment.

A cognitive control system: the brain system governing executive function, including deliberative thinking, impulse control, foresight, and the evaluation of risk and reward.

According to this dual-systems model, adolescent risk taking is hypothesized to be stimulated by a rapid and dramatic increase in dopaminergic activity within the socioemotional system around the time of puberty, which is presumed to lead to increases in reward seeking. However, this increase in reward seeking precedes the structural maturation of the cognitive control system and its connections to areas of the socioemotional system, a maturation process that is gradual, unfolds over the course of adolescence, and permits more advanced self-regulation and impulse control. The temporal gap between the arousal of the socioemotional system, which is an early adolescent development, and the full maturation of the cognitive control system, which occurs later, creates a period of heightened vulnerability to risk taking during middle adolescence (Steinberg 2007).

Neurobiological evidence in support of this dual-systems model is rapidly accumulating. A growing literature, derived primarily from rodent studies but with implications for human development, indicates that the remodeling of the dopaminergic system within the socioemotional network involves an initial postnatal rise and then, starting in preadolescence, a subsequent reduction of dopamine receptor density in the striatum and prefrontal cortex; this pattern is more pronounced among males than females (Sisk & Foster 2004, Sisk & Zehr 2005, Teicher et al. 1995). As a result of this remodeling, dopaminergic activity in the prefrontal cortex increases significantly in early adolescence and is higher during this period than before or after. Because dopamine plays a critical role in the brain’s reward circuitry, the increase, reduction, and redistribution of dopamine receptor concentration around puberty, especially in projections from the limbic system to the prefrontal area, is likely to increase reward-seeking behavior and, accordingly, sensation seeking. There is equally compelling neurobiological evidence for changes in brain structure and function during adolescence and early adulthood that facilitate improvements in self-regulation that permit individuals to modulate their inclinations to seek rewards, although this development is presumed to unfold along a different timetable and to be independent of puberty (see Paus 2005 for a summary). Because of synaptic pruning and the continued myelination of prefrontal brain regions, resulting in improved connectivity among cortical areas and between cortical and subcortical areas, there are improvements over the course of adolescence in many aspects of executive function, such as response inhibition, planning, weighing risks and rewards, and the simultaneous consideration of multiple sources of information. There is also improved coordination of affect and cognition, reflected in improved emotion regulation, which is facilitated by the increased connectivity between regions associated with the socioemotional and cognitive control systems.

The development of the cognitive control system, which is manifested chiefly in improved connectivity across brain regions, must be distinguished from the well-publicized maturation of the frontal lobes because of synaptic pruning. Although both processes result in improved thinking abilities, they occur at different times in adolescence and have different implications for cognitive development. Whereas increases in connectivity take place throughout adolescence and well into adulthood, the decline in gray matter density that reflects synaptic
pruning takes place in preadolescence and early adolescence and is more or less complete by age 16. Consequently, performance on tasks that activate the frontal lobes continues to improve through middle adolescence but not beyond age 16 on tasks of moderate difficulty (Conklin et al. 2007, Crone & van der Molen 2004, Hooper et al. 2004, Luna et al. 2001). In contrast, adult-like performance on more demanding cognitive tasks, especially those that require coordination between and among multiple cortical and subcortical brain regions, is not attained until later in development.

The upshot of this developmental neuroscience is that changes in the socioemotional system at puberty may promote reckless, sensation-seeking behavior in early and middle adolescence, while the regions of the prefrontal cortex that govern cognitive control continue to mature over the course of adolescence and into young adulthood. This temporal gap between the increase in sensation seeking around puberty and the later development of mature self-regulatory competence may combine to make adolescence a time of inherently immature judgment. Thus, despite the fact that in many ways adolescents may appear to be as intelligent as adults (at least as indexed by performance on tests of information processing and logical reasoning), their ability to regulate their behavior in accord with these advanced intellectual abilities is more limited. As the next section makes clear, research on adolescent cognitive and psychosocial development is consistent with this neurobiological profile.

Adolescent Cognitive Development

The application of information about normative adolescent development to policy and practice in the justice system necessitates differentiating between cognitive and psychosocial development, which appear to follow different developmental trajectories (Steinberg 2008). Briefly, on relatively less-demanding tasks that are mainly or exclusively cognitive in nature, and where improvement in adolescence is likely due to synaptic pruning of the frontal lobes, adolescents evince adult levels of competence by age 16. In contrast, on more challenging tasks that involve the coordination of affect and cognition, and on many measures of psychosocial maturity, performance continues to improve well into young adulthood, most likely because this improvement is mediated by improved connectivity across brain regions, a relatively later development. As I discuss below, this temporal disjunction has created a great deal of confusion with regard to where we should draw the legal boundary between adolescence and adulthood, because different developmental literatures suggest different chronological ages.

The most important cognitive capacities involved in decision making are understanding (i.e., the ability to comprehend information relevant to the decision) and reasoning (i.e., the ability to use this information logically to make a choice). These capacities increase through childhood into adolescence. Between late childhood and middle adolescence (roughly between the ages of 11 and 16), individuals show marked improvements in reasoning (especially deductive reasoning) and in both the efficiency and capacity of information processing (Hale 1990, Kail 1997, Keating 2004, Overton 1990). Research has demonstrated conclusively that, as a result of gains in these areas, individuals become more capable of abstract, multidimensional, deliberative, and hypothetical thinking as they develop from late childhood into middle adolescence (Kuhn 2009). These abilities reach an asymptote sometime around 16, and by this age, teens’ capacities for understanding and reasoning in making decisions, at least in controlled experiments, roughly approximate those of adults. This comparability between middle adolescents and adults is not limited to basic cognitive abilities such as memory or verbal fluency or to performance on tasks of logical reasoning. Studies of capacity to grant informed consent to receive medical treatment or participate as a research subject, for example, show little improvement beyond age 16 (Belter & Grisso 1984, Grisso & Vierling 1978, Gustafson & McNamara 1987, Weithorn & Campbell 1982).
The notion that adolescents and adults demonstrate comparable capacities for understanding and reasoning should not be taken to mean that they also demonstrate comparable levels of maturity of judgment, however. As my colleagues and I have argued elsewhere, maturity of judgment is affected both by cognitive capabilities as well as psychosocial ones, and although the former show adult levels of maturity by 16, the latter do not (Steinberg et al. 2008b). As a result, adolescents may be less able to deploy their cognitive capacities as effectively as adults in exercising judgment in their everyday lives when decisions are influenced by emotional and social variables. The development of these psychosocial factors is described in the next section.

**Adolescent Psychosocial Development**

New perspectives on adolescent “cognition-in-context” emphasize that adolescent thinking in everyday settings is a function of social and emotional, as well as cognitive, processes, and that a full account of youthful judgment must examine the interaction of all of these influences (Scott et al. 1995, Steinberg & Cauffman 1996). Even when adolescent cognitive capacities approximate those of adults, youthful decision making may still differ from that of adults due to psychosocial immaturity. Indeed, research indicates that psychosocial maturation proceeds more slowly than cognitive development, and that age differences in judgment may reflect social and emotional differences between adolescents and adults that continue well beyond mid-adolescence. Of particular relevance to the present discussion are age differences in susceptibility to peer influence, future orientation, reward sensitivity, and the capacity for self-regulation. Available research indicates that adolescents and adults differ significantly with respect to each of these attributes.

**Peer influence.** Substantial research evidence supports the conventional wisdom that teens are more oriented toward peers and responsive to peer influence than are adults (Steinberg & Monahan 2007). Resistance to peer influence increases between adolescence and adulthood as individuals begin to form an independent sense of self and develop greater capacity for autonomous decision making. Studies of age differences and age changes in resistance to peer influence suggest somewhat different patterns vis-à-vis antisocial versus neutral or prosocial peer pressure prior to middle adolescence (with resistance to antisocial influence decreasing during this time, especially among boys, but resistance to other forms of peer influence increasing), but similar patterns after age 14 (with resistance to all forms of peer influence increasing). Because the main justice policy and practice questions concern differences between adolescents and adults, especially during the latter part of the adolescent period, it is this increase in resistance to peer influence from age 14 on that is of particular interest.

Recent studies of the neural underpinnings of resistance to peer influence in adolescence indicate that improvements in this capacity may be linked to the development of greater connectivity between cortical and subcortical regions, which likely facilitates the better coordination of affect and cognition (Grosbras et al. 2007, Paus et al. 2008), although it should be noted that this conclusion is based on studies of individual differences in brain morphology and function among same-aged adolescents who differ in their self-reported resistance to peer pressure and not to cross-sectional or longitudinal studies that link age differences in resistance to peer influence to age differences in brain structure or function. Nevertheless, it is reasonable to speculate that the social and arousal processes that may undermine logical decision making during adolescence, when connectivity is still maturing, do not have the same impact during adulthood. One recent behavioral study found, for instance, that adolescents, college undergraduates, and adults performed similarly on a risk-taking task when performing the task alone, but that the presence of same-aged friends doubled risk taking among adolescents and increased it 50% among the undergraduates, but had no
impact on the adults (Gardner & Steinberg 2005).

Peer influence affects adolescent judgment both directly and indirectly. In some contexts, adolescents might make choices in response to direct peer pressure, as when they are coerced to take risks that they might otherwise avoid. More indirectly, adolescents’ desire for peer approval and consequent fear of rejection affects their choices even without direct coercion. The increased salience of peers in adolescence likely makes approval seeking especially important in group situations. Thus, it is not surprising, perhaps, that adolescents are far more likely than are adults to commit crimes in groups (Zimring 1998). Peers also may provide models for behavior that adolescents believe will assist them to accomplish their own ends. For example, there is some evidence that during early and middle adolescence, teens who engage in certain types of antisocial behavior, such as fighting or drinking, may enjoy higher status among their peers as a consequence. Accordingly, some adolescents may engage in antisocial conduct to impress their friends or to conform to peer expectations; indeed, in one of the most influential accounts of so-called adolescence-limited offenders (that is, individuals who commit crimes during adolescence but not before or after), imitation of higher-status peers is hypothesized to be a prime motivation for antisocial behavior (Moffitt 1993).

Future orientation. Future orientation, the capacity and inclination to project events into the future, may also influence judgment because it affects the extent to which individuals consider the long-term consequences of their actions in making choices. Over the course of adolescence and into young adulthood, individuals become more future oriented, with increases in their consideration of future consequences, in their concern about the future, and in their ability to plan ahead (Greene 1986, Nurmi 1991, Steinberg et al. 2008c).

There are several plausible explanations for this age gap in future orientation. In part, adolescents’ weaker future orientation may reflect their more limited life experience (Gardner 1993). To a young person, a short-term consequence may have far greater salience than one five years in the future. The latter may seem very remote simply because five years represents a substantial portion of her life. There is also evidence linking the differences between adolescents and adults in future orientation to age differences in brain structure and function, especially in the prefrontal cortex (Cauffman et al. 2005).

Reward sensitivity. Research evidence also suggests that, relative to adults, adolescents are more sensitive to rewards and, especially, to immediate rewards, a difference that may explain age differences in sensation seeking and risk taking (Galvan et al. 2007, Steinberg et al. 2008a). Although it had once been believed that adolescents and adults differ in risk perception, it now appears that age differences in risk taking are more likely mediated by age differences in reward sensitivity than by age differences in sensitivity to the potential adverse consequences of a risky decision (Cauffman et al. 2008, Millstein & Halpern-Felsher 2002). Thus, adolescents and adults may perceive risks similarly (both in the lab and in the real world) but evaluate rewards differently, especially when the benefits of the risky decision are weighed against the costs. So, for example, in deciding whether to speed while driving a car, adolescents and adults may estimate the risks of this behavior (e.g., being ticketed, getting into an accident) similarly, but adolescents may weigh the potential rewards (e.g., the thrill of driving fast, peer approval, getting to one’s destination sooner) more heavily than adults, leading to lower risk ratios for teens—and a higher likelihood of engaging in the (rewarding) activity. Thus, what distinguishes adolescents from adults in this regard is not the fact that teens are less knowledgeable about risks, but rather that they attach greater value to the rewards that risk taking provides (Steinberg 2004).

The heightened salience of rewards to adolescents, relative to adults, is seen in age
differences in performance on the Iowa Gambling Task, in which subjects are given four decks of cards, face down, and are instructed to turn over cards, one at a time, from any deck. Each card has information about how much money the subject has won or lost by selecting that card. Two of the decks are “good,” in that drawing from them will lead to gains over time, and two of the decks are “bad”; drawing from them will produce net losses. Because a few cards in the “bad” decks offer very high rewards, though, a person who is especially sensitive to rewards will be drawn to the “bad” decks, even if he or she keeps losing money as a result. At the beginning of the task, people tend to draw randomly from all four decks, but as the task progresses, normal adults pick more frequently from the good decks. Children and younger adolescents (as well as adults with damage to the ventromedial prefrontal cortex) do poorly on this task (Crone et al. 2005, Crone & van der Molen 2004, Hooper et al. 2004). Performance improves with age, with the most dramatic improvement taking place during middle adolescence. This likely reflects a decrease in susceptibility to choosing based on the prospect of an immediate, attractive reward. Further evidence that adolescents tend to value immediate rewards more than adults do is seen in age differences in performance on tests of delay discounting, in which individuals are asked to choose between a smaller immediate reward (e.g., receiving $600 tomorrow) and a larger delayed one (e.g., receiving $1000 in one year) (Steinberg et al. 2008c). Heightened reward sensitivity, indexed by self-report or task performance, is especially pronounced during early and middle adolescence, when reward circuitry in the brain is undergoing extensive remodeling. There is some evidence from both human and animal studies that this may be linked to pubertal maturation (Dahl 2004).

Self-regulation. In addition to age differences in susceptibility to peer influence, future orientation, and reward sensitivity, adolescents and adults also differ with respect to their ability to control impulsive behavior and choices. Thus, the widely held stereotype that adolescents are more reckless than adults is supported by research on developmental changes in impulsivity and self-management over the course of adolescence (Galvan et al. 2007, Leshem & Glicksohn 2007). In general, studies show gradual but steady increases in the capacity for self-direction through adolescence, with gains continuing through the high school years and into young adulthood. Similarly, impulsivity, as a general trait, declines linearly between adolescence and adulthood (Steinberg et al. 2008a).

An illustration of behavioral research that sheds light on age differences in impulse control is the study of performance on a task known as the Tower of London. In this test, the subject is presented with an arrangement of colored balls, stacked in a certain order, and several empty vertical rods onto which the balls can be moved. The subject is then presented with a picture of a different configuration of balls and asked to turn the original configuration into the new one by moving one ball at a time, using the fewest number of moves (Berg & Byrd 2002). This task requires thinking ahead, because extra moves must be used to undo a mistake. In several studies, our research group found that early and middle adolescents performed similarly to adults when the problem presented was an easy one (i.e., one that could be solved in two or three moves), but that they did not plan ahead as much as late adolescents and young adults on the harder problems; unlike the older subjects, the younger individuals spent no more time before making their first move on the complex problems than they did on the simple ones (Steinberg et al. 2008a). These findings are consistent with casual observations of teenagers in the real world, which also suggest that they are less likely than are adults to think ahead before acting.

Taken together, these findings from self-report and behavioral studies of psychosocial development indicate that individuals become more resistant to peer influence and oriented to the future, and less drawn to immediate rewards and impulsive, as they mature from adolescence to adulthood. Although the science of
adolescent brain development is still in its infancy, finding indicate that much of this maturation continues well beyond the age by which individuals evince adult levels of performance on tests of cognitive capacity. As I discuss in the next section, the continued maturation of cognitive competence through age 16 and the continued maturation of psychosocial competence into young adulthood have important implications for how we view and respond to the criminal behavior of juveniles.

**JUVENILE JUSTICE ISSUES INFORMED BY DEVELOPMENTAL SCIENCE**

**Criminal Culpability of Youth**

The adult justice system presumes that defendants who are found guilty are responsible for their own actions, should be held accountable, and should be punished accordingly. Because of the relative immaturity of minors, however, it may not be justified to hold them as accountable as one might hold adults. If, for example, adolescents below a certain age cannot grasp the long-term consequences of their actions or cannot control their impulses, one cannot hold them fully accountable for their actions. In other words, we cannot claim that adolescents “ought to know better” if, in fact, the evidence indicates that they do not know better, or more accurately, cannot know better, because they lack the abilities needed to exercise mature judgment. It is important to note that culpability cannot really be researched directly. Because an individual’s culpability is something that is judged by someone else, it is largely in the eye of the beholder. What can be studied, however, are the capabilities and characteristics of individuals that make them potentially blameworthy, such as their ability to behave intentionally or to know right from wrong.

I use the term “culpability” in this review as a shorthand for several interrelated phenomena, including responsibility, accountability, blameworthiness, and punishability. These notions are relevant to the adjudication of an individual’s guilt or innocence, because an individual who is not responsible for his or her actions by definition cannot be guilty, and to the determination of a disposition (in juvenile court) or sentence (in criminal court), in that individuals who are found guilty but less than completely blameworthy, owing to any number of mitigating circumstances, merit proportionately less punishment than do guilty individuals who are fully blameworthy.

The starting point in a discussion of criminal culpability is a principle known as penal proportionality. Simply put, penal proportionality holds that criminal punishment should be determined by two criteria: the harm a person causes and his blameworthiness in causing that harm. The law recognizes that different wrongful acts cause different levels of harm through a complex system of offense grading under which more serious crimes (rape, for example) are punished presumptively more severely than less serious crimes (shoplifting, for example). Beyond this, though, two people who engage in the same wrongful conduct may differ in their blameworthiness. A person may be less culpable than other criminals—or not culpable at all—because he inadvertently (rather than purposely) causes the harm, because he is subject to some endogenous deficiency or incapacity that impairs his decision making (such as mental illness), or because he acts in response to an extraordinary external pressure—a gun to the head is the classic example. Less-blameworthy offenders deserve less punishment, and some persons who cause criminal harm deserve no punishment at all (Scott & Steinberg 2008).

The concept of mitigation plays an important role in the law’s calculation of blame and punishment, although it gets little attention in the debate about youth crime. Mitigation applies to persons engaging in harmful conduct who are blameworthy enough to meet the minimum threshold of criminal responsibility but who deserve less punishment than a typical offender would receive. Through mitigation, the criminal law calculates culpability and punishment along a continuum and is not limited to the options of full responsibility or complete...
excuse. Indeed, criminal law incorporates calibrated measures of culpability. For example, the law of homicide operates through a grading scheme under which punishment for killing another person varies dramatically depending on the actor’s blameworthiness. Thus, the actor who kills intentionally is deemed less culpable if he does so without premeditation because his choice reveals less consideration of the harmful consequences of his act, and the actor who negligently causes another’s death is guilty of a less serious crime than one who intends to kill. A person who kills in response to provocation or under extreme emotional disturbance may be guilty only of manslaughter and not of murder. Under standard homicide doctrine, mitigating circumstances and mental states are translated into lower-grade offenses that warrant less punishment.

What makes the conduct of one person less blameworthy than that of another person who causes the same harm? Generally, a person who causes criminal harm is a fully responsible moral agent (and deserves full punishment) if, in choosing to engage in the wrongful conduct, he has the capacity to make a rational decision and a “fair opportunity” to choose not to engage in the harmful conduct. Under this view, the actor whose thinking is substantially impaired or whose freedom is significantly constrained is less culpable than is the typical offender and deserves less punishment—how much less depends on the extent of the impairment or coercion. Under American criminal law, two very different kinds of persons can show that their criminal conduct was less culpable than that of the offender who deserves full punishment—those who are very different from ordinary persons due to impairments that contributed to their criminal choices and those who are ordinary persons whose offenses are responses to extraordinary circumstances or are otherwise aberrant conduct (Scott & Steinberg 2008).

Although it seems paradoxical, adolescents, in a real sense, belong to both groups. In the first group are individuals with endogenous traits or conditions that undermine their decision-making capacity, impairing their ability to understand the nature and consequences of their wrongful acts or to control their conduct. In modern times, this category has been reserved mostly for offenders who suffer from mental illness, mental disability, and other neurological impairments. The criminal law defenses of insanity, diminished capacity, extreme emotional disturbance, and involuntary act recognize that psychological and biological incapacities can undermine decision making in ways that reduce or negate the culpability of criminal choices.

Individuals in the second group are ordinary persons whose criminal conduct is less culpable because it is a response to extraordinary external circumstances: These cases arise when the actor faces a difficult choice, and his response of engaging in the criminal conduct is reasonable under the circumstances, as measured by the likely response of an ordinary law-abiding person in that situation. Thus, under standard self-defense doctrine, a person who kills a threatening assailant is excused from liability if a reasonable person in his place would have felt that his life was in danger. Similarly, the defenses of duress, necessity, and provocation are available to actors who can explain their criminal conduct in terms of unusual external pressures that constrained their ability to choose.

In the preceding section, I described aspects of psychological development in adolescence that are relevant to youthful choices to get involved in criminal activity and that may distinguish young offenders from their adult counterparts. Although youths in mid-adolescence have cognitive capacities for reasoning and understanding that approximate those of adults, even at age 18 adolescents are immature in their psychosocial and emotional development, and this likely affects their decisions about involvement in crime in ways that distinguish them from adults. Teenagers are more susceptible to peer influence than are adults and tend to focus more on rewards and less on risks in making choices. They also tend to focus on short-term rather than long-term consequences and are less capable of anticipating future consequences, and they are more impulsive and volatile in their emotional responses. When we consider these
developmental factors within the conventional criminal law framework for assessing blameworthiness, the unsurprising conclusion is that adolescent offenders are less culpable than are adults. The mitigating conditions generally recognized in the criminal law—diminished capability and coercive circumstances—are relevant to criminal acts of adolescents and often characterize the actions of juvenile offenders. This does not excuse adolescents from criminal responsibility, but it renders them less blameworthy and less deserving of adult punishment.

Although in general lawmakers have paid minimal attention to the mitigating character of adolescents’ diminished decision-making capacities, some legislatures and courts have recognized that immature judgment reduces culpability. Most notably, in its consideration of the constitutionality of the juvenile death penalty, the Supreme Court has focused on this rationale for mitigation. In *Roper v. Simmons*, the 2005 case that abolished the juvenile death penalty, the Court adopted the developmental argument for mitigation that follows from the research reviewed above. Justice Kennedy, writing for the majority, described three features of adolescence that distinguish young offenders from their adult counterparts in ways that mitigate culpability—features that are familiar to the reader at this point. The first is the diminished decision-making capacity of youths, which may contribute to a criminal choice that is “not as morally reprehensible as that of adults” because of its developmental nature. The Court pointed to the tendency of adolescents to engage in risky behavior and noted that immaturity and an “underdeveloped sense of responsibility” often result in “impetuous and ill-considered decisions” by youths. Second, the Court pointed to the increased vulnerability of youths to external coercion, including peer pressure. Finally, the Court emphasized that the unformed nature of adolescent identity made it “less supportive to conclude that even a heinous crime was evidence of irretrievably depraved character.” Adolescents are less blameworthy than are adults, the Court suggested, because the traits that contribute to criminal conduct are transient, and because most adolescents will outgrow their tendency to get involved in crime as they mature. Although the Court did not elaborate, we have seen that each of these attributes of adolescence corresponds to a conventional source of mitigation in criminal law (*Roper v. Simmons* 2005).

Does this argument apply to the conduct of immature adults? Although most impulsive young risk takers mature into adults with different values, some adult criminals are impulsive, sensation-seeking risk takers who discount future consequences and focus on the here and now. Are these adolescent-like adults also less culpable than other adult offenders and deserving of reduced punishment? I think not. Unlike the typical adolescent, the predispositions, values, and preferences that motivate the adult offenders are not developmental but characterological, and they are unlikely to change merely with the passage of time. Adolescent traits that contribute to criminal conduct are normative of adolescence, but they are not typical in adulthood. In an adult, these traits are often part of the personal identity of an individual who does not respect the values of the criminal law and who deserves punishment when he or she violates its prohibitions (Scott & Steinberg 2008).

Competence of Adolescents to Stand Trial

Before discussing adolescents’ competence to stand trial, it is worth underscoring the distinction between competence and culpability—two very different constructs that are often confused, even by those with expertise in criminal law. Competence to stand trial refers to the ability of an individual to function effectively as a defendant in a criminal or delinquency proceeding. In contrast, determinations of culpability focus on the defendant’s blameworthiness in engaging in the criminal conduct and on whether and to what extent he will be held responsible. Although many of the same incapacities that excuse or mitigate criminal responsibility may also render a defendant incompetent, the two issues are analytically distinct and
separate legal inquiries, and they focus on the defendant’s mental state at two different points in time (the time of the crime and the time of the court proceeding).

The reason that competence is required of defendants in criminal proceedings is simple: When the state asserts its power against an individual with the goal of taking away his liberty, the accused must be capable of participating in a meaningful way in the proceeding against him. If a defendant is so mentally ill or disabled that he cannot participate adequately, then the trial lacks fundamental fairness that is required as a part of due process under the Fourteenth Amendment to the U.S. Constitution (Scott & Grisso 2005).

In re Gault: the U.S. Supreme Court case that determined that juveniles adjudicated in juvenile court were entitled to many of the same procedural protections as adults adjudicated in criminal court

Developmental incompetence: a lack of competence to stand trial due to normal cognitive or psychosocial immaturity, as opposed to mental illness or disability

In 1960, the Supreme Court announced a legal standard for trial competence in *Dusky v. United States* that has since been adopted uniformly by American courts. According to *Dusky*, when the issue of a defendant’s competence is raised in a criminal trial, the court’s determination should focus on “whether the defendant has sufficient present ability to consult with his lawyer with a reasonable degree of rational understanding—and whether he has a rational, as well as factual, understanding of the proceedings against him.” Thus, there are two parts to the competence requirement: The defendant must be able to consult with her attorney about planning and making decisions in her defense, and she must understand the charges, the meaning, and purpose of the proceedings and the consequences of conviction (Scott & Grisso 2005).

The requirement that criminal defendants be competent to stand trial had no place in delinquency proceedings in the traditional juvenile court. In a system in which the government’s announced purpose was to rehabilitate and not to punish errant youths, the procedural protections accorded adult defendants—including the requirement of adjudicative competence—were thought to be unnecessary. This all changed with *In re Gault*, which led to an extensive restructuring of delinquency proceedings to conform to the requirements of constitutional due process. Today, it is generally accepted that requirements of due process and fundamental fairness are satisfied only if youths facing charges in juvenile court are competent to stand trial.

Until the 1990s, the issue of juveniles’ trial competence involved a straightforward incorporation into delinquency proceedings of a procedural protection that was relevant to a relatively small number of mentally impaired adult defendants, where it was assumed to apply similarly to a small number of mentally incapacitated youths. The regulatory reforms that began in the late 1980s changed the situation by increasing the punishment stakes facing many young offenders and by eroding the boundary between the adult and juvenile systems. The importance of this issue was not recognized immediately, however. As legislatures across the country began to enact laws that dramatically altered the landscape of juvenile crime policy, the procedural issue of whether developmentally immature youngsters charged with crimes might be less able to participate in criminal proceedings than are adult defendants—what is referred to in this article as developmental incompetence—was not central to the policy debates.

Given that developmental incompetence largely escaped the attention of courts and policy makers until recently, it is worth asking directly whether the constitutional prohibition against criminal adjudication of incompetent defendants must be applied to this form of incapacity. The answer is surely “yes.” The competence requirement is functional at its core, speaking to questions about the impact of cognitive deficiencies on trial participation. Functionally it makes no difference if the defendant cannot understand the proceeding she faces or assist her attorney, whether due to mental illness or to immaturity (Scott & Grisso 2005). In either case, the fairness of the proceeding is undermined. In short, the same concerns that support the prohibition against trying criminal defendants who are incompetent due to mental impairment apply with equal force when immature youths are subject to criminal proceedings. In the context of the recent changes in juvenile
justice policy, it has become important to have a better understanding of how the capacities of children and adolescents to participate in criminal proceedings compare with those of adults. In pursuit of this end, I first examine the specific abilities that are required for adjudicative competence under the legal standard. I then turn to the research directly comparing the abilities of juveniles and adults.

Three broad types of abilities are implicated under the Dusky standard for competence to stand trial: (a) a factual understanding of the proceedings, (b) a rational understanding of the proceedings, and (c) the ability to assist counsel (Scott & Grisso 2005). Courts applying the standard are directed to weigh each factor, but otherwise they exercise substantial discretion in deciding how much competence is enough. Examining each component of competence under the Dusky standard and considering how the capacities of juvenile defendants are likely to compare with those of adults is instructive.

Factual understanding focuses on the defendant’s knowledge and awareness of the charges and his understanding of available pleas, possible penalties, the general steps in the adjudication process, the roles of various participants in the pretrial and trial process, and his rights as a defendant. Intellectual immaturity in juveniles may undermine factual understanding, especially given that youths generally have less experience and more limited ability to grasp concepts such as rights. Juveniles also may be more likely than are adults to have extensive deficits in their basic knowledge of the trial process, such that more than brief instruction is needed to attain competence.

The rational understanding requirement of Dusky has been interpreted to mean that defendants must comprehend the implications, relevance, or significance of what they understand factually regarding the trial process. Deficits in rational understanding typically involve distorted or erroneous beliefs that nullify factual understanding. For example, an immature defendant may know that he has a right to remain silent, yet believe that the judge can take this “right” away at any time by demanding a response to questions. (When asked what he thought the “right to remain silent” meant, my 12-year-old son said, “It means that you don’t have to say anything until the police ask you a question.”) Intellectual, emotional, and psychosocial immaturity may undermine the ability of some adolescents to grasp accurately the meaning and significance of matters that they seem to understand factually.

Finally, the requirement that the defendant in a criminal proceeding must have the capacity to assist counsel encompasses three types of abilities. The first is the ability to receive and communicate information adequately to allow counsel to prepare a defense. This ability may be compromised by impairments in attention, memory, and concentration, deficits that might undermine the defendant’s ability to respond to instructions or to provide important information to his attorney, such as a coherent account of the events surrounding the offense. As I noted above, these capacities continue to improve through age 16, according to studies of cognitive development. Second, the ability to assist counsel requires a rational perspective regarding the attorney and her role, free of notions or attitudes that could impair the collaborative relationship. For example, some young defendants develop a belief that all adults involved in the proceeding are allied against him, perhaps after seeing defense attorneys and prosecutors chatting together outside the courtroom. Third, defendants must have the capacity to make decisions about pleading and the waiver or assertion of other constitutional rights. These decisions involve not only adequate factual and rational understanding, but also the ability to consider alternatives and make a choice in a decision-making process. Immature youths may lack capacities to process information and exercise reason adequately in making trial decisions, especially when the options are complex and their consequences far reaching.

As juveniles’ competence to stand trial began to emerge as an important issue in the mid-1990s, the need for a comprehensive study comparing the abilities of adolescents
and adults in this realm became apparent. Before this time, a few small studies had looked at particular capacities in juveniles that were important at different stages in the justice process. However, no comprehensive research had compared the specific capacities of juveniles and adults that are directly implicated in assessments of adjudicative competence. In response to that need, the MacArthur Foundation Research Network on Adolescent Development and Juvenile Justice sponsored a large-scale study of individuals between the ages of 11 and 24—half of whom were in the custody of the justice system and half of whom had never been detained—designed to examine empirically the relationship between developmental immaturity and the abilities of young defendants to participate in their trials (Grisso et al. 2003). The study also probed age differences in psychosocial influences on decision making in the criminal process.

Based on participants’ responses to a structured interview that had been used in previous studies of competence to stand trial among mentally ill adults, and for which norms had been established to define clinically significant “impairment,” the researchers found that competence-related abilities improve significantly between the ages of 11 and 16. On average, youths aged 11 to 13 demonstrated significantly poorer understanding of trial matters, as well as poorer reasoning and recognition of the relevance of information for a legal defense, than did 14- and 15-year-olds, who in turn performed significantly more poorly than individuals aged 16 and older. There were no differences between the 16- and 17-year-olds and the young adults. The study produced similar results when adolescents and adults were categorized according to their scores above and below the cut-off scores indicating impairment. Nearly one-third of 11- to 13-year-olds and about one-fifth of 14- and 15-year-olds, but only 12% of individuals 16 and older, evidenced impairment at a level comparable to mentally ill adults who had been found incompetent to stand trial with respect to either their ability to reason with facts or understand the trial process. Individual performance did not differ significantly by gender, ethnicity, or, in the detained groups, as a function of the extent of individuals’ prior justice system experience. This last finding is important because it indicates that there are components of immaturity independent of a lack of relevant experience that may contribute to elevated rates of incompetence among juveniles.

A different structured interview was used to probe how psychosocial influences affect decision making by assessing participants’ choices in three hypothetical legal situations involving a police interrogation, consultation with a defense attorney, and the evaluation of a proffered plea agreement. Significant age differences were found in responses to police interrogation and to the plea agreement. First, youths, including 16- to 17-year-olds, were much more likely to recommend waiving constitutional rights during an interrogation than were adults, with 55% of 11- to 13-year-olds, 40% of 14- to 15-year-olds, and 30% of 16- to 17-year-olds choosing to “talk and admit” involvement in an alleged offense (rather than “remaining silent”), but only 15% of the young adults making this choice. There were also significant age differences in response to the plea agreement. This vignette was styled so as not to clearly favor accepting or rejecting the state’s offer, which probably accounted for the fact that young adults were evenly divided in their responses. In contrast, 75% of the 11- to 13-year-olds, 65% of the 14- to 15-year-olds, and 60% of the 16- to 17-year-olds recommended accepting the plea offer. Together, these results suggest a much stronger tendency for adolescents than for young adults to make choices in compliance with the perceived desires of authority figures (Grisso et al. 2003).

Analysis of participants’ responses to the vignettes also indicated differences between the youngest age group and older subjects in risk perception and future orientation. Participants were asked to explain their choices, including their perceptions about positive and negative consequences of various options; questions probed the subjects’ assessment of the...
seriousness of risks (the perceived negative consequences) and the likelihood of risks materializing. Analyses indicated age differences for all of these dimensions of “risk perception,” with the 11- to 13-year-olds less able to see risks than 16- to 17-year-olds and young adults. Similarly, in comparison with older adolescents, fewer 11- to 13-year-olds mentioned the long-range consequences of their decisions, which suggests that future orientation differences exist that are consistent with those described above.

The study’s findings are consistent with those of earlier studies that examined various dimensions of youths’ functioning in the justice system. For example, an important study of youths’ and adults’ capacities to understand Miranda rights in the early 1980s found that, compared with adults in the criminal justice system, 14-year-olds in juvenile detention were less able to understand the meaning and importance of Miranda warnings (Grisso 1981). Other studies using smaller samples also have found age differences across the adolescent years with regard to knowledge of legal terms and the legal process in delinquency and criminal proceedings (e.g., Cooper 1997). Finally, a series of studies found significant age differences across the adolescent years in “strategic thinking” about pleas; older adolescents were more likely than younger subjects to make choices that reflected calculations of probabilities and costs based on information provided (e.g., Peterson-Badali & Abramovitch 1993).

In light of what is known about psychological maturation in early and mid-adolescence, these findings are not surprising. Indeed, given the abilities required of defendants in criminal proceedings, it would be puzzling if youths and adults performed similarly on competence-related measures. This research provides powerful and tangible evidence that some youths facing criminal charges may function less capably as criminal defendants than do their adult counterparts. This does not mean, of course, that all youths should be automatically deemed incompetent to stand trial any more than would a psychiatric diagnosis or low IQ score. It does mean, however, that the risk of incompetence is substantially elevated in early and mid-adolescence; it also means that policy makers and practitioners must address developmental incompetence as it affects the treatment of juveniles in court (Scott & Grisso 2005).

It is important to emphasize that the pattern of age differences in studies of legal decision making more closely resembles that seen in studies of cognitive development (where few age differences are apparent after 16) than in studies of psychosocial development (where age differences are observed in late adolescence and sometimes in young adulthood). This suggests that determinations of where to draw a legal boundary between adolescence and adulthood must be domain specific. In matters in which cognitive abilities predominate, and where psychosocial factors are of minimal importance (that is, in situations where the influence of adolescents’ impulsivity, susceptibility to peer pressure, reward sensitivity, and relatively weaker future orientation is mitigated), adolescents older than 15 should probably be treated like adults. In situations in which psychosocial factors are substantially more important, drawing the boundary at an older age is more appropriate. This is why my colleagues and I have argued that it is perfectly reasonable to have a lower boundary for adolescents’ autonomous access to abortion (a situation in which mandatory waiting periods limit the impact of impulsivity and shortsightedness and where consultation with adults likely counters immaturity of judgment) than for judgments of criminal responsibility (because adolescents’ crimes are often impulsive and influenced by peers) (Steinberg et al. 2008b).

Impact of Punitive Sanctions on Adolescent Development and Behavior

As noted above, the increasingly punitive orientation of the justice system toward juvenile offenders has resulted in an increase in the number of juveniles tried and sanctioned as adults and in the use of harsher sanctions in responding to the delinquent behavior of juveniles who have been retained in the juvenile justice
Life-course-persistent offenders: antisocial individuals whose offending begins before adolescence and persists into adulthood

Age-crime curve: in criminology, the relation between age and crime, showing that the prevalence of criminal activity increases between preadolescence and late adolescence, peaks around age 17, and declines thereafter.

System. Research on the impact of adult prosecution and punishment and on the use of punitive sanctions more generally suggests, however, that these policies and practices may actually increase recidivism and jeopardize the development and mental health of juveniles (Fagan 2008). Consequently, there is a growing consensus among social scientists that policies and practices, such as setting the minimum age of criminal court jurisdiction below 18 (as about one-third of all states currently do), transferring juveniles to the adult system for a wide range of crimes, including nonviolent crimes, relying on incarceration as a primary means of crime control, and exposing juvenile offenders to punitive programs such as boot camps, likely do more harm than good, cost taxpayers much more than they need spend on crime prevention, and ultimately pose a threat to public safety (Greenwood 2006).

In order to understand why this is the case, it is important to begin with a distinction between adolescence-limited and life-course-persistent offenders (Moffitt 1993). Dozens of longitudinal studies have shown that the vast majority of adolescents who commit antisocial acts desist from such activity as they mature into adulthood and that only a small percentage—between five and ten percent, according to most studies—become chronic offenders. Thus, nearly all juvenile offenders are adolescent limited. This observation is borne out in inspection of what criminologists refer to as the age-crime curve, which shows that the incidence of criminal activity increases between preadolescence and late adolescence, peaks at about age 17 (slightly younger for nonviolent crimes and slightly older for violent ones), and declines thereafter. These findings, at both the individual and aggregate level, have emerged from many studies that have been conducted in different historical epochs and around the world (Piquero et al. 2003).

In view of the fact that most juvenile offenders mature out of crime (and that most will desist whether or not they are caught, arrested, prosecuted, or sanctioned), one must therefore ask how to best hold delinquent youth responsible for their actions and deter future crime (both their own and that of others) without adversely affecting their mental health, psychological development, and successful transition into adult roles. If the sanctions to which juvenile offenders are exposed create psychological disturbance, stunt the development of cognitive growth and psychosocial maturity, and interfere with the completion of schooling and entrance into the labor force, these policies are likely to exacerbate rather than ameliorate many of the very factors that lead juveniles to commit crimes in the first place (mental illness, difficulties in school or work, and, as reviewed above, psychological immaturity).

It is clear that sanctioning adolescents as adults is counterproductive. One group of researchers examining this question compared a group of 2700 Florida youths transferred to criminal court, mostly based on prosecutors’ discretionary authority under Florida’s direct-file statute, with a matched group of youths retained in the juvenile system (Bishop & Frazier 2000). In another study, the researchers compared 15- and 16-year-olds charged with robbery and burglary in several counties in metropolitan New York and in demographically similar counties in New Jersey. The legal settings differed in that New York juveniles age 15 and older who are charged with robbery and burglary are automatically dealt with in the adult system under that state’s legislative waiver statute, whereas in New Jersey, transfer is rarely used, and the juvenile court retains jurisdiction over almost all youths charged with these crimes (Fagan 1996).

The New York-New Jersey study found that youths convicted of robbery in criminal court were rearrested and incarcerated at a higher rate than those who were dealt with in the juvenile system, but that rates were comparable for burglary, a less serious crime. The study also examined the number of days until rearrest and found a similar pattern; the youths sentenced for robbery in criminal court reoffended sooner than did their juvenile court counterparts. Recidivism was not affected by sentence length; longer sentences were not more
effective at reducing recidivism than were shorter sentences. Results of the Florida study also support the conclusion that juvenile sanctions may reduce recidivism more effectively than criminal punishment. This study measured only rearrest rates and found lower rates for youths who were retained in juvenile court than for youths who were transferred. The follow-up period in this study was relatively brief—less than two years. During this period, transferred youth were more likely to be rearrested, committed more offenses per year, and reoffended sooner than did juveniles in the juvenile system. As in the New York-New Jersey study, longer sentences did not have a deterrent effect.

Within the juvenile system, of course, there is wide variation in the types and severity of sanctions to which offenders are exposed. Some youths are incarcerated in prison-like training schools, whereas others receive loosely supervised community probation—neither of which is effective at changing antisocial behavior. An important question therefore is, what can the juvenile system offer young offenders that will be effective at reducing recidivism? A detailed discussion of the enormous literature evaluating the effects of various sanctions and interventions is beyond the scope of this review, and this literature has been summarized many times (Greenwood 2006, Lipsey 1999). Here I highlight a few main points.

Until the 1990s, most researchers who study juvenile delinquency programs might well have answered that the system had little to offer in the way of effective therapeutic interventions; the dominant view held by social scientists in the 1970s and 1980s was that “nothing works” to reduce recidivism with young offenders. Today the picture is considerably brighter, in large part due to a substantial body of research produced over the past 15 years showing that many juvenile programs, in both community and institutional settings, have a substantial crime-reduction effect; for the most promising programs, that effect is in the range of 20% to 30%. An increased focus on research-based programs and on careful outcome evaluation allows policy makers to assess accurately the impact on recidivism rates of particular programs to determine whether the economic costs are justified. In a real sense, these developments have revived rehabilitation as a realistic goal of juvenile justice interventions.

In general, successful programs are those that attend to the lessons of developmental psychology, seeking to provide young offenders with supportive social contexts and to assist them in acquiring the skills necessary to change problem behavior and to attain psychosocial maturity. In his comprehensive meta-analysis of 400 juvenile programs, Lipsey (1995) found that among the most effective programs in both community and institutional settings were those that focused on improving social development skills in the areas of interpersonal relations, self-control, academic performance, and job skills. Some effective programs focus directly on developing skills to avoid antisocial behavior, often through cognitive behavioral therapy. Other interventions that have been shown to have a positive effect on crime reduction focus on strengthening family support, including Multisystemic Therapy, Functional Family Therapy, and Multidimensional Treatment Foster Care, all of which are both effective and cost effective (Greenwood 2006). It is also clear from these reviews that punitive sanctions administered within the juvenile system have iatrogenic effects similar to those seen in studies of juveniles tried as adults. Punishment-oriented approaches, such as “Scared Straight” or military-style boot camps, do not deter future crime and may even inadvertently promote reoffending. Nor do these programs appear to deter other adolescents from offending (Greenwood 2006).

The dearth of evidence supporting the effectiveness of tough sanctions in deterring youthful criminal activity becomes less puzzling when we consider the response of young offenders to harsh punishment in light of developmental knowledge about adolescence discussed earlier. Teenagers on the street deciding whether to hold up a convenience store may simply be less capable than adults, due to their
psychosocial immaturity, of considering the sanctions they will face. Thus, the developmental influences on decision making that mitigate culpability also may make adolescents less responsive to the threat of criminal sanctions (Scott & Steinberg 2008).

In addition, adolescence is a formative period of development. In mid and late adolescence, individuals normally make substantial progress in acquiring and coordinating skills that are essential to filling the conventional roles of adulthood. First, they begin to develop basic educational and vocational skills to enable them to function in the workplace as productive members of society. Second, they also acquire the social skills necessary to establish stable intimate relationships and to cooperate in groups. Finally, they must begin to learn to behave responsibly without external supervision and to set meaningful personal goals for themselves. For most individuals, the process of completing these developmental tasks extends into early adulthood, but making substantial progress during the formative stage of adolescence is important. This process of development toward psychosocial maturity is one of reciprocal interaction between the individual and her social context. Several environmental conditions are particularly important, such as the presence of an authoritative parent or guardian, association with prosocial peers, and participation in educational, extracurricular, or employment activities that facilitate the development of autonomous decision making and critical thinking. For the youth in the justice system, the correctional setting becomes the environment for social development and may affect whether he acquires the skills necessary to function successfully in conventional adult roles (Steinberg et al. 2004).

Normative teenagers who get involved in crime do so, in part, because their choices are driven by developmental influences typical of adolescence. In theory, they should desist from criminal behavior and mature into reasonably responsible adults as they attain psychosocial maturity—and most do, especially as they enter into adult work and family responsibilities. Whether youths successfully make the transition to adulthood, however, depends in part on whether their social context provides opportunity structures for the completion of the developmental tasks described above. The correctional environment may influence the trajectories of normative adolescents in the justice system in important ways. Factors such as the availability (or lack) of good educational, skill building, and rehabilitative programs; the attitudes and roles of adult supervisors; and the identity and behavior of other offenders shape the social context of youths in both the adult and the juvenile systems. These factors may affect the inclination of young offenders to desist or persist in their criminal activities and may facilitate or impede their development into adults who can function adequately in society—in the workplace, in marriage or other intimate unions, and as citizens.

SUMMARY AND CONCLUDING COMMENTS

The overarching question I pose in this article is whether research on adolescent development indicates that adolescents and adults differ in ways that warrant their differential treatment when they violate the law. More specifically, I ask how this research informs debate about three fundamental questions that continue to challenge the justice system: (a) Should adolescents be held to adult standards of criminal culpability and, accordingly, exposed to the same punishment as adults; (b) Do adolescents possess the necessary capabilities to function as competent defendants in an adversarial court proceeding; and (c) How are juvenile offenders affected by the sorts of punitive sanctions that became increasingly popular during the past several decades?

It is now incontrovertible that psychological development continues throughout adolescence and into young adulthood in ways that are relevant to all three questions. Although basic cognitive competence matures by the time individuals reach age 16, many of the social and emotional capacities that influence adolescents’
judgment and decision making, especially outside the psychologist’s laboratory, continue to mature into late adolescence and beyond. Compared to individuals in their mid to late twenties, adolescents even as old as 18 are more impulsive, less oriented to the future, and more susceptible to the influence of their peers. In addition, because adolescence is also period during which individuals are still acquiring the psychological capacities they will need to successfully transition into adult work and family roles, it is important that the sanctions to which juvenile offenders are exposed not adversely affect their development. Recent research on the neural underpinnings of these developments does not change the portrait of adolescent immaturity painted by behavioral research, but it does add detail and support to the argument that makes the story more compelling. It is one thing to say that adolescents don’t control their impulses, stand up to peer pressure, or think through the consequences of their actions as well as adults; it is quite another to say that don’t because they can’t.

Because American criminal law clearly provides that diminished judgment mitigates criminal responsibility, it is reasonable to argue that adolescents are inherently less blameworthy than their elders in ways should affect decisions about criminal punishment; as a class, adolescents are inherently less blameworthy than adults. The picture that emerges from an analysis of the capacities necessary for competence to stand trial is not the same, however. Here the relevant research indicates that some adolescents (generally, those 16 and older) have adult-like capabilities but that others (generally those 15 and younger) may not. Research on the impact of punitive sanctions on adolescent development and behavior, although not explicitly developmental in nature, indicates that trying adolescents as adults or exposing them to especially harsh sanctions does little to deter offending and may indeed have iatrogenic effects.

Although justice system policy and practice cannot, and should not, be dictated solely by studies of adolescent development, the ways in which we respond to juvenile offending should at the very least be informed by the lessons of developmental science. Taken together, the lessons of developmental science offer strong support for the maintenance of a separate juvenile justice system in which adolescents are judged, tried, and sanctioned in developmentally appropriate ways. Using developmental science to inform juvenile justice policy is not a panacea that will solve the problem of youth crime. Adolescents will always get in trouble, sometimes very serious trouble, and some will continue to offend, despite the state’s best efforts to respond to their crimes in ways that will deter future offending. At the same time, the future prospects of some youths will be harmed by a system that holds them to adult levels of accountability for their crimes under our transfer rules. No one policy regime will yield good outcomes for all young offenders, but looking to developmental research to guide our decision making provides a solid framework for policies and practices that will enhance public safety in the long run by promoting healthy adolescent development.

**SUMMARY POINTS**

1. During the past two decades, policies and practices concerning the treatment of juvenile offenders in the United States became increasingly punitive, as evidenced by the increase in the number of juveniles tried as adults and the expanded use of harsh sanctions within both the juvenile and criminal justice systems. This was a break from the traditional model of juvenile justice, which emphasized rehabilitation rather than punishment as its core purpose, that had prevailed for most of the twentieth century.
2. In order to make well-informed decisions about the treatment of juveniles who have entered the juvenile justice pipeline, therefore, policymakers, practitioners, and mental health professionals need to be familiar with the developmental changes that occur during childhood and adolescence in the capabilities and characteristics that are relevant to their competence to stand trial, their criminal culpability, and their likely response to treatment.

3. Brain maturation continues well into young adulthood, and although individuals, on average, perform at adult levels on tests of basic cognitive ability by the time they are 16, most do not attain adult-like levels of social and emotional maturity until very late in adolescence or early in adulthood. Compared to adults, adolescents are more susceptible to peer influence, less oriented to the future, more sensitive to short-term rewards, and more impulsive.

4. This research on adolescent brain, cognitive, and psychosocial development supports the view that adolescents are fundamentally different from adults in ways that warrant their differential treatment in the justice system. An analysis of factors that mitigate criminal responsibility under the law indicates that adolescents are inherently less culpable than are adults and should therefore be punished less severely. In addition, studies of competence to stand trial indicate that those who are under 16 are more likely to be incompetent than are adults, raising questions about the appropriateness of trying younger adolescents in criminal court.

5. Studies of the impact of punitive sanctions on adolescent development and behavior, including prosecuting and sanctioning adolescents as adults, indicate that they do not deter adolescents from breaking the law and may in fact increase recidivism. In contrast, family-based interventions have been shown to be both effective and cost effective.

DISCLOSURE STATEMENT

The author is not aware of any biases that might be perceived as affecting the objectivity of this review.

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LITERATURE CITED


Provides an excellent summary of research on the impact of trying juveniles as adults on adolescents' behavior, mental health, and recidivism.

Furnishes a comprehensive analysis of the effectiveness of various approaches to preventing and treating juvenile delinquency.

Landmark empirical study that demonstrates that in comparison to adults, individuals under 16 are more likely to be incompetent to stand trial.
Roper v. Simmons, 541 U.S. 1040 2005 Provides a legal analysis of how the justice system might best take the developmental incompetence of juveniles into account. Argues that a lower standard of competence should be used in juvenile than in criminal court.
A social neuroscience perspective on adolescent risk-taking

Laurence Steinberg *

Department of Psychology, Temple University, Philadelphia, PA 19122, United States

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Abstract

This article proposes a framework for theory and research on risk-taking that is informed by developmental neuroscience. Two fundamental questions motivate this review. First, why does risk-taking increase between childhood and adolescence? Second, why does risk-taking decline between adolescence and adulthood? Risk-taking increases between childhood and adolescence as a result of changes around the time of puberty in the brain’s socio-emotional system leading to increased reward-seeking, especially in the presence of peers, fueled mainly by a dramatic remodeling of the brain’s dopaminergic system. Risk-taking declines between adolescence and adulthood because of changes in the brain’s cognitive control system—changes which improve individuals’ capacity for self-regulation. These changes occur across adolescence and young adulthood and are seen in structural and functional changes within the prefrontal cortex and its connections to other brain regions. The differing timetables of these changes make mid-adolescence a time of heightened vulnerability to risky and reckless behavior.

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* Fax: +1 215 204 1286.
E-mail address: lds@temple.edu.

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Introduction

Adolescent risk-taking as a public health problem

It is widely agreed among experts in the study of adolescent health and development that the greatest threats to the well-being of young people in industrialized societies come from preventable and often self-inflicted causes, including automobile and other accidents (which together account for nearly half of all fatalities among American youth), violence, drug and alcohol use, and sexual risk-taking (Blum & Nelson-Mmari, 2004; Williams, Holmbeck, & Greenley, 2002). Thus, while considerable progress has been made in the prevention and treatment of disease and chronic illness among this age group, similar gains have not been made with respect to reducing the morbidity and mortality that result from risky and reckless behavior (Hein, 1988). Although rates of certain types of adolescent risk-taking, such as driving under the influence of alcohol or having unprotected sex, have dropped, the prevalence of risky behavior among teenagers remains high, and there has been no decline in adolescents’ risk behavior in several years (Centers for Disease Control & Prevention, 2006).

It is also the case that adolescents engage in more risky behavior than adults, although the magnitude of age differences in risk-taking vary as a function of the specific risk in question and the age of the “adolescents” and “adults” used as comparison groups; rates of risk-taking are high among 18- to 21-year-olds, for instance, some of whom may be classified as adolescents and some who may be classified as adults. Nonetheless, as a general rule, adolescents and young adults are more likely than adults over 25 to binge drink, smoke cigarettes, have casual sex partners, engage in violent and other criminal behavior, and have fatal or serious automobile accidents, the majority of which are caused by risky driving or driving under the influence of alcohol. Because many forms of risk behavior initiated in adolescence elevate the risk for the behavior in adulthood (e.g., drug use), and because some forms of risk-taking by adolescents put individuals of other ages at risk (e.g., reckless driving, criminal behavior), public health experts agree that reducing the rate risk-taking by young people would make a substantial improvement in the overall well-being of the population (Steinberg, 2004).

False leads in the prevention and study of adolescent risk-taking

The primary approach to reducing adolescent risk-taking has been through educational programs, most of them school-based. There is reason to be highly skeptical about the effectiveness of this effort, however. According to AddHealth data (Bearman, Jones, & Udry, 1997), virtually all American adolescents have received some form of educational intervention designed to reduce smoking, drinking, drug use, and unprotected sex, but the most recent report of findings from the Youth Risk Behavior Survey, conducted by the Centers for Disease Control and Prevention, indicates that more than one-third of high school students did not use a condom either the first time or even the last time they had sexual intercourse, and that during the year prior to the survey, nearly 30% of adolescents rode in a car driven by someone who had been drinking, more than 25% reported multiple episodes of binge drinking, and nearly 25% were regular cigarette smokers (Centers for Disease Control & Prevention, 2006).
Although it is true, of course, that the situation might be even worse were it not for these educational efforts, most systematic research on health education indicates that even the best programs are far more successful at changing individuals' knowledge than in altering their behavior (Steinberg, 2004, 2007). Indeed, well over a billion dollars each year are spent educating adolescents about the dangers of smoking, drinking, drug use, unprotected sex, and reckless driving—all with surprisingly little impact. Most taxpayers would be surprised—perhaps shocked—to learn that vast expenditures of public dollars are invested in health, sex, and driver education programs that either do not work, such as D.A.R.E. (Ennett, Tobler, Ringwalt, & Flewelling, 1994), abstinence education (Trenholm et al., 2007), or driver training (National Research Council, 2007), or are at best of unproven or unstudied effectiveness (Steinberg, 2007).

The high rate of risky behavior among adolescents relative to adults, despite massive, ongoing, and costly efforts to educate teenagers about its potentially harmful consequences, has been the focus of much theorizing and empirical research by developmental scientists for at least 25 years. Most of this work has been informative, but in an unexpected way. In general, where investigators have looked to find differences between adolescents and adults that would explain the more frequent risky behavior of youth, they have come up empty handed. Among the widely-held beliefs about adolescent risk-taking that have not been supported empirically are (a) that adolescents are irrational or deficient in their information processing, or that they reason about risk in fundamentally different ways than adults; (b) that adolescents do not perceive risks where adults do, or are more likely to believe that they are invulnerable; and (c) that adolescents are less risk-averse than adults. None of these assertions is correct: The logical reasoning and basic information-processing abilities of 16-year-olds are comparable to those of adults; adolescents are no worse than adults at perceiving risk or estimating their vulnerability to it (and, like adults, overestimate the dangerousness associated with various risky behaviors); and increasing the salience of the risks associated with making a poor or potentially dangerous decision has comparable effects on adolescents and adults (Millstein & Halpern-Felsher, 2002; Reyna & Farley, 2006; Steinberg & Cauffman, 1996; see also Rivers, Reyna, & Mills, 2008, this issue). Indeed, most studies find few, if any, age differences in individuals’ evaluations of the risks inherent in a wide range of dangerous behaviors (e.g., driving while drunk, having unprotected sex), in their judgments about the seriousness of the consequences that might result from risky behavior, or in the ways that they evaluate the relative costs and benefits of these activities (Beyth-Marom, Austin, Fischoff, Palmgren, & Jacobs-Quadrel, 1993). In sum, adolescents’ greater involvement than adults in risk-taking does not stem from ignorance, irrationality, delusions of invulnerability, or faulty calculations (Reyna & Farley, 2006).

The fact that adolescents are knowledgeable, logical, reality-based, and accurate in the ways in which they think about risky activity—or, at least, as knowledgeable, logical, reality-based, and accurate as their elders—but engage in higher rates of risky behavior than adults raises important considerations for both scientists and practitioners. For the former, this observation pushes us to think differently about the factors that may contribute to age differences in risky behavior and to ask what it is that changes between adolescence and adulthood that might account for these differences. For the latter, it helps explain why educational interventions have been so limited in their success, suggests that providing adolescents with information and decision-making skills may be a misguided strategy, and argues that we need a new approach to public
health interventions aimed at reducing adolescent risk-taking if it is adolescents’ actual behavior that we wish to change.

These sets of scientific and practical considerations form the basis for this article. In it, I argue that the factors that lead adolescents to engage in risky activity are social and emotional, not cognitive; that the field’s emerging understanding of brain development in adolescence suggests that immaturity in these realms may have a strong maturational and perhaps unalterable basis; and that efforts to prevent or minimize adolescent risk-taking should therefore focus on changing the context in which risky activity takes place rather than mainly attempting, as current practice does, to change what adolescents know and the ways they think.

A social neuroscience perspective on adolescent risk-taking

Advances in the developmental neuroscience of adolescence

The last decade has been one of enormous and sustained interest in patterns of brain development during adolescence and young adulthood. Enabled by the growing accessibility and declining cost of structural and functional Magnetic Resonance Imaging (MRI) and other imaging techniques, such as Diffusion Tensor Imaging (DTI), an expanding network of scientists have begun to map out the course of changes in brain structure between childhood and adulthood, describe age differences in brain activity during this period of development, and, to a more modest degree, link findings on the changing morphology and functioning of the brain to age differences in behavior. Although it is wise to heed the cautions of those who have raised concerns about “brain overclaim” (Morse, 2006), there is no doubt that our understanding of the neural underpinnings of adolescent psychological development is shaping—and reshaping—the ways in which developmental scientists think about normative (Steinberg, 2005) and atypical (Steinberg et al., 2006) development in adolescence.

It is important to point out that our knowledge of changes in brain structure and function during adolescence far exceeds our understanding of the actual links between these neurobiological changes and adolescent behavior, and that much of what is written about the neural underpinnings of adolescent behavior—including a fair amount of this article—is what we might characterize as “reasonable speculation.” Frequently, contemporaneous processes of adolescent neural and behavioral development—for example, the synaptic pruning that occurs in the prefrontal cortex during adolescence and improvements in long-term planning—are presented as causally linked without hard data that even correlates these developments, much less demonstrates that the former (brain) influences the latter (behavior), rather than the reverse. It is therefore wise to be cautious about simple accounts of adolescent emotion, cognition, and behavior that attribute changes in these phenomena directly to changes in brain structure or function. Readers of a certain age are reminded of the many premature claims that characterized the study of hormone–behavior relationships in adolescence that appeared in the developmental literature in the mid-1980s soon after techniques for performing salivary assays became widespread and relatively inexpensive, much as brain imaging techniques have in the last decade. Alas, the search for direct hormone–behavior linkages proved more difficult and less fertile than many scientists had hoped (Buchanan, Eccles, & Becker, 1992), and there are few effects of hormones on adolescent behavior that are not conditioned on the environment in which
the behavior occurs; even something as hormonally driven as libido only affects sexual behavior in the right context (Smith, Udry, & Morris, 1985). There is no reason to expect that brain–behavior relationships will be any less complicated. There is, after all, a long history of failed attempts to explain everything adolescent as biologically determined dating back not only to Hall (1904), but to early philosophical treatises on the period (Lerner & Steinberg, 2004). These caveats notwithstanding, the current state of our knowledge about adolescent brain development (both structural and functional) and possible brain–behavior links during this period, although incomplete, is nonetheless sufficient to offer some insight into “emerging directions” in the study of adolescent risk-taking.

The aim of this article is to provide a review of the most important discoveries in our understanding of adolescent brain development relevant to the study of adolescent risk-taking and to sketch out a rudimentary framework for theory and research on risk-taking that is informed by developmental neuroscience. Before proceeding, a few words about this point of view are in order. Any behavioral phenomenon can be studied at multiple levels. The development of risk-taking in adolescence, for example, can be approached from a psychological perspective (focusing on increases in emotional reactivity that may underlie risky decision-making), a contextual perspective (focusing on interpersonal processes that influence risky behavior), or a biological perspective (focusing on the endocrinology, neurobiology, or genetics of sensation-seeking). All of these levels of analysis are potentially informative, and most scholars of adolescent psychopathology agree that the study of psychological disorder has profited from cross-fertilization among these various approaches (Cicchetti & Dawson, 2002).

My emphasis on the neurobiology of adolescent risk-taking in this review is not intended to downplay the importance of studying the psychological or contextual aspects of the phenomenon, any more than studying changes in neuroendocrine functioning in adolescence that might increase vulnerability to depression (e.g., Walker, Sabuwalla, & Huot, 2004) would obviate the need to study the psychological or contextual contributors to, manifestations of, or treatment of the illness. Nor does my focus on the neurobiology of adolescent risk-taking reflect a belief in the primacy of biological explanation over other forms of explanation, or a subscription to a naïve form of biological reductionism. At some level, of course, every aspect of adolescent behavior has a biological basis; what matters is whether understanding the biological basis helps us understand the psychological phenomenon. My point, though, is that any psychological theory of adolescent risk-taking needs to be consistent with what we know about neurobiological functioning during this time period (just as any neurobiological theory ought to be consistent with what we know about psychological functioning), and that most extant psychological theories of adolescent risk-taking, in my view, do not map well onto what we know about adolescent brain development. To the extent that these theories are inconsistent with what we know about brain development they are likely to be wrong, and so long as they continue to inform the design of preventive interventions, these interventions unlikely to be effective.

A tale of two brain systems

Two fundamental questions about the development of risk-taking in adolescence motivate this review. First, why does risk-taking increase between childhood and adolescence? Second, why does risk-taking decline between adolescence and adulthood? I believe that
developmental neuroscience provides clues that may lead us toward an answer to both questions.

In brief, risk-taking increases between childhood and adolescence as a result of changes around the time of puberty in what I refer to as the brain’s *socio-emotional system* that lead to increased reward-seeking, especially in the presence of peers. Risk-taking declines between adolescence and adulthood because of changes in what I refer to as the brain’s *cognitive control system*—changes which improve individuals’ capacity for self-regulation, which occur gradually and over the course of adolescence and young adulthood. The differing timetables of these changes—the increase in reward-seeking, which occurs early and is relatively abrupt, and the increase in self-regulatory competence, which occurs gradually and is not complete until the mid-20s, makes mid-adolescence a time of heightened vulnerability to risky and reckless behavior.

Why does risk-taking increase between childhood and adolescence?

In my view, the increase in risk-taking between childhood and adolescence is due primarily to increases in sensation seeking that are linked to changes in patterns of dopaminergic activity around the time of puberty. Interestingly, however, as I shall explain, although this increase in sensation-seeking is coincident with puberty, it is not entirely caused by the increase in gonadal hormones that takes place at this time, as is widely assumed. Nonetheless, there is some evidence that the increase in sensation-seeking that takes place in adolescence is correlated more with pubertal maturation than with chronological age (Martin et al., 2002), which argues against accounts of adolescent risk-taking that are solely cognitive, given that there is no evidence linking changes in thinking in adolescence to pubertal maturation.

Remodeling of the dopaminergic system at puberty

Important developmental changes in the dopaminergic system take place at puberty (Chambers, Taylor, & Potenza, 2003; Spear, 2000). Given the critical role of dopaminergic activity in affective and motivational regulation, these changes likely shape the course of socioemotional development in adolescence, because the processing of social and emotional information relies on the networks underlying coding for affective and motivational processes. Key nodes of these networks comprise the amygdala, nucleus accumbens, orbitofrontal cortex, medial prefrontal cortex, and superior temporal sulcus (Nelson, Leibenluft, McClure, & Pine, 2005). These regions have been implicated in diverse aspects of social information processing, including the recognition of socially relevant stimuli (e.g., faces, Hoffman & Haxby, 2000; biological motion, Heberlein, Adolphs, Tranel, & Damasio, 2004), social judgments (appraisal of others, Ochsner, Bunge, Gross, & Gabrieli, 2002; judging attractiveness, Aharon et al., 2001; evaluating race, Phelps et al., 2000; assessing others’ intentions, Baron-Cohen, Tager-Flusberg, & Cohen, 1999; Gallagher, 2000), social reasoning (Rilling et al., 2002), and many other aspects of social information processing (for a review, see Adolphs, 2003). Importantly, among adolescents the regions that are activated during exposure to social stimuli overlap considerably with regions also shown to be sensitive to variations in reward magnitude, such as the ventral striatum and medial prefrontal areas (cf. Galvan et al., 2005; Knutson, Westdorp, Kaiser, & Hommer, 2000; May et al., 2004). Indeed, a recent study of adolescents engaged in a task in which peer
acceptance and rejection were experimentally manipulated (Nelson et al., 2007) revealed greater activation when subjects were exposed to peer acceptance, relative to rejection, within brain regions implicated in reward salience (i.e., the ventral tegmental area, extended amygdala, and ventral pallidum). Because these same regions have been implicated in many studies of reward-related affect (cf., Berridge, 2003; Ikemoto & Wise, 2004; Waraczynski, 2006), these findings suggest that, at least in adolescence, social acceptance by peers may be processed in ways similar to other sorts of rewards, including non-social rewards (Nelson et al., 2007). As I explain later, this overlap between the neural circuits that mediate social information processing and reward processing helps to explain why so much adolescent risk-taking occurs in the context of the peer group.

The remodeling of the dopaminergic system within the socio-emotional network involves an initial post-natal rise and then, starting at around 9 or 10 years of age, a subsequent reduction of dopamine receptor density in the striatum and prefrontal cortex, a transformation that is much more pronounced among males than females (at least in rodents) (Sisk & Foster, 2004; Sisk & Zehr, 2005; Teicher, Andersen, & Hostetter, 1995). Importantly, however, the extent and timing of increases and decreases in dopamine receptors differ between these cortical and subcortical regions; there is some speculation that it is changes in the relative density of dopamine receptors in these two areas that underlies changes in reward processing in adolescence. As a result of this remodeling, dopaminergic activity in the prefrontal cortex increases significantly in early adolescence and is higher during this period than before or after. Because dopamine plays a critical role in the brain’s reward circuitry, the increase, reduction, and redistribution of dopamine receptor concentration around puberty, especially in projections from the limbic system to the prefrontal area, may have important implications for sensation-seeking.

Several hypotheses concerning the implications of these changes in neural activity have been offered. One hypothesis is that the temporary imbalance of dopamine receptors in the prefrontal cortex relative to the striatum creates a “reward deficiency syndrome,” producing behavior among young adolescents that is not unlike that seen among individuals with certain types of functional dopamine deficits. Individuals with this syndrome have been postulated to “actively seek out not only addicting drugs but also environmental novelty and sensation as a type of behavioral remediation of reward deficiency” (Gardner, 1999, cited in Spear, 2002, p. 82). If a similar process takes place at puberty, we would expect to see increases in reward salience (the degree to which adolescents are attentive to rewards and sensitive to variations in rewards) and in reward-seeking (the extent to which they pursue rewards). As Spear writes:

[A]dolts may generally attain less positive impact from stimuli with moderate to low incentive value, and may pursue new appetitive reinforcers through increases in risk taking/novelty seeking and via engaging in deviant behaviors such as drug taking. The suggestion is thus that adolescents display a mini-‘reward deficiency syndrome’ which is similar, albeit typically transient and of lesser intensity, to that hypothesized to be associated in adults with [dopamine] hypofunctioning in reward circuitry. . . . Indeed, adolescents appear to show some signs of attaining less appetitive value from a variety of stimuli relative to individuals at other ages, perhaps leading them to seek additional appetitive reinforcers via pursuit of new social interactions and engagement in risk taking or novelty seeking behaviors. Such adolescent-typical features may have been adaptive evolutionarily in helping adolescents
to disperse from the natal unit and to negotiate with success the developmental transition from dependence to independence. In the human adolescent, these propensities may be expressed, however, in alcohol and drug use, as well as a variety of other problem behaviors (2000, pp. 446–447).

The notion that adolescents suffer from a “reward deficiency syndrome,” although intuitively appealing, is undermined by several studies that indicate elevated activity in subcortical regions, especially the accumbens, in response to reward during adolescence (Ernst et al., 2005; Galvan et al., 2006). An alternative account is that the increase in sensation-seeking in adolescence is due not to functional dopamine deficits but to a temporary loss of “buffering capacity” associated with the disappearance of dopamine autoreceptors in the prefrontal cortex that serve a regulatory negative-feedback function during childhood (Dumont, Andersen, Thompson, & Teicher, 2004, cited in Ernst and Spear, in press). This loss of buffering capacity, resulting in diminished inhibitory control of dopamine release, would result in relatively higher levels of circulating dopamine in prefrontal regions in response to comparable degrees of reward during adolescence than would be the case during childhood or adulthood. Thus, the increase in sensation-seeking seen during adolescence would not be the result, as has been speculated, of a decline in the “rewardingness” of rewarding stimuli that drives individuals to seek higher and higher levels of reward (as would be predicted if adolescents were especially likely to suffer from a “reward deficiency syndrome”), but to an increase in the sensitivity and efficiency of the dopaminergic system, which, in theory, would make potentially rewarding stimuli experienced as more rewarding and thereby heighten reward salience. This account is consistent with the observation of increased dopaminergic innervation in the prefrontal cortex during adolescence (Rosenberg & Lewis, 1995), despite a reduction in dopamine receptor density.

**Steroid-independent and steroid-dependent processes**

I noted earlier that it is common to attribute this dopaminergic-mediated change in reward salience and reward-seeking to the impact of pubertal hormones on the brain, an attribution that I myself made in earlier writings on the subject (e.g., Steinberg, 2004). Although this remodeling is coincident with puberty, however, it is not clear that it is directly caused by it. Animals that have had their gonads removed prepubertally (and thus do not experience the increase in sex hormones associated with pubertal maturation) show the same patterns of dopamine receptor proliferation and pruning as animals who have not been gonadectomized (Andersen, Thompson, Krenzel, & Teicher, 2002). Thus it is important to distinguish between puberty (the process that leads to reproductive maturation) and adolescence (the behavioral, cognitive, and socioemotional changes of the period) which are not the same thing, either conceptually or neurobiologically. As Sisk and Foster explain, “gonadal maturation and behavioral maturation are two distinct brain-driven processes with separate timing and neurobiological mechanisms, but they are intimately coupled through iterative interactions between the nervous system and gonadal steroid hormones” (Sisk & Foster, 2004, p. 1040). Thus, there may well be a maturationally-driven increase in reward salience and reward seeking in early adolescence that has a strong biological basis and, that is contemporaneous with puberty, but that may only be partially related to changes in gonadal hormones in early adolescence.
In point of fact, many behavioral changes that occur at puberty (and that are sometimes mistakenly attributed to puberty) are pre-programmed by a biological clock whose timing makes them coincident with, but independent of, changes in pubertal sex hormones. Accordingly, some changes in adolescent neurobiological and behavioral functioning at puberty are steroid-independent, others are steroid-dependent, and others are the product of an interaction between the two (where steroid independent processes affect susceptibility to steroid-dependent ones) (Sisk & Foster, 2004). Moreover, within the category of steroid-dependent changes are those that are the outcome of hormonal influences on brain organization during the pre- and perinatal periods, which set in motion changes in behavior that do not manifest themselves until puberty (referred to as organizational effects of sex hormones); changes that are the direct result of hormonal influences at puberty (both on brain organization and on psychological and behavioral functioning, the latter of which are referred to as activational effects); and changes that are the result of the interaction between organizational and activational influences. Even changes in sexual behavior, for example, which we normally associate with the hormonal changes of puberty, is regulated by a combination of organizational, activational, and steroid-independent processes. At this point, the extent to which changes in dopaminergic functioning at puberty are (1) steroid-independent, (2) due to the organizational effects of exposure to sex steroids (either early in life or during adolescence, which may build on or amplify early organizational influences), (3) due to the activational influences of sex steroids at puberty, or more likely, (4) due to some mix of these factors has not been determined. It may be the case, for instance, that the structural remodeling of the dopaminergic system is not influenced by gonadal steroids at puberty but that its functioning is (Cameron, 2004; Sisk & Zehr, 2005).

There is also reason to hypothesize that sensitivity to the organizational effects of pubertal hormones decreases with age (see Schulz & Sisk, 2006), suggesting that the impact of pubertal hormones on reward-seeking might be stronger among early maturers than on-time or late maturers. Early maturers may also be at heightened risk for risk-taking because there is a longer temporal gap between the change in the dopaminergic system and the full maturation of the cognitive control system. Given these biological differences, we would therefore expect to see higher rates of risk-taking among early maturing adolescents than among their same-aged peers (again, arguing against a purely cognitive account of adolescent recklessness, since there are no major differences in cognitive performance between early and late physical maturers), as well as a drop over historical time in the age of initial experimentation with risky behavior, because of the secular trend toward the earlier onset of puberty. (The average age of menarche in industrialized nations declined by about 3–4 months per decade during the first part of the 20th century and continued to drop between the 1960s and 1990s, by about 2½ months in total [see Steinberg, 2008]). There is clear evidence for both of these predictions: Early maturing boys and girls report higher rates of alcohol and drug use, delinquency, and problem behavior, a pattern seen in different cultures and across different ethnic groups within the United States (Collins & Steinberg, 2006; Deardorff, Bonzales, Christopher, Roosa, & Millsap, 2005; Steinberg, 2008), and the age of experimentation with alcohol, tobacco, and illegal drugs (as well as the age of sexual debut) clearly has declined over time (Johnson & Gerstein, 1998), consistent with the historical decline in the age of pubertal onset.
Adolescent sensation-seeking and evolutionary adaptation

Although structural changes in the dopaminergic system that occur at puberty may not be directly due to the activational influences of pubertal hormones, it nevertheless makes good evolutionary sense that the emergence of some behaviors, such as sensation-seeking, occur around puberty, especially among males (among whom the dopaminergic remodeling is more pronounced, as noted earlier) (see also Spear, 2000). Sensation-seeking, because it involves ventures into uncharted waters, carries with it a certain degree of risk, but such risk-taking may be necessary in order to survive and facilitate reproduction. As Belsky and I have written elsewhere, “The willingness to take risks, even life-threatening risks, might well have proved advantageous to our ancestors when refusing to incur such risk was in fact even more dangerous to survival or reproduction. However chancey running through a burning savannah or attempting to cross a swollen stream might have been, not doing so might have been even more risky” (Steinberg & Belsky, 1996, p. 96).

To the extent that individuals inclined to take such risks were differentially advantaged when it came to surviving and producing descendants who would themselves survive and reproduce in future generations, natural selection would favor the preservation of inclinations toward at least some risk-taking behavior during adolescence, when sexual reproduction begins.

In addition to promoting survival in inherently risky situations, risk-taking might also confer advantages, especially upon males, by means of dominance displays and through a process called “sexual selection” (Diamond, 1992). With respect to the dominance displays, being willing to take risks might well have been a tactic for achieving and maintaining dominance in social hierarchies. Such means of status attainment and maintenance might have been selected for not only because they contributed to obtaining for oneself and one’s kin a disproportionate share of physical resources (e.g., food, shelter, clothing), but because they also increased reproductive opportunities by preventing other males from mating. To the extent that dominance displays mediate the link between risk-taking and reproduction, it makes good evolutionary sense to delay the increase in risk-taking until pubertal maturation has taken place, so that risk-takers are more adult-like in strength and appearance.

With respect to sexual selection, displays of sensation-seeking by males may have sent messages about their desirability as a sexual partner to prospective mates. It makes biological sense for males to engage in those behaviors that attract females and for females to choose males most likely to bear offspring with high prospects of surviving and reproducing themselves (Steinberg & Belsky, 1996). In aboriginal societies that are studied by anthropologists to gain insight into the conditions under which human behavior evolved (e.g., the Ache in Venezuela; the Yamamano in Brazil; the !Kung in Africa), “young men are constantly being assessed as prospects by those who might select them as husbands and lovers...” (Wilson & Daly, 1993, p. 99, emphasis in original). Moreover, “prowess in hunting, warfare, and other dangerous activity is evidently a major determinant of young men’s marriageability” (Wilson & Daly, 1993, p. 98).

Readers skeptical of this evolutionary argument are reminded of the wealth of literary and cinematic allusions to the fact that adolescent girls find “bad boys” sexually appealing. Even in contemporary society, there is empirical evidence that adolescent girls prefer and find more attractive dominant and aggressive boys (Pellegrini & Long, 2003).
Although the notion that risk-taking is adaptive in adolescence makes more intuitive sense when applied to the analysis of male than female behavior, and although there is evidence that male adolescents engage in some forms of real-world risk-taking more frequently than females (Harris, Jenkins, & Glaser, 2006), sex differences in risk-taking are not always seen in laboratory studies of risk-taking (e.g., Galvan, Hare, Voss, Glover, & Casey, 2007). Moreover, higher levels of risk-taking among adolescents versus adults have been reported in studies of females as well as males (Gardner & Steinberg, 2005). The fact that the gender gap in real-world risk-taking appears to be narrowing (Byrnes, Miller, & Schafer, 1999) and that imaging studies employing risk-taking paradigms do not find gender differences (Galvan et al., 2007) suggests that sex differences in risky behavior may mediated more by context than by biology.

Changes in sensation seeking, risk-taking, and reward sensitivity in early adolescence

Several findings from a recent study my colleagues and I have conducted on age differences in capacities that likely affect risk-taking are consistent with the notion that early adolescence in particular is a time of important changes in individuals' inclinations toward and risk-taking (see Steinberg, Cauffman, Woolard, Graham, & Banich, submitted for publication for a description of the study). To my knowledge, this is one of the only studies of these phenomena with a sample that spans a wide enough age range (from 10 to 30 years) and is large enough \((N = 935)\) to examine developmental differences across preadolescence, adolescence, and early adulthood. Our battery included a number of widely-used self-report measures, including the Benthin Risk Perception Measure (Benthin, Slovic, & Severson, 1993), the Barratt Impulsiveness Scale (Patton, Stanford, & Barratt, 1995), and the Zuckerman Sensation-Seeking Scale (Zuckerman, Eysenck, & Eysenck, 1978), as well as several new ones developed for this project, including a measure of Future Orientation (Steinberg et al., submitted for publication) and a measure of Resistance to Peer Influence (Steinberg & Monahan, 2007). The battery also included numerous computer-administered performance tasks, including the Iowa Gambling Task, which measures reward sensitivity (Bechara, Damasio, Damasio, & Anderson, 1994); a Delay Discounting task, which measures relative preference for immediate versus delayed rewards (Green, Myerson, & Ostaszewski, 1999); and the Tower of London, which measures planning ahead (Berg & Byrd, 2002).

We found a curvilinear relation between age and the extent to which individuals reported that the benefits outweighed the costs of various risky activities, such as having unprotected sex or riding in a car driven by someone who had been drinking, and between age and self-reported sensation seeking (Steinberg, Albert et al., submitted for publication). Because our version of the Iowa Gambling Task permitted us to create independent measures of respondents' selection of decks that produced monetary gains versus their avoidance of decks that produced monetary losses, we could look separately at age differences in reward and punishment sensitivity. Interestingly, we found a curvilinear relation between age and reward sensitivity, similar to the pattern seen for risk preference and sen-

1 Many of the items on the full Zuckerman scale appear to measure impulsivity, not sensation seeking (e.g., “I often do things on impulse.”) Because we have a separate measure of impulsivity in our battery, we used only the Zuckerman items that clearly indexed thrill- or novelty-seeking (e.g., “I sometimes like to do things that are a little frightening.”).
sensation-seeking, but not between age and punishment sensitivity, which increased linearly (Cauffman et al., submitted for publication). More specifically, scores on sensation-seeking, risk preference, and reward sensitivity all increased from age 10 until mid-adolescence (peaking somewhere between 13 and 16, depending on the measure) and declined thereafter. Preference for short-term rewards in the Delay Discounting task was greatest among the 12- to 13-year-olds (Steinberg et al., submitted for publication), also consistent with heightened reward sensitivity around puberty. In contrast, scores on measures of other psychosocial phenomena, such as future orientation, impulse control, and resistance to peer influence, as well punishment sensitivity on the Iowa Gambling Task and planning on the Tower of London task, showed a linear increase over this same age period, suggesting that the curvilinear pattern observed with respect to sensation-seeking, risk preference, and reward sensitivity is not simply a reflection of more general psychosocial maturation. As I will explain, these two different patterns of age differences are consistent with the neurobiological model of developmental change in risk-taking I set forth in this article.

The increase in sensation-seeking, risk preference, and reward sensitivity between preadolescence and middle adolescence observed in our study is consistent with behavioral studies of rodents showing an especially significant increase in reward salience around the time of puberty (e.g., Spear, 2000). There is also evidence of a shift in the anticipation of consequences of risk-taking, with risky behavior more likely to be associated with the anticipation of negative consequences among children but with more positive consequences among adolescents, a developmental shift that is accompanied by an increase in activity in the nucleus accumbens during risk-taking tasks (Galvan et al., 2007).

Changes in neural oxytocin at puberty

The remodeling of the dopaminergic system is one of several important changes in synaptic organization that likely undergird the increase in risk-taking that takes place early in adolescence. Another important change in synaptic organization is more directly linked to the rise in gonadal hormones at puberty. In general, studies find that gonadal steroids exert a strong influence on memory for social information and on social bonding (Nelson et al., 2005), and that these influences are mediated, at least in part, through the influence of gonadal steroids on the proliferation of receptors for oxytocin (a hormone that also functions as a neurotransmitter) in various limbic structures, including the amygdala and nucleus accumbens. Although most work on changes in oxytocin receptors at puberty has examined the role of estrogen (e.g., Miller, Ozimek, Milner, & Bloom, 1989; Tribollet, Charpak, Schmidt, Dubois-Dauphin, & Dreifuss, 1989), there is also evidence of similar effects of testosterone (Chibbar, Toma, Mitchell, & Miller, 1990; Insel, Young, Witt, & Crews, 1993). Moreover, in contrast to studies of gonadectomized rodents, which indicate few effects of gonadal steroids at puberty on dopamine receptor remodeling (Andersen et al., 2002), experimental studies that manipulate gonadal steroids at puberty through post-gonadectomy administration of steroids indicate direct effects of estrogen and testosterone on oxytocin-mediated neurotransmission (Chibbar et al., 1990; Insel et al., 1993).

Oxytocin is perhaps best known for the role it plays in social bonding, especially with respect to maternal behavior, but it is also important in regulating the recognition and memory of social stimuli (Insel & Fernald, 2004; Winslow & Insel, 2004). As Nelson et al. note, “gonadal hormones have important effects on how structures within the [socio-emotional system] respond to social stimuli, and will ultimately influence the emo-
tional and behavioral responses elicited by a social stimulus during adolescence” (2005, p. 167). These hormonal changes help explain why, relative to children and adults, adolescents show especially heightened activation of limbic, paralimbic, and medial prefrontal areas in response to emotional and social stimuli, including faces with varying emotional expressions and social feedback. They also explain why early adolescence is a time of heightened awareness of others’ opinions, so much so that adolescents often engage in “imaginary audience” behavior, which involves having such a strong sense of self-consciousness that the teenager imagines that his or her behavior is the focus of everyone else’s concern and attention. Feelings of self-consciousness increase during early adolescence, peak around age 15, and then decline (Ranking, Lane, Gibbons, & Gerrard, 2004). This rise and fall in self-consciousness has been attributed both to changes in hypothetical thinking (Elkind, 1967) and to fluctuations in social confidence (Ranking et al., 2004), and although these may in fact be contributors to the phenomenon, the arousal of the socio-emotional network as a result of increases in pubertal hormones probably plays a role as well.

**Peer influences on risk-taking**

The proposed link between the proliferation of oxytocin receptors and increased risk-taking in adolescence is not intuitively obvious; indeed, given the importance of oxytocin in maternal bonding, one might predict just the reverse (i.e., it would be disadvantageous for mothers to engage in risky behavior while caring for highly dependent offspring). My argument is not that the increase in oxytocin leads to risk-taking, however, but that it leads to an increase in the salience of peer relations, and that this increase in the salience of peers plays a role in encouraging risky behavior.

The heightened attentiveness to social stimuli that results as a consequence of puberty is particularly important in understanding adolescent risk-taking. One of the hallmarks of adolescent risk-taking is that it is far more likely than that of adults to occur in groups. The degree to which an adolescent’s peers use alcohol or illicit drugs is one of the strongest, if not the single strongest, predictors of that adolescent’s own substance use (Chassin et al., 2004). Research on automobile accidents indicates that the presence of same-aged passengers in a car driven by an adolescent driver significantly increases the risk of a serious accident (Simons-Morton, Lerner, & Singer, 2005). Adolescents are more likely to be sexually active when their peers are (DiBlasio & Benda, 1992; East, Felice, & Morgan, 1993; Udry, 1987) and when they believe that their friends are sexually active, whether or not their friends actually are (Babalola, 2004; Brooks-Gunn & Furstenberg, 1989; Dilorio et al., 2001; Prinstein, Meade, & Cohen, 2003). And statistics compiled by the Federal Bureau of Investigation show quite compellingly that adolescents are far more likely than adults to commit crimes in groups than by themselves (Zimring, 1998).

There are several plausible explanations for the fact that adolescent risk-taking often occurs in groups. The relatively greater prevalence of group risk-taking observed among adolescents may stem from the fact that adolescents simply spend more time in peer groups than adults do (Brown, 2004). An alternative view is that the presence of peers activates the same neural circuitry implicated in reward processing, and that this impels adolescents toward greater sensation seeking. In order to examine whether the presence of peers plays an especially important role in risk-taking during adolescence, we conducted an experiment in which adolescents (mean age 14), youths (mean age 20), and adults
(mean age 34) were randomly assigned to complete a battery of computerized tasks under one of two conditions: alone or in the presence of two friends (Gardner & Steinberg, 2005). One of the tasks included in this study was a video driving game that simulates the situation in which one is approaching an intersection, sees a traffic light turn yellow, and tries to decide whether to stop or proceed through the intersection. In the task, a moving car is on the screen, and a yellow traffic light appears, signaling that at some point soon, a wall will appear and the car will crash. Loud music is playing in the background. As soon as the yellow light appears, participants must decide whether to keep driving or apply the brakes. Participants are told that the longer they drive, the more points they earn but that if the car crashes into the wall, all the points that have been accumulated are lost. The amount of time that elapses between the appearance of the light and the appearance of the wall is varied across trials, so there is no way to anticipate when the car will crash. Individuals who are more inclined to take risks in this game drive the car longer than those who are more risk averse. When subjects were alone, levels of risky driving were comparable across the three age groups. However, the presence of friends doubled risk-taking among the adolescents, increased it by fifty percent among the youths, but had no effect on the adults, a pattern that was identical among both males and females (not surprisingly, we did find a main effect for sex, with males taking more risks than females). The presence of peers also increased individuals’ stated willingness to behave in an antisocial fashion significantly more among younger than older subjects, again, among both males and females.

Further evidence that the impact of peers on adolescent risk-taking may be neurally mediated by heightened activation of the socioemotional network comes from some pilot work we have conducted with two male 19-year-old subjects (Steinberg & Chein, 2006). In this work, we collected fMRI data while the subjects performed an updated version of the driving task, in which they encountered a series of intersections with traffic lights that turned yellow and had to decide whether to attempt to drive through the intersection (which would increase their reward if they made it through safely but decrease it if they crashed into an approaching car) or apply the brakes (which would decrease their reward but not as much as if they crashed the car). As in the Gardner and Steinberg (2005) study, subjects came to the lab with two friends, and we manipulated the peer context by having the peers either present in the magnet control room (viewing the subject’s behavior on an external computer monitor and receiving a share of the subject’s monetary incentives) or moved to an isolated room. Subjects performed two runs of the driving task in the peer-present condition, and two in the peer-absent condition; in the peer-present condition, they were told that their friends would be watching, and in the peer-absent condition, they were told that their friends would not be able to see their performance. Behavioral data collected from subjects in the scanner indicated an increase in risk-taking in the presence of peers that was similar in magnitude to that observed in the earlier study, as evidenced by an increase in the number of crashes and concomitant decrease in the frequency of braking when the traffic lights turned yellow.

Examination of the fMRI data indicated that the presence of peers activated certain regions that were not activated when the driving game was played in the peer-absent condition. As expected, regardless of peer condition, decisions in the driving task elicited a widely distributed network of brain regions including prefrontal and parietal association cortices (regions linked to cognitive control and reasoning). But in the peer-present condition, we also saw increased activity in the medial frontal cortex, left ventral striatum (primarily in the accumbens), left superior temporal sulcus, and left medial temporal
structures. In other words, the presence of peers activated the socio-emotional network and led to more risky behavior. This is pilot work, of course, so it is important to be very cautious in its interpretation. But the fact that the presence of peers activated the same circuitry that is activated by exposure to reward is consistent with the notion that peers may actually make potentially rewarding—and potentially risky—activities even more rewarding. In adolescence, then, more might not only be merrier—more may also be riskier.

Summary: Arousal of the socio-emotional system at puberty

In summary, there is strong evidence that the pubertal transition is associated with a substantial increase in sensation-seeking that is likely due to changes in reward salience and reward sensitivity resulting from a biologically-driven remodeling of dopaminergic pathways in what I have called the socio-emotional brain system. This neural transformation is accompanied by a significant increase in oxytocin receptors, also within the socio-emotional system, which in turn heightens adolescents’ attentiveness to, and memory for, social information. As a consequence of these changes, relative to prepubertal individuals, adolescents who have gone through puberty are more inclined to take risks in order to gain rewards, an inclination that is exacerbated by the presence of peers. This increase in reward-seeking is most apparent during the first half of the adolescent decade, has its onset around the onset of puberty, and likely peaks sometime around age 15, after which it begins to decline. Behavioral manifestations of these changes are evident in a wide range of experimental and correlational studies using a diverse array of tasks and self-report instruments, are seen across many mammalian species, and are logically linked to well-documented structural and functional changes in the brain.

This set of assertions must be tempered, however, in view of the absence of direct evidence in humans that link the biology with the behavior. As noted earlier, the fact that particular sets of neurobiological and behavioral changes occur concurrently in development can only be taken as suggestive of a connection between them. More research that simultaneously examines brain structure function and its relation to risky behavior, either in studies of age differences or in studies of individual differences, is much needed.

It also is important to emphasize that, although the increase in sensation-seeking observed in early adolescence may be maturationally driven, all individuals do not manifest this inclination in the form of dangerous, harmful, or reckless behavior. As Dahl notes, “For some adolescents, this tendency to activate strong emotions and this affinity for excitement can be subtle and easily managed. In others these inclinations toward high-intensity feelings can lead to emotionally-charged and reckless adolescent behaviors and at times to impulsive decisions by (seemingly) intelligent youth that are completely outrageous” (2004, p. 8). Presumably, many factors moderate and modulate the translation of sensation seeking into risky behavior, including maturational timing (i.e., with early matures at greater risk), opportunities to engage in antisocial risk-taking (e.g., the degree to which adolescents’ behavior is monitored by parents and other adults, the availability of alcohol and drugs, and so forth), and temperamental predispositions that may amplify or attenuate tendencies to engage in potentially dangerous activities. Individuals who are behaviorally inhibited by nature, prone to high levels of anxiety, or especially fearful would be expected to shy away from harmful activities. For example, a recent follow-up of adolescents who had been highly reactive as infants (i.e., exhibiting high motor activity and frequent crying) found them to be significantly more nervous, introverted, and
morose than their counterparts who had been low-reactive (Kagan, Snidman, Kahn, & Towsley, 2007).

Why does risk-taking decline between adolescence and adulthood?

There are two plausible neurobiological processes that may help account for the decline in risky behavior that occurs between adolescence and adulthood. The first, which has received only scant attention, is that further changes in the dopaminergic system, or in reward processing that is mediated by some other neurotransmitter, take place in late adolescence that alter reward sensitivity, and, in turn, diminish reward-seeking. Little is known about changes in reward seeking after adolescence, however, and there remain inconsistencies in the literature with respect to age differences in reward sensitivity after adolescence (cf. Bjork et al., 2004; Ernst et al., 2005; Galvan et al., 2006), likely due to methodological differences between studies in the manipulation of reward salience (e.g., whether the comparison of interest is in reward versus cost or among rewards of different magnitudes) and whether the task involves the anticipation or actual receipt of the reward. Nevertheless, studies of age differences in sensation seeking (in addition to our own) show a decrease in this tendency after age 16 (Zuckerman et al., 1978), and there is some behavioral evidence (Millstein & Halpern-Felsher, 2002) suggesting that adolescents may be more sensitive than adults to variation in rewards and comparably or even less sensitive to variation in costs, a pattern borne out in our Iowa Gambling Task data (Cauffman et al., submitted for publication).

A more likely (although not mutually exclusive) cause of the decline in risky activity after adolescence concerns the development of self-regulatory capacities that occurs over the course of adolescence and during the 1920s. Considerable evidence suggests that higher level cognition, including the uniquely human capacities for abstract reasoning and deliberative action, is supported by a recently evolved brain system including the lateral prefrontal and parietal association cortices and parts of the anterior cingulate cortex to which they are highly interconnected. The maturation of this cognitive control system during adolescence is likely a primary contributor to the decline in risk-taking seen between adolescence and adulthood. This account is consistent with a growing body of work on structural and functional changes in the prefrontal cortex, which plays a substantial role in self-regulation, and in the maturation of neural connections between the prefrontal cortex and the limbic system, which permits the better coordination of emotion and cognition. These changes permit the individual to put the brakes on impulsive sensation-seeking behavior and to resist the influence of peers, which, together, should diminish risk-taking.

Structural maturation of the cognitive control system

Three important changes in brain structure during adolescence are now well-documented (see Paus, 2005, for a summary). First, there is a decrease in gray matter in prefrontal regions of the brain during adolescence, reflective of synaptic pruning, the process through which unused neuronal connections are eliminated. This elimination of unused neuronal connections occurs mainly during preadolescence and early adolescence, the period during which major improvements in basic information processing and logical reasoning are seen (Keating, 2004; Overton, 1990), consistent with the timetable for synaptic pruning in the prefrontal cortex, most of which is complete by mid-adolescence.
(Casey, Tottenham, Liston, & Durston, 2005; see also Casey, Getz, & Galvan, 2008, this issue). Although some improvements in these cognitive capacities continue until age 20 or so (Kail, 1991, 1997), changes after mid-adolescence are very modest in magnitude and tend to be seen mainly in studies employing relatively demanding cognitive tasks on which performance is facilitated by greater connectivity among cortical areas, permitting more efficient processing (see below). In our study of capacities related to risk-taking described earlier, we saw no improvement in basic cognitive processes, such as working memory or verbal fluency, after age 16 (Steinberg, Cauffman et al. submitted for publication).

Second, there is an increase in white matter in these same regions, reflective of myelination, the process through which nerve fibers become sheathed in myelin, a fatty substance that provides a sort of insulation of the neural circuitry. Unlike the synaptic pruning of the prefrontal areas, which takes place early adolescence, myelination is ongoing well into the second decade of life and perhaps beyond (Lenroot et al., 2007). Improved connectivity within the prefrontal cortex should be associated with subsequent improvements in higher-order functions subserved by multiple prefrontal areas, including many aspects of executive function, such as response inhibition, planning ahead, weighing risks and rewards, and the simultaneous consideration of multiple sources of information. In contrast to our findings with respect to basic information processing, which showed no maturation beyond age 16, we found continued improvement beyond this age in self-reported future orientation (which increased through age 18) and in planning (as indexed by the amount of time subjects waited before making their first move on the Tower of London task, which increased not only through adolescence but through the early 20s).

Generally speaking, performance on tasks that activate the frontal lobes continues to improve through middle adolescence (until about age 16 on tasks of moderate difficulty), in contrast to performance on tasks that activate more posterior brain regions, which reaches adult levels by the end of preadolescence (Conklin, Luciana, Hooper, & Yarger, 2007). Improved executive function in adolescence is reflected in better performance with age on tasks known to activate the dorsolateral prefrontal cortex, such as relatively difficult tests of spatial working memory (Conklin et al., 2007) or especially challenging tests of response inhibition (Luna et al., 2001); and the ventromedial prefrontal cortex, such as the Iowa Gambling Task (Crone & van der Molen, 2004; Hooper, Luciana, Conklin, & Yarger, 2004). Although some tests of executive function simultaneously activate both the dorsolateral and ventromedial regions, there is some evidence that the maturation of these regions may take place along somewhat different timetables, with performance on exclusively ventromedial tasks reaching adult levels somewhat earlier than performance on exclusively dorsolateral tasks (Conklin et al., 2007; Hooper et al., 2004). In one recent study of age differences in cognitive performance using tasks known to differentially activate these two prefrontal regions, there was age-related improvement into middle adolescence on both types of tasks, but there were no significant correlations between performance on the ventromedial and dorsolateral tasks, suggesting that maturation of the ventromedial prefrontal cortex may be a developmentally distinct process from the maturation of the dorsolateral prefrontal cortex (Hooper et al., 2004). Performance on especially difficult tasks known to activate dorsolateral areas continues to improve during late adolescence (Crone, Donohue, Honomichl, Wendelken, & Bunge, 2006; Luna et al., 2001).

Third, as evidenced in the proliferation of projections of white matter tracts across different brain regions, there is an increase not only in connections among cortical areas (and between different areas of the prefrontal cortex), but between cortical and subcortical
areas (and, especially, between the prefrontal regions and the limbic and paralimbic areas, including the amygdala, nucleus accumbens, and hippocampus) (Eluvathingal, Hasan, Kramer, Fletcher, & Ewing-Cobbs, 2007). This third anatomical change should be associated with improved coordination of affect and cognition, and reflected in improved emotion regulation, facilitated by the increased connectivity of regions important in the processing of emotional and social information (e.g., the amygdala, ventral striatum, orbitofrontal cortex, medial prefrontal cortex, and superior temporal sulcus) and regions important in cognitive control processes (e.g., the dorsolateral prefrontal cortex, anterior and posterior cingulate, and temporo-parietal cortices). Consistent with this, we found increases in self-reported impulse control through the mid-20s (Steinberg, Albert et al., submitted for publication).

**Functional changes in the cognitive control system**

Functional studies of brain development in adolescence are largely consistent with the findings from structural studies and from studies of cognitive and psychosocial development. Several overarching conclusions can be drawn from this research. First, studies point to a gradual development of cognitive control mechanisms over the course of adolescence and early adulthood, consistent with the anatomical changes in the dorsolateral prefrontal cortex described earlier. Imaging studies examining performance on tasks requiring cognitive control (e.g., Stroop, flanker tasks, Go-No/Go, antisaccade) have shown that adolescents tend to recruit the network less efficiently than do adults, and that regions whose activity correlates with task performance (i.e., cognitive control areas) become more focally activated with age (Durston et al., 2006). It has been suggested that this increasingly focal engagement of cognitive control areas reflects a strengthening of connections within the control network, and of its projections to other regions (a claim consistent with data on increased connectivity among cortical areas with development; Liston et al., 2006).

Improved performance on cognitive control tasks between childhood and adulthood is accompanied by two different functional changes: Between childhood and adolescence, there appears to be an increase in activation of the dorsolateral prefrontal cortex (Adleman et al., 2002; Casey, Giedd, & Thomas, 2000; Durston et al., 2002; Luna et al., 2001; Tamm, Menon, & Reiss, 2002), consistent with the synaptic pruning and myelination of this region at this time. The period between adolescence and adulthood, in contrast, appears to be one of fine-tuning (rather than one characterized by an overall increase or decrease in activation; Brown et al., 2005), presumably facilitated by the more extensive connectivity within and across brain areas (Crone et al., 2006; Luna et al., 2001). For example, imaging studies using tasks in which individuals are asked to inhibit a “prepotent” response, like trying to look away from, rather than toward, a point of light (an antisaccade task), have shown that adolescents tend to recruit the cognitive control network less selectively and efficiently than do adults, perhaps overtaxing the capacity of the regions they activate (Luna et al., 2001). In essence, whereas the advantage that adolescents have over children in cognitive control inheres in the maturation of brain regions implicated in executive function (mainly, dorsolateral prefrontal cortex), the reasons the cognitive control system of adults is more effective than that of adolescents may be because adults’ brains evince more differentiated activation in response to different task demands. This would be consistent with the notion that performance on relatively basic tests of exec-
utive processing reaches adult levels around age 16, whereas performance of especially challenging tasks, which may require more efficient activation, continues to improve in late adolescence.

While the cognitive control network is clearly implicated in reasoning and decision-making, several recent findings suggest that decision-making is often governed by a competition between this network and the socio-emotional network (Drevets & Raichle, 1998). This competitive interaction has been implicated in a wide range of decision-making contexts, including drug use (Bechara, 2005; Chambers et al., 2003), social decision processing (Sanfey, Rilling, Aronson, Nystrom, & Cohen, 2003), moral judgments (Greene, Nystrom, Engell, Darley, & Cohen, 2004), and the valuation of alternative rewards and costs (Ernst et al., 2004; McClure, Laibson, Loewenstein, & Cohen, 2004), as well as in an account of adolescent risk-taking (Chambers et al., 2003). In each instance, impulsive or risky choices are presumed to arise when the socio-emotional network dominates the cognitive control network. More specifically, risk-taking is more likely when the socio-emotional network is relatively more activated or when processes mediated by the cognitive control network are disrupted. For example, McClure et al. (2004) have shown that decisions reflecting a preference for smaller immediate rewards over larger delayed rewards are associated with relatively increased activation of the ventral striatum, orbitofrontal cortex, and medial prefrontal cortex, all regions linked to the socio-emotional network, whereas regions implicated in cognitive control (dorsolateral prefrontal cortex, parietal areas) are engaged equivalently across decision conditions. Similarly, two recent studies (Ernst et al., 2004; Matthews, Simmons, Lane, & Paulus, 2004) show that increased activity in regions of the socio-emotional network (ventral striatum, medial prefrontal cortex) predicts the selection of comparatively risky (but potentially highly rewarding) choices over more conservative choices. Finally, one recent experimental study found that transient disruption of right dorsolateral prefrontal cortical function via transcranial magnetic stimulation (i.e., disruption of a region known to be crucial to cognitive control) increased risk-taking in a gambling task (Knoch et al., 2006).

Coordination of cortical and subcortical functioning

A second, but less well documented, change in brain function during adolescence involves the increasing involvement of multiple brain regions in tasks involving the processing of emotional information (e.g., facial expressions, emotionally arousing stimuli). Although it has been widely reported that adolescents show significantly greater limbic activity than adults when exposed to emotional stimuli (which is popularly interpreted as evidence for adolescents’ “emotionality”), this is not consistently the case. In some such studies adolescents do show a tendency toward relatively more limbic activation than adults (e.g., Baird et al., 1999; Killgore & Yurgelun-Todd, 2007), but in others, adolescents show relatively more prefrontal activation (e.g., Baird, Fugelsang, & Bennett, 2005; Nelson et al., 2003). Much depends on the stimuli used, whether the stimuli are presented explicitly or subliminally, and the specific instructions given to the participant (e.g., whether the participant is asked to pay attention to the emotion or to pay attention to some other aspect of the stimulus material). A more cautious reading of this literature is not that adolescents are unequivocally more prone than adults to activation of subcortical brain systems when presented with emotional stimuli (or that they are more “emotional”), but that they may be less likely to activate multiple cortical and subcortical...
areas simultaneously, suggesting deficits, relative to adults, in the synchronization of cognition and affect.

This lack of cross-talk across brain regions results not only in individuals acting on gut feelings without fully thinking (the stereotypic portrayal of adolescent risk-taking), but also in thinking too much when one’s gut feelings ought to be attended to (which teenagers also do from time to time) (see also Reyna & Farley, 2006, for a discussion of adolescents’ deficiencies in intuitive, or “gist-based,” decision-making). Few readers would be surprised to hear of studies showing more impulsivity and less deliberative thinking among adolescents than adults. But in one recent study (Baird et al., 2005), when asked whether some obviously dangerous activities (e.g., setting one’s hair on fire, swimming with sharks) were “good ideas,” adolescents took significantly longer (i.e., deliberated more) than adults to respond to the questions and activated a less narrowly distributed set of cognitive control regions, particularly in the dorsolateral prefrontal cortex—a result reminiscent of Luna’s study of age differences in response inhibition (Luna et al., 2001). This was not the case when the queried activities were not dangerous ones, however (e.g., eating salad, taking a walk), where adolescents and adults performed similarly and showed similar patterns of brain activation. Thus, it is the lack of coordination of affect and thinking, rather than the dominance of affect over thinking, that may characterize adolescence. This results in two patterns of risk-taking that are behaviorally quite different (impulsively acting before thinking, and overthinking rather than acting impulsively) but that actually may have a similar neurobiological origin.

The temporal gap between the development of basic information-processing abilities, which is facilitated by maturation of the prefrontal cortex and largely complete by age 16, and the development of abilities that require the coordination of affect and cognition, which is facilitated by improved connections among cortical regions and between cortical and subcortical regions, and which is a later development, is illustrated in Fig. 1. The figure is based on data from our study of 10- to 30-year-olds mentioned earlier (Steinberg, Cauffman et al. submitted for publication). The two capacities graphed are basic intellectual ability, which is a composite score that combines performance on tests of working memory (Thompson-Schill, 2002), digit-span, and verbal fluency; and psychosocial maturity, which composites scores of the self-report measures of impulsivity, risk perception, and

![Fig. 1. Proportion of individuals in each age group scoring at or above the mean for 26- to 30-year-olds on indices of intellectual and psychosocial maturity. From Steinberg, Cauffman et al. submitted for publication.](image-url)
sensation-seeking, future orientation, and resistance to peer influence mentioned earlier. Mature functioning with respect to these psychosocial capacities requires the effective coordination of emotion and cognition. The figure shows the proportion of individuals in each age group who score at or above the mean level of the 26- to 30-year-olds in our sample on the psychosocial and intellectual composites. As the figure indicates, and consistent with other studies, basic intellectual abilities reach adult levels around age 16, long before the process of psychosocial maturation is complete—well into the young adult years.

Changes in brain connectivity and the development of resistance to peer influence

The improved connectivity between cortical and subcortical areas also has implications for understanding changes in susceptibility to peer influence, which, as I noted, is an important contributor to risk behavior during adolescence. Resistance to peer influence, I believe, is achieved by cognitive control of the impulsive reward-seeking behavior that is stimulated by the presence of peers through activation of the socio-emotional network. To the extent that improved coordination between the cognitive control and socio-emotional networks facilitates this regulatory process, we should see gains in resistance to peer influence over the course of adolescence that continue at least into late adolescence (when maturation of inter-region connections are still ongoing). This is precisely what we have found in our own work, in which we show that gains in self-reported resistance to peer influence continue at least until 18 (Steinberg & Monahan, 2007), and that the actual impact of the presence of peers on risky behavior is still evident among college undergraduates averaging 20 years in age (Gardner & Steinberg, 2005).

Two recent studies of the relation between resistance to peer influence and brain structure and function provide further support for this argument. In an fMRI study of 43 10-year-olds who were exposed to emotionally-arousing video clips containing social information (clips of angry hand movements or angry facial expressions), we found that individuals with relatively lower scores on our self-report measure of resistance to peer influence showed significantly greater activation of regions implicated in the perception of others’ actions (i.e., right dorsal premotor cortex), whereas those with relatively higher scores showed greater functional connectivity between these action-processing regions and regions implicated in decision-making (i.e., dorsolateral prefrontal cortex); such differences were not observed when individuals were presented with emotionally-neutral clips (Grosbras et al., 2007). These results suggest that individuals who are especially susceptible to peer influence may be unusually aroused by signs of anger in others but less able to exert inhibitory control over their responses to such stimuli. In a second study, of differences in brain morphology between individuals (aged 12–18) scoring high versus low in resistance to peer influence, we found morphological evidence that, after controlling for age, adolescents high in resistance to peer influence showed evidence of greater structural connectivity between premotor and prefrontal regions, a pattern consistent with the more frequent concurrent engagement of these networks among individuals more able to resist peer pressure (Paus et al., in press). Also consistent with this is work showing that recruitment of cognitive control resources (which would counter impulsive susceptibility to peer pressure) is greater among individuals with stronger connections between frontal and striatal regions (Liston et al., 2006).
Summary: improvements in cognitive control over adolescence and young adulthood

In sum, risk taking declines between adolescence and adulthood for two, and perhaps, three reasons. First, the maturation of the cognitive control system, as evidenced by structural and functional changes in the prefrontal cortex, strengthens individuals’ abilities to engage in longer-term planning and inhibit impulsive behavior. Second, the maturation of connections across cortical areas and between cortical and subcortical regions facilitates the coordination of cognition and affect, which permits individuals to better modulate socially and emotionally aroused inclinations with deliberative reasoning and, conversely, to modulate excessively deliberative decision-making with social and emotional information. Finally, there may be developmental changes in patterns of neurotransmission after adolescence that change reward salience and reward-seeking, but this is a topic that requires further behavioral and neurobiological research before saying anything definitive.

Implications for prevention and intervention

In many respects, then, risk-taking during adolescence can be understood and explained as the product of an interaction between the socio-emotional and cognitive control networks (Drevets & Raichle, 1998), and adolescence is a period in which the former abruptly becomes more assertive at puberty while the latter gains strength only gradually, over a longer period of time. It is important to note, however, that the socio-emotional network is not in a state of constantly high activation, even during early and middle adolescence. Indeed, when the socio-emotional network is not highly activated (for example, when individuals are not emotionally excited or are alone), the cognitive control network is strong enough to impose regulatory control over impulsive and risky behavior, even in early adolescence; recall that in our video driving game study, when individuals were alone we found no age differences in risk-taking between adolescents who averaged 14 and adults who averaged 34 (Gardner & Steinberg, 2005). In the presence of peers or under conditions of emotional arousal, however, the socio-emotional network becomes sufficiently activated to diminish the regulatory effectiveness of the cognitive control network. (We are currently beginning research in our lab to examine whether positive or negative emotional arousal has differential effects on risk-taking during adolescence and adulthood.) During adolescence, the cognitive control network matures, so that by adulthood, even under conditions of heightened arousal in the socio-emotional network inclinations toward risk-taking can be modulated.

What does this formulation mean for the prevention of unhealthy risk-taking in adolescence? Given extant research suggesting that it is not the way that adolescents think or what they don’t know or understand that is the problem, rather than attempting to change how adolescents view risky activities a more profitable strategy might focus on limiting opportunities for immature judgment to have harmful consequences. As I noted in the introduction to this article, more than 90% of all American high school students have had sex, drug, and driver education in their schools, yet large proportions of them still have unsafe sex, binge drink, smoke cigarettes, and drive recklessly (some all at the same time; Steinberg, 2004). Strategies such as raising the price of cigarettes, more vigilantly enforcing laws governing the sale of alcohol, expanding adolescents’ access to mental health and contraceptive services, and raising the driving age would likely be more effective in limiting adolescent smoking, substance abuse, pregnancy, and automobile fatalities.
than attempts to make adolescents wiser, less impulsive, or less shortsighted. Some things just take time to develop, and mature judgment is probably one of them.

The research reviewed here suggests that heightened risk-taking during adolescence is likely to be normative, biologically driven, and, to some extent, inevitable. There is probably very little we can or ought to do to either attenuate or delay the shift in reward sensitivity that takes place at puberty, a developmental shift that likely has evolutionary origins. It may be possible to accelerate the maturation of self-regulatory competence, but no research has examined whether this can be done. We do know that individuals of the same age vary in their impulse control, planfulness, and susceptibility to peer influence, and that variations in these characteristics are related to variations in risky and antisocial behavior (Steinberg, 2008). Although there is a wealth of studies showing familial influences on psychosocial maturity in adolescence, indicating that adolescents who are raised in homes characterized by authoritative parenting (i.e., parenting that is warm but firm) are more mature and less likely to engage in risky or antisocial behavior (Steinberg, 2001), we do not know whether this link is mediated by changes in the underlying bases of self-regulation, or whether they mainly reflect the imposition of external constraints (through parental monitoring) on adolescents’ access to harmful situations and substances. Nonetheless, there is reason to study whether altering the context in which adolescents develop may have beneficial effects on the development of self-regulatory capacities. Understanding how contextual factors, both inside and outside the family, influence the development of self-regulation, and the neural underpinnings of these processes, should be a high priority for those interested in the physical and psychological well being of young people.

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Juvenile Crime and Criminal Justice: Resolving Border Disputes

Jeffrey Fagan

Summary
Rising juvenile crime rates during the 1970s and 1980s spurred state legislatures across the country to exclude or transfer a significant share of offenders under the age of eighteen to the jurisdiction of the criminal court, essentially redrawing the boundary between the juvenile and adult justice systems. Jeffrey Fagan examines the legal architecture of the new boundary-drawing regime and how effective it has been in reducing crime.

The juvenile court, Fagan emphasizes, has always had the power to transfer juveniles to the criminal court. Transfer decisions were made individually by judges who weighed the competing interests of public safety and the possibility of rehabilitating young offenders. This authority has now been usurped by legislators and prosecutors. The recent changes in state law have moved large numbers of juveniles into the adult system. As many as 25 percent of all juvenile offenders younger than eighteen, says Fagan, are now prosecuted in adult court. Many live in states where the age boundary between juvenile and criminal court has been lowered to sixteen or seventeen.

The key policy question is: do these new transfer laws reduce crime? In examining the research evidence, Fagan finds that rates of juvenile offending are not lower in states where it is relatively more common to try adolescents as adults. Likewise, juveniles who have been tried as adults are no less likely to re-offend than their counterparts who have been tried as juveniles. Treating juveniles as adult criminals, Fagan concludes, is not effective as a means of crime control.

Fagan argues that the proliferation of transfer regimes over the past several decades calls into question the very rationale for a juvenile court. Transferring adolescent offenders to the criminal court exposes them to harsh and sometimes toxic forms of punishment that have the perverse effect of increasing criminal activity. The accumulating evidence on transfer, the recent decrease in serious juvenile crime, and new gains in the science of adolescent development, concludes Fagan, may be persuading legislators, policymakers, and practitioners that eighteen may yet again be the appropriate age for juvenile court jurisdiction.

Jeffrey Fagan is a professor of law and public health at Columbia University. He thanks Ryan Pakter for excellent research assistance.
At the outset of the juvenile court more than a century ago, juvenile court judges were given the option to expel cases and transfer them to criminal court. Transfer was an essential and necessary feature of the institutional architecture of the new juvenile court. Indeed, transfer helped maintain the court’s legitimacy by removing hard cases that challenged the court’s comparative advantage in dealing with young offenders—cases that critics could use to launch attacks on the court’s efficacy and therefore its core jurisprudential and social policy rationales.

Unlike today, though, hard cases in the early years of the juvenile court did not necessarily involve children charged with murder or other violence. Rather, the youth who were expelled more often were thought to be “incorrigible”—repetitive delinquents whose failure to respond to the court’s therapeutic regime signaled the intractability of their developmental and social deficits. Such cases negated the theory of the court: these youth’s repeated failures to respond to treatment canceled their eligibility for protection from the harmful regimes of criminal punishment. In fact, for more than five decades, juveniles charged with murder were more likely than not to be retained in the juvenile court, beneficiaries of both its diversionary and stigma avoidance rationales.

During these years, decisions to transfer youth to criminal court were made routinely and almost exclusively by juvenile court judges with little attention or scrutiny from legislators, advocates, scholars, or the press. Their decisions were individualized to the unique factors for each youth. That is, judges decided which youth were immature and “amenable to treatment” on a case-by-case basis. In some instances, transfer decisions were based on the severity of the offense, where principles of proportionality—the requirement that the punishment fit the crime—trumped collateral considerations that might have otherwise mitigated the case for transfer.

These procedures lasted for decades, until 1966, when the U.S. Supreme Court in *Kent v. U.S.* identified constitutionally sanctioned standards, criteria, and procedures governing decisions by the juvenile court to waive its jurisdiction over the offending adolescent. Signs of “maturity” and “sophistication” in the crime were important parts of the *Kent* calculus, signaling to the judge that the young offender posed a danger for further crimes. Adolescents who were deemed “amenable to treatment” were retained in the juvenile court. In deciding whom to waive to the criminal court and whom to retain in the juvenile court, judges relied heavily on the evaluations of social work professionals whose recommendations on waiver were usually persuasive and authoritative to the court.

*Kent* was decided during the mid-1960s, when both juvenile and adult crime began to spike in the United States. In reaction to the sharp rise in crime, many states began in the mid-1970s to redesign the laws and revise the philosophy that had long shaped the boundary between juvenile and criminal courts. Popular reactions to rising crime and violence shaped the social and political context of the restructuring, a process that continued through the late 1990s, when juvenile crime began a decade-long decline. As adolescents came increasingly to be feared as perpetrators of the most serious and violent crimes, the principles of rehabilitation that were essential to the juvenile court were largely abandoned. Judicial discretion was weakened. In some
states, judicial authority was replaced with politically designed sentencing structures that fixed punishment to crime seriousness. In other states, the decision whether to try a juvenile as an adult was either shifted to the prosecutor or was made by legislators who carved out large groups of youth who were excluded from the juvenile court.

Demands for dismantling the juvenile court’s judicially centered waiver regime focused on four issues: inconsistencies and disparities from one case to the next, racial biases, insensitivity by judges to the seriousness of adolescent crimes, and rising rates of serious juvenile crime that signaled the failure of the juvenile court and corrections to control youth crime. The critiques motivated state legislatures across the country to remove judicial discretion by disqualifying large sectors of the juvenile court population—children as young as ten years of age—and removing them to the jurisdiction of the criminal court. The result was a recurring cycle of legislation, starting in 1978 and lasting for more than two decades, that redrew the boundaries between juvenile and adult court. State legislators passed new laws and revised old ones, steadily expanding the criteria for transfer to the criminal court and punishment as an adult. In effect, the legislatures decided that adolescent offenders had become criminally culpable and more dangerous at younger ages than they were in the past.

This cycle of legislation also reassigned—from juvenile court judges to prosecutors, criminal court judges, legislators, and correctional professionals—a large share of the discretion over the types of cases to be transferred. Today, decisions about court jurisdiction sometimes are made in a retail process repeated daily in juvenile courts or prosecutors’ offices; at other times, corrections officials may decide which youth can be released early and which will serve the balance of long prison sentences; and at other times, the choice is made in a wholesale legislative process by elected officials far removed from the everyday workings of the juvenile courts.

These choices involve not just two very different court systems, but deeply held assumptions about the nature of youth crime, about the blameworthiness of youth who commit crimes, and about how society should reconcile the competing concerns of public safety, victim rights, and youth development. The two courts have sharply contrasting ideas about adolescents who break the law—their immaturity and culpability, whether they can be treated or rehabilitated, the security threats they pose, and the punishment they might deserve. Whatever the motivation, sending an adolescent offender to the criminal court is a serious and consequential step. It is an irreversible decision that exposes young lawbreakers to harsh and sometimes toxic forms of punishment that, as the empirical evidence shows, have the perverse effect of increasing criminal activity.

Nearly four decades after Kent and three decades after this restructuring began, it is now possible to look at the results of this large-scale experiment in youth and crime-control policy. In this article I examine the new boundaries of the juvenile court from three different perspectives. The first perspective is doctrinal or statutory: what is the legal architecture of the new boundary-drawing and boundary-maintenance regimes? The second perspective is conceptual and jurisprudential: what are the justifications for the adult punishment of juvenile offenders, and what do the new boundaries signal about popular views on youth crime, about the appropriate responses to such crime, and
about the theory of a juvenile court stripped of its most challenging cases? The third perspective involves policy. Looking at the new boundaries from a policy perspective requires assessing empirical evidence on the reach, consequences, and effectiveness of relocating entire groups of juvenile offenders and offenses to the criminal court. After revisiting the jurisprudential and policy issues that are the heart of this debate, I look to the future of law and policy regulating the upper boundary of the juvenile court.

Statutory Architecture of Juvenile Transfer

In the midst of the 1978 New York gubernatorial election, a fifteen-year-old named Willie Bosket shot three strangers on a New York City subway platform.\(^{10}\) The horrific murder evoked a fierce legislative response. The traditionally shorter sentences in the juvenile court for dangerous young men like Willie became the focus of widespread outrage and, quickly, political action. New York legislators promptly passed the Juvenile Offender Law,\(^{11}\) which lowered the age of majority for murder to thirteen and to fourteen for other major felonies. The new law signaled a broad attack on the structure and independence of the juvenile court for dangerous young men like Willie became the focus of widespread outrage and, quickly, political action. New York legislators promptly passed the Juvenile Offender Law,\(^{11}\) which lowered the age of majority for murder to thirteen and to fourteen for other major felonies. The new law signaled a broad attack on the structure and independence of the juvenile court, a major restructuring of the border between juvenile and criminal court that was repeated across the nation in recurring cycles for more than two decades.

Current Boundary-Drawing Regimes

At its birth, the Juvenile Offender Law was, and remains today, the nation’s toughest law on juvenile crime. New York State was already tough on juvenile crime, one of three states in the nation where the age of majority was sixteen.\(^{12}\) Two years earlier, it had passed the Predicate Felony Law, a measure that mandated minimum terms of confinement for serious juvenile offenders in juvenile corrections facilities.\(^{13}\) Determinacy in sentencing—that is, introducing certainty both in sentence length and in conditions—was nothing new for adults, but this law was the first of its kind for juveniles.\(^{14}\) But the JO Law, as it came to be known, trumped the Predicate Felony Law in ways that signaled the trend that was to come.

First, the legislative branch itself assumed transfer authority by excluding entire categories of juvenile offenders and offenses from the jurisdiction of the family court and removing them to the criminal court.\(^{15}\) The lawmakers could simply have curtailed the discretion of family court judges, but the JO Law foreclosed any role for them. One reading of the law, then, was as an attack on the family court and its deep adherence to the principles of individualized justice and “best interests of the child.” The JO Law not only stripped transfer authority from family court judges, but also devolved it to police and prosecutors, whose unreviewable decisions about charging young offenders often determined whether cases met the thresholds that would trigger a transfer.\(^{16}\)

Second, the new law based the transfer decision solely on age and offense. It accorded no weight to culpability, mitigation, or any other individual factor, including either therapeutic needs or prior record. It assumed that all youth in these age-offense categories were both sufficiently culpable as to merit criminal justice sanctions and likely to continue their criminal behavior regardless of any interventions provided for them in juvenile corrections. In effect, the legislators made an actuarial group prediction of future dangerousness.

Third, the new law made sentences for Juvenile Offenders, the label applied to juveniles whose cases were removed by the law, long
Table 1. Transfer Mechanisms by State, 2003

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enough to require trans-correctional placements—placements that began in juvenile settings and continued into the adult corrections system. Thus the law not only mandated transfers but made them routine, a move that affected large numbers of younger offenders who were sentenced to lengthy prison terms despite the absence of a prior record.

In the next two decades, every state in the nation passed legislation to ease and expand the prosecution of juveniles in adult courts. The watershed year was 1995, when seventeen states expanded eligibility for transfer. Most states supplanted or eclipsed the traditional system of judicial transfer from the juvenile court using one or more of the mechanisms built into the design of the JO Law. Still other laws created a new statutory authority to transfer not court jurisdiction but correctional jurisdiction, and ceded that authority to a forum that is more administrative than adjudicative. Some states maintained the structure and primacy of judicial waiver, but increased the number of youth being waived by mandating that waiver be considered for some offense and offender categories and shifting the burden of proof from the prosecution to the defense to show why the accused should not be transferred to the criminal court.

Given its scope and reach, the expansion of transfer for juvenile offenders was a massive social and legal experiment that fundamentally transformed the borders and boundaries of the juvenile justice system. The experiment evolved and strengthened over time: once passed, laws often were re-crafted in recurring legislative sessions to further expand the scope of laws to transfer or remove youth to criminal court at lower ages and for more offenses. As I show below, the experiment took on several unique forms.

**Mechanisms for Juvenile Transfer**

Table 1 arrays the states on each of the mechanisms of juvenile transfer in effect as of 2004. Judicial waiver, statutory exclusion, direct file, and blended sentencing are the mechanisms used to transfer juvenile offenders to adult court.

**Judicial waiver.** Judicial waiver to criminal court is the most common transfer mechanism: forty-seven states and the District of Columbia provide judicial discretion to waive certain juveniles to criminal court. Table 2 shows the age and offense thresholds of waiver eligibility for each state. Historically, judicial waiver decisions were made following a motion by prosecutors. Evidence was presented and argued, and a decision was made. In 1966, in *Kent v. U.S.*, the Supreme Court articulated both procedural and substantive standards to regulate judicial waiver decisions. Though only advisory in the original *Kent* case, the *Kent* guidelines quickly were adopted into law in most states.

Since 1978, judicial waiver criteria and procedures have been redesigned in many states to increase the likelihood of waiver. Some states created a presumption of waiver for specific offenses or offenders, based on age, offense, or prior record. Presumptive waiver shifts the burden of proof from the state to the juvenile to show that he or she should not be transferred. Other states mandate waiver for specific categories of offenses and offenders, often to ensure sentencing terms that can take place only in the criminal court.

**Statutory exclusion.** Statutory exclusions, like New York’s JO Law, relocate entire categories of youth defined by age or offense criteria, or both, to the criminal court. More than half of the states have statutes that exclude some adolescent offenders from the juvenile court.
### Table 2. Eligibility for Judicial Waiver by State, Age, and Offense Type, 2003

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<th>Certain felonies</th>
<th>Capital crime</th>
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Note: An entry in the column below an offense category means that there is some offense or offenses in that category for which a juvenile may be waived for criminal prosecution. The number indicates the youngest possible age at which a juvenile accused of an offense in that category may be waived. “NS” means no age restriction is specified for an offense in that category.

Example: In Tennessee, a juvenile may be waived for criminal prosecution of any offense committed after reaching the age of sixteen (Any offense—16). In addition, a juvenile of any age may be waived for prosecution of first- or second-degree murder or attempted first- or second-degree murder (Murder—NS). Finally, a juvenile of any age may be waived for prosecution of rape, aggravated rape, aggravated or especially aggravated robbery, kidnapping, aggravated or especially aggravated kidnapping, or the attempt to commit any of these offenses (Person offense—NS).

Table 3 shows the age and offense threshold for statutory exclusion in each of those states. In addition to devolving transfer authority to prosecutors and police, these statutes also moot Kent by rendering a legislative judgment about the future behavior and malleability of excluded youth. Exclusions vary from specific offenses, as in New York, to any felony offense at the age of seventeen, as in Mississippi.

**Concurrent jurisdiction and direct file.**
Concurrent jurisdiction gives prosecutors the option and discretion to file cases directly in adult court. Fifteen states have created concurrent juvenile and criminal court jurisdiction for specific categories of offenses and offenders, permitting prosecutors to elect the judicial forum for the adjudication and sentencing of the young offender. Table 4 shows the combinations of offense and age criteria that trigger eligibility for concurrent jurisdiction in each state. A quick glance shows that these statutes are targeted primarily at violent crimes. Most states with
Blended sentencing. Seventeen states give the criminal court the power to impose contingent criminal sanctions for juveniles convicted of certain serious crimes; fifteen states permit juvenile courts to do the same; many give the power to either court. These statutes, known as blended sentencing statutes or extended jurisdiction statutes, identify a specific group of juveniles—based on age, offense, and prior record—whose sentences have separate juvenile and adult components that are linked through a contingent process to determine whether the extended (criminal) punishment will be carried out.\textsuperscript{21} Typically, the adult component is imposed only if the youth violates the provisions of the juvenile portion or commits a new offense. The conditions in the juvenile phase may be narrowly tailored (for example, avoiding subsequent crime) or vague and subjective (for example, making satisfactory “progress” in treatment). Table 5 shows the offense and age criteria for blended sentencing in the states with such provisions. Two states, Vermont and Kansas, permit blended sentences for any offense for youth beginning at age ten. Many other states have no minimum age for one or more of the eligible offense categories.

Although intended to ameliorate the consequences of transfer and waiver, blended sentencing in practice has raised several issues. First is net widening. In Minnesota, for example, blended sentences did not concurrent jurisdiction make youth eligible at age fourteen, though others have either lower or higher age thresholds for specific crimes.

Table 4. State Array of Concurrent Jurisdiction Statutes Permitting Direct File by Prosecutor by Age and Offense, 2003

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<thead>
<tr>
<th>State</th>
<th>Any offense</th>
<th>Certain felonies</th>
<th>Capital crime</th>
<th>Murder</th>
<th>Person offense</th>
<th>Property offense</th>
<th>Drug offense</th>
<th>Weapons offense</th>
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Note: An entry in the column below an offense category means that there is some offense or offenses in that category that may be handled in juvenile or criminal court at the prosecutor’s option. The number indicates the youngest possible age at which a juvenile accused of an offense in that category is subject to criminal prosecution at the prosecutor’s option. “NS” means no age restriction is specified for an offense in that category.

Example: Wyoming provides for concurrent jurisdiction of the following offenses committed by fourteen-year-olds: any felony committed by a juvenile with at least two previous felony adjudications (Certain felonies—14); murder or manslaughter (Murder—14); kidnapping, first- or second-degree sexual assault, robbery, aggravated assault, or aircraft hijacking (Person offense—14); first- or second-degree arson and aggravated burglary (Property offense—14).

reduce the number of waivers; instead, they were given to youth who in the past were sentenced within the juvenile system. Second, the decision to activate the adult portion of the transitional sentence often lacks procedural safeguards and at times lacks accountability. States vary on whether the decision is judicial or administrative, as well as on the evidence necessary to trigger the adult portion of the sentence, on the standard of proof, on whether youth can contest or rebut the evidence against them, on whether they are entitled to representation, and on whether the decision is reviewable. Given the length and conditions of the adult portion of the sentence, a more formal, standardized, and constitutionally sound procedure would be appropriate and consistent with the principles of Gault and McKiever.

Competing Instincts and Second Thoughts
The complexity of state laws, the piecemeal character of the statutory landscape, and the fact that most states have overlapping transfer mechanisms suggests some ambivalence about the instincts to get tough by imposing criminal sanctions on adolescents. Certainly, a state that really wanted to crack down on juveniles could simply lower its age of majority. Yet throughout this thirty-year interval of increasingly tougher sanctions for adolescent offenders, only two states—Wisconsin and New Hampshire—have done so, lowering the age of majority from seventeen to sixteen. Between 1989 and 1995, five states abolished the juvenile death penalty, far more than the number of states that lowered the age of majority in the same period. And one

### Table 5. State Array of Blended Sentencing Statutes by Age and Offense Type, 2003

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<th>State</th>
<th>Statute type*</th>
<th>Any offense</th>
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Note: An entry in the column below an offense category means that there is some offense or offenses in that category for which a juvenile may receive a blended sentence in juvenile court. The number indicates the youngest possible age at which a juvenile committing an offense in that category is subject to blended sentencing. “NS” means no age restriction is specified for an offense in that category.

*Statute types are coded “I” for inclusive, “E” for exclusive, and “C” for contiguous.
†Vermont has an anomalous juvenile blended sentencing provision, which permits a juvenile entering a plea of guilty or nolo contendere in a criminal proceeding to petition for transfer to family court for disposition. Following the transfer, the family court must impose both a juvenile disposition and a suspended criminal sentence. However, there is no minimum age/offense threshold for juvenile blended sentencing in such a case—the provision applies to all juveniles transferred from criminal court for Youthful Offender Disposition.

state—Connecticut—recently raised its age of majority from sixteen to eighteen.

Instead, the states have criminalized delinquency incrementally and in pieces, stopping short of the more obvious and expedient step of lowering the age of majority. The current statutory landscape is full of trapdoors and loopholes that allow some youth—no one knows exactly how many—to escape the reach of the criminal law and its harsher punishments. Legislators appear ambivalent, refusing to completely abandon the principles of juvenile justice, yet seeking to divide delinquents into two categories: those worthy of the remedial and therapeutic interventions of the juvenile court and those who can be abandoned to the punitive regime of criminal justice in the name of retribution and public safety.

Two collateral provisions of the new transfer mechanisms illustrate these competing instincts about adolescence, youth crime, and juvenile justice. Viewed together, they suggest an ambivalent political and social culture on how tough to get with adolescent criminals. The first provision is reverse waiver, the return of transferred cases back to the juvenile court. Reverse waiver is a retail corrective mechanism, designed to detect errors in attributing full culpability or overlooking evidence of amenability to treatment. Twenty-four states permit reverse waiver once cases have been initiated in the criminal courts, including twenty-one of the states with direct file (or prosecutorial waiver) statutes. In some states with statutory exclusion, such as Pennsylvania, these decertification hearings are routine. In New York City, nearly one-third of youth excluded by statute from family court are returned there by the adult court. Cases can be returned to the juvenile court either for adjudication and sentencing or only for sentencing within its statutory authority.

The opposite instinct is evident in the thirty-one states that have enacted “once waived, always waived” legislation. In these states, juveniles who have been waived to adult court and convicted subsequently must be charged in criminal court regardless of the offense. For example, in Virginia, any juvenile previously convicted as an adult is forever excluded from juvenile court jurisdiction. In California, any youth whose case is waived to criminal court qualifies for permanent waiver, regardless of whether he or she is convicted in the first waived case. Permanent waiver can be invoked in ten states, and must be invoked in twelve others, if the offender previously has been adjudicated delinquent.

Thus, the punitive and child-saver instincts for youth crime co-exist uneasily in the current statutory environment, forcing a binary choice between criminal and juvenile court jurisdiction, a choice that is not well suited to reconcile these tensions.

The Enduring Importance of Maturity and Development in Juvenile Justice

What, then, do twenty-five years of transfer activism signal about legal and popular notions of the culpability and maturity of adolescents and about the place of developmental considerations in juvenile justice? The political discourse and legal mobilization that animated the criminalization push beginning in the 1970s was ambiguous about maturity. From the outside, legal academics read the movement as a sign that legislators assumed that young offenders have reached a developmental threshold of criminal responsibility that makes them fully culpable for their crimes. Indeed, even the Kent regulations confused “sophistication of the crime” with

\[\text{Equation}\]
“maturity” and culpability. Critics of the juvenile court argued that proportionality and the concerns of victims should trump the “best interests of the child.” Some argued that proportionality was necessary to maintain the legitimacy of the juvenile court. Others recommended a proportionality regime in the interests of fairness and consistency, deemphasizing but not discarding the notions of immaturity and diminished culpability of adolescents. Public safety concerns also loomed large, with proponents wishing to draw hard lines to determine when longer, incapacitating punishments were needed to protect citizens. Still other critics of the juvenile court preferred the deterrent effects of criminal court punishment over a regime of individualized justice. The notion of immaturity as a culpability discount was set aside or standardized in a complex heuristic of when and for whom transfer is necessary.

Accordingly, the transfer activism of the past two decades did not affirmatively or uniformly reject the notion of developmental immaturity and diminished culpability of youth. In many instances, it merely reserved it for less serious or visible offenders. Functionally, though not explicitly, transfer activism assumes that adolescents are no different from adults in the capacities that comprise maturity and hence culpability. It also assumes that adolescents have the same competencies as adults to understand and meaningfully participate in criminal proceedings. In the absence of good social and behavioral science, legislators were free to make those assumptions.

But as Elizabeth Scott and Laurence Steinberg show in their article in this volume, there are good reasons now to doubt these claims. For example, in *Roper v. Simmons*, the 2005 U.S. Supreme Court decision banning execution of adolescents younger than eighteen who commit capital murder, the Court took notice that juveniles are less culpable because they are “more vulnerable and susceptible to negative peer influences and outside pressures, including peer pressure,” and are “comparatively immature, reckless and irresponsible.” The sum of these developmental gaps between adolescents and adults, according to the *Roper* majority, “. . . means it is less supportable to conclude that even a heinous crime committed by a juvenile is evidence of irretrievably depraved character.”

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**While the law moves toward waiving increasingly younger teens into criminal court, social and biological evidence suggests moving in the other direction.**

The *Roper* court drew both from social science research and from “anatomically-based” evidence of “concrete differences” between juveniles and adults showing that “critical developmental changes in key brain regions occur only after late adolescence.” So behavioral science and natural science are nearly perfectly aligned to show that “the average adolescent cannot be expected to act with the same control or foresight as a mature adult.”

The new science of juvenile culpability runs counter to the patterns in transfer law. In transfer law, the downward ratcheting of the age at which youth are exposed to adult punishment is sharply at odds with evidence
that full maturity in culpability and blame-worthiness comes later than eighteen, not earlier. The recent push to lower the age threshold for treating juvenile offenders as adults assumes that they are sufficiently mature to be held culpable for their crimes, that any deficits in their maturity are minor compared with the harm they have done, and that unless punished harshly, they are likely to offend again. The new scientific evidence on developmentally constrained choices suggests that the law has been moving in the wrong direction.\textsuperscript{38}

The new developmental and neuropsychological research has strong implications for laws that funnel adolescents wholesale into the adult courts. The new evidence casts reasonable doubt on statutes that sweep all fourteen-, fifteen-, or sixteen-year-old offenders into the criminal justice system. Some adolescent offenders may have reached a threshold of maturity by age sixteen consistent with the legal conceptions of maturity-culpability, but many others have not. In legal regimes that assume maturity where it simply does not exist, the new evidence on immaturity, both in the capacities that comprise culpability and the brain functions that launch them, argues persuasively against transfer to the criminal court.

The alternative to wholesale transfer is to rely on case-by-case assessments, much as the early juvenile courts did in deciding which youth were so incorrigible as to warrant expulsion from the juvenile court. Yet given the limitations of prediction, one might worry about the accuracy of such assessments.\textsuperscript{39} Developmental variability means that the younger the line for eligibility for criminal punishment is drawn, the greater the risk of error.\textsuperscript{40} So, for example, the new science should raise strong cautions about laws that draw the line at age twelve or younger. One can hardly expect legislators, prosecutors, and judges to systematically and accurately make these complex judgments for young adolescents.\textsuperscript{41} Getting it wrong has serious costs. Waiver to adult court is not exactly a death sentence, but it often is irreversible and has serious consequences, as I show next, both for adolescents and for public safety. While the law moves toward waiving increasingly younger teens into criminal court, social and biological evidence suggests moving in the other direction.

**The Reach of Transfer Law**

The complexity of the statutory landscape challenges efforts to compile accurate and comprehensive estimates of the reach of transfer laws.\textsuperscript{42} Accurate tallies of the number of adolescents transferred to criminal court would require counts in state court administrative databases of the number of cases filed in the criminal court by age, race, and offense, plus data on their dispositions to determine how many transferred cases remain in criminal court after reverse waiver or judicial review. These data may exist, but they are highly disaggregated by state and, in some instances, exist only in local court records.

**How Many Are Transferred?**

Estimates of the number of youth tried and sentenced in the criminal courts are highly sensitive to data sources and methods of counting. Donna Bishop estimates that between 210,000 and 260,000 minors were prosecuted in criminal courts in 1996.\textsuperscript{43} Most of those (80 percent) were excluded from juvenile courts either by the statutory age boundary for juvenile court or by statutes that exclude specific categories of offenses and offenders. The Campaign for Youth Justice makes a similar estimate: 7,500 cases are
judicially waived to criminal court each year, 27,000 are sent by direct file by a prosecutor, and 218,000 completely bypass the juvenile system and are sent by legislation that sets a lower age of adulthood than eighteen.\footnote{Comparing this figure with the estimated 973,000 youth who received dispositions in the juvenile court in the same year, Bishop concludes that between 20 and 25 percent of all juvenile offenders younger than eighteen were processed in the criminal courts.}

These figures are difficult to verify, however. For example, there are no comprehensive records of direct file activity by prosecutors. And records of minors prosecuted in criminal court are available only for samples from the nation’s largest counties and only for some years,\footnote{Or from surveys of prosecutors who report secondary data of uncertain reliability.} or from surveys of prosecutors who report secondary data of uncertain reliability. These data sources are useful as lead indicators of trends over time, but are not helpful in generating estimates of the number and rate of juvenile offenders in the criminal courts.

Although precise estimates may be elusive, it is possible to verify current estimates by aggregating other evidence. “Front-end statistics” on the number of youth judicially transferred suggest that traffic from juvenile to criminal court is heavy. For example, the National Center for Juvenile Justice examined judicial waiver between 1988 and 1999 in more than 2,000 juvenile courts representing 70 percent of the U.S. population. Figure 1 shows that the rate of waiver is low and, with two exceptions, stable over time. Approximately eight cases were waived for every 1,000 formally processed over the decade, fewer than 1 percent of all cases. Waiver rates peaked in 1992 at 1.6 percent of all cases and declined through the rest of the decade consistent with an overall decline in juvenile arrests. Person offenses were waived most often during the decade (1.1 percent of all formal cases), and property cases least often.\footnote{Judicial waivers for drug offenses declined from a peak of 4 percent in 1991 to slightly more than 1 percent in 1999. Given the low frequency of judicial waivers, the attack on the autonomy of juvenile court judges to make waiver decisions is puzzling.}

These front-end statistics on waiver do not include juvenile transfers to criminal court via direct file or statutory exclusions, nor those
minors (as in New York or other states with age limits below eighteen) who are automatically considered adults by virtue of the state age of majority. Yet it is difficult to count these groups. Records often are not kept, and arrest data rarely differentiate the subchapters in penal codes that trigger statutory exclusion.

“Back-end statistics” on youth serving sentences in adult jails and prison illustrate the consequences of all transfer mechanisms. These data provide a different picture. The number of youth under age eighteen in adult jails rose sharply through the 1990s to a high of almost 9,500 in 1999 and then leveled off to an average of just over 7,200 since 2000. Figure 2 shows that between 1990 and 2004 there was a 208 percent increase in the number of juveniles younger than eighteen serving time in adult jails on any given day. The share of youth under age eighteen among total jail populations, however, is dropping; these youth accounted for 1.4 percent of the total population of state jails in 1994, 1.2 percent in 2000, and 1 percent in 2004.47

Figure 3 shows that the number of juveniles younger than eighteen admitted to state prisons nationally peaked in 1995 at approximately 7,500 and declined over the next seven years. The share of these youth among prison populations is also dropping. Youth under age eighteen accounted for 2.3 percent of the total population of state prisons in 1996, more than double the share (1.1 percent) in 2002. Since 1995, the total prison population has risen 16 percent, while the number of youth under age eighteen in prison has dropped 45 percent.48

Finally, in California, 6,629 youth were sentenced to the California Department of Corrections between 1989 and 2003 to serve sentences as adults.49 The average incarceration rate was 475 a year, but varied from a low of 172 in 1989 to a peak of 794 in 1997. In 2003, 504 minors were sentenced to adult prison in California.

Together, these front- and back-end estimates suggest that the commonly cited estimate that 210,000 youth a year are transferred to
criminal court may be an upper bound. How much lower the estimate should be is difficult to determine, and any estimate is prone to error. What can be said is that there is substantial traffic between the juvenile and criminal courts, and most of it is one-way. And the consequences of transfer are severe. Each year tens of thousands of youth below age eighteen are newly incarcerated in prisons and jails, often together with adults, launching an experience whose irrevocable stigma clouds their future economic and social lives. By any measure, this is a large-scale social "experiment" in youth policy whose effects, as I show later, are anything but positive.

Race and Transfer

The overrepresentation of minority youth among those transferred is not surprising, given their overrepresentation at every stage of juvenile and criminal justice processing. Whether minority youth are overrepresented relative to their crime rates, and especially relative to the types of crimes that are enumerated in many state transfer and exclusion laws, is a more complex question, but the balance of evidence suggests that they are. Again, the picture of disparity varies at different stages in the juvenile and criminal justice systems. A back-end view, for example, suggests strong disparities among youth serving in prisons. In 1997, Bureau of Justice Statistics data showed that between 1985 and 1997, 58 percent of the youth admitted to state prisons under eighteen years of age were black and 15 percent were Hispanic. The Campaign for Youth Justice cites data from the California Department of Corrections that in 2003, black youth were 4.7 times more likely to be transferred than white youth, and Hispanic youth 3.4 times more likely. These populations would include youth transferred judicially to criminal court, as well as those excluded by statute under Proposition 21. The same report cites Virginia Department of Corrections data from 2005 showing that black youth comprise less than 50 percent of youth arrested but more than 73 percent of youth entering adult prisons.

A front-end view suggests fewer disparities in waiver. For example, Charles Puzzanchera reports that 46 percent of the judicially waived population during 1990–99 was non-white. Yet most analysts duck the question
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Table 6. Index of Racial Disparity in the Juvenile Justice System, 2002

<table>
<thead>
<tr>
<th>Decision points</th>
<th>White</th>
<th>Black</th>
<th>Relative rate index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Juvenile arrests</td>
<td>1,576,400</td>
<td>625,000</td>
<td></td>
</tr>
<tr>
<td>Cases referred to juvenile court</td>
<td>1,086,700</td>
<td>473,100</td>
<td></td>
</tr>
<tr>
<td>Cases detained</td>
<td>199,700</td>
<td>118,600</td>
<td></td>
</tr>
<tr>
<td>Cases petitioned</td>
<td>596,800</td>
<td>306,000</td>
<td></td>
</tr>
<tr>
<td>Cases judicially waived to criminal court</td>
<td>4,400</td>
<td>2,500</td>
<td></td>
</tr>
<tr>
<td>Cases adjudicated delinquent</td>
<td>421,400</td>
<td>179,000</td>
<td></td>
</tr>
<tr>
<td>Adjudicated cases resulting in placement</td>
<td>90,400</td>
<td>47,500</td>
<td></td>
</tr>
</tbody>
</table>

Rates (per 100)

<table>
<thead>
<tr>
<th>Majority</th>
<th>Minor</th>
<th>Rate differential</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td>Arrests to population*</td>
<td>6.1</td>
<td>11.5</td>
</tr>
<tr>
<td>Cases referred to juvenile arrests</td>
<td>68.9</td>
<td>75.6</td>
</tr>
<tr>
<td>Cases detained to cases referred</td>
<td>18.4</td>
<td>25.1</td>
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<tr>
<td>Cases petitioned to cases referred</td>
<td>54.9</td>
<td>64.7</td>
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<tr>
<td>Cases waived to cases petitioned</td>
<td>0.7</td>
<td>0.8</td>
</tr>
<tr>
<td>Cases adjudicated to cases petitioned</td>
<td>70.6</td>
<td>58.5</td>
</tr>
<tr>
<td>Placements to cases adjudicated</td>
<td>21.5</td>
<td>26.5</td>
</tr>
</tbody>
</table>

- For every 100 white youth ages ten to seventeen in the U.S. population, there were 6.1 arrests of white youth under age eighteen. The rate for black youth was 11.5, yielding an RRI for the arrest decision of 1.9. The black rate was almost double the white rate.
- Except for the adjudication decision point, the RRI shows a degree of racial disparity for black youth. This disparity accumulates throughout the process, so that in the end, while black youth were 16 percent of the youth population and were involved in 28 percent of the arrests of youth in 2002, they accounted for 33 percent of the juvenile court cases that resulted in an out-of-home placement.

* Population ages ten to seventeen = 25,994,400 (white) and 5,431,300 (black).


of whether waiver is racially disproportionate to race-specific crime or arrest rates. Instead, they more often compute race differences based on earlier stages of case processing, mooting the cumulative effects of how youth of different races enter the system. As part of the federal Disproportionate Minority Confinement program, Howard Snyder and Melissa Sickmund computed a Relative Rate Index to estimate disparities at each stage of juvenile justice processing. Table 6 reproduces the chart for 2002 from their most recent report. Large disparities between black and white youth are evident at arrest and at detention. Judicially waived cases show fewer disparities. But these data are misleading in two ways. First, they filter out cumulative disadvantages by race from the outset of a case in the juvenile court—decisions in charging, detention, charge reduction, and the decision to seek waiver itself—and look only at the decision to waive. This selective filtering, or “selection bias,” seriously limits understanding of race and waiver. Second, the judicial waiver data are likely underestimates that do not take into account youth excluded by statute from juvenile court jurisdiction. A more comprehensive data set used by Bishop, including data on all three routes of transfer, reports that 69 percent of the tens of thousands of youth excluded each year by statute are non-white. No estimate of racial differences in youth crime, apart from homicide, suggests that minority youth account for such a large share of crime.
The Snyder and Sickmund report on judicial waiver also claims that race disparities are narrowing. The share of white defendant cases in juvenile court that were waived increased from 1990 to 1999 by 9 percent, while the share for black youth declined by 24 percent. This decline, however, may be an artifact of the expansion of other pathways for transfer during this period, an expansion that may have disproportionally affected minority youth who were more often arrested for laws that were the targets of legislative activism.

The real issue, though, is not whether disparities in waiver exist because minority youth are more often involved in crime or because they are arrested at disproportionately higher rates per crime than are white youth relative to their involvement in crime. Rather, the essential question about race and transfer is whether there is disparate treatment given the fact of contact with the juvenile or criminal court. We might expect more black youth to be judicially waived or in adult prison relative to white youth if their offending rates are higher. But disparity might better be viewed in terms of the balance across racial and ethnic groups in the rate of transfer relative to each group’s arrest rate, rather than their offending rate. This measure is akin to the ways that epidemiologists compute relative risk ratios given exposure to an agent.

There are reasons to think that these ratios are not balanced and that racial disparities in the incarceration of youth under age eighteen in state prisons cannot be explained simply by differences in offending. The racial disparities in incarceration are produced by the cumulative effects of an entanglement of discretionary processes at each stage of the juvenile and criminal justice process. Analysts consistently find evidence of selective enforcement that targets minorities well beyond what any difference in their crime rates might predict. A long line of studies shows how race influences police officers’ decision making and judgment about suspicion and dangerousness. Social science evidence also suggests the banal, commonplace, and normalized influence of racial biases in everyday case processing in the juvenile and criminal courts, much of it influenced by implicit biases. Either directly or through surrogates and substitutes such as clothing, demeanor, neighborhood, or other racialized cues, unconscious and conscious biases influence decisions about whom to arrest and how to charge and sentence them.

Either directly or through surrogates and substitutes such as clothing, demeanor, neighborhood, or other racialized cues, unconscious and conscious biases influence decisions about whom to arrest and how to charge and sentence them.

Evidence from other corners of criminal justice also shows the cumulative effects of racial bias, from which youth are not exempt. Both discretionary and statutory routes for youth to the criminal court pass through these gates. Accordingly, disparities in transfer are the product of a cumulative process that involves the systematic and cascading application of discretion across the juvenile and criminal justice systems, as well as in structural components created both by policy and law.
The Punitive Reach of Transfer

Transfer statutes and policy typically are designed to increase the certainty, length, and severity of punishment. Leniency, or limits on penal proportionality, was one of the lightning rods for those hostile to the juvenile court who advocated for tougher measures for juvenile crime. The evidence, however, suggests that these advocates only partially achieved their goals and that they put in place a far more complex and contingent pattern of sentencing and punishment than they might have anticipated.

Several studies illustrate the variability and contingencies in sentencing of transferred cases in the criminal courts. For example, Martin Roysher and Peter Edelman showed in the 1970s that sanctions were no more severe in criminal court than in juvenile court in the years immediately following passage of the JO Law in New York; in many cases, and in some upstate counties, sentences were less harsh. Over time, research in different locales by Kay Gillespie and Michael Norman, by Dean Champion, and by Barry Feld, all showed similar patterns. Contrary to the retributive intent of waiver, Marilyn Houghtalin and Larry Mays showed that juveniles are sanctioned less severely in criminal court than are their counterparts in juvenile court, through relatively lenient sanctions and higher case attrition. In 1984 Peter Greenwood and several colleagues offered several explanations why adolescents might face more lenient sanctions in criminal court, and, based on recent studies in Florida, Minnesota, and New York, these explanations seem accurate today. Young offenders in criminal court may appear less threatening—physically smaller and younger, shorter criminal records—than their older counterparts with longer records. Moreover, even though juvenile records are unshielded legally in many jurisdictions, Barry Feld showed that the juvenile’s criminal history often may be unavailable to the criminal court because of the functional and physical separation of juvenile and criminal court staffs who must compile and combine these records and, sometimes, because of sheer bureaucratic ineptitude. As a result, the same juvenile recidivist who appears incorrigible to the juvenile court may appear to the criminal court to be a less chronic and less serious offender. However, many states have removed these shields, and juvenile records are now routinely considered in criminal court.

But more recent studies show that the leniency gap has been reversed. In the Florida studies, Donna Bishop and her colleagues reported that youth charged with violent crimes were more likely to be incarcerated if sentenced in the adult court. Aaron Kupchik and several colleagues showed a similar pattern comparing structured sentencing of transferred youth in New York with discretionary sentencing of youth in the juvenile court in New Jersey. In many jurisdictions, structured sentencing determines the disposition in criminal court: the seriousness of a young adult’s present offense and adult criminal history are the calculus of sentencing. This is one reason why nearly one-third of youth aged sixteen and seventeen in New York with no previous record were sentenced to adult prison under the New York JO Law. This figure reflects the emphasis on violent crimes in expanded transfer laws and procedures across the states. National trends on judicial waivers show that adolescents charged with and waived for violent crimes receive substantial sentences as adults. Local studies show the same. For example, Cary Rudman and several colleagues, looking only at adolescents charged with violent crimes in four jurisdictions, found that the criminal court was more punitive. The likelihood of
incarceration was the same in juvenile and criminal court, but juveniles waived to criminal court received longer sentences—almost always in adult prisons—because there was no upper age boundary for incarceration. Barry Feld and Marcy Podkopacz found that waived youth in Minneapolis received longer sentences for violent crimes, but shorter sentences for property crime, than retained youth. Fagan, comparing sentences in New York and New Jersey for offenders aged fifteen and sixteen in 1981–82, found that youth adjudicated on robbery or assault in adult rather than juvenile court were more likely to be incarcerated and received longer sentences. But in a second study of juveniles sentenced five years later in the same two courts, the gap between juvenile and criminal court sanctions had narrowed significantly.

Thus, the age-offense relationship apparently produces a peculiar disjunction in the sentences of juveniles as adults. When sentenced as adults, young property offenders may receive shorter sentences than do their juvenile counterparts, though young violent offenders may receive dramatically longer sentences and under more punitive conditions than do their juvenile counterparts.

Comparative Correctional Experiences
What little research there is on the correctional experiences of transferred youth has focused on transferred youth who are locked up in state prisons. Little is known about the short stays of such youth in county jails. Nothing is known about how they experience probation supervision, including whether they are linked to services that can help them avoid a return to crime. Nor is anything known about how youth receiving blended sentences, or contingent punishment, experience their two-stage correctional stays. Likewise, for youth released from prison, little research charts their re-entry experiences and outcomes. More research is needed about all these areas of transfer policy to fully understand why transfer itself, not just the experiences of the group that goes to adult prison, seems to produce worse outcomes.

Few modern criminologists or correctional administrators maintain the illusion that incarceration has either broad therapeutic benefits or a strong deterrent effect.

As I show later, incarceration does explain the higher recidivism rates of transferred youth. Why should their correctional experiences matter? There are two reasons. The first is that the primary thrust of transfer laws was to increase the length and severity of punishment. A serious assessment of transfer as a policy must engage its retributive component. One impulse behind transfer activism, fed by the popular perception that the juvenile court’s punishment tools were mismatched to the increasing severity of youth crime, was to challenge the juvenile court to attain proportionality in the length and severity of its punishments. A careful analysis of transfer, then, should consider the quality of retribution and the possibility that, for adolescents, lengthy stays in harsh conditions of confinement can be disfiguring, with unknown developmental costs.

Comparisons of juvenile and adult correctional settings suggest that youth in prisons face higher risks of violence. Martin Forst and several colleagues showed how the sharp policy and atmospheric differences between
the security orientation in adult prisons and the therapeutic and educational orientations of juvenile facilities translate into serious consequences for safety and mental health. They compared the experiences of 140 youth in adult and juvenile facilities over four locales. Youth in adult prisons reported higher rates of physical and sexual assault than did matched samples of youth in juvenile corrections. Using standardized scales, youth in juvenile settings reported that staff was more involved and helpful in social and behavioral services. They reported stronger educational programs and employment training and rated therapeutic case management services higher. They also noted that staff in the juvenile facilities were far more attentive to building and strengthening ties to family and other social networks that would be influential on release. Bishop and Frazier reported nearly identical responses in their Florida sample.

In a replication a decade later, Fagan and Kupchik found fewer differences in victimization than did Forst and his colleagues. In fact, juvenile facilities appeared to be more chaotic, with higher levels of drug use and self-reported offending and victimization. But youth in adult prisons nevertheless felt less safe and reported significantly more symptoms of mental illness and post-traumatic stress disorder. Even in the more outwardly stable contexts of adult prisons, where the social organization is maintained by rigid inmate networks, the perceptions and consequences of being surrounded by cohorts of older, often violent, inmates produced stronger feelings of insecurity and collateral mental health consequences.

A second reason why correctional experience should matter is one of principle. The corrective component of punishment often is invoked to justify its effects, yet incarceration seems to have little correctional effect. Few modern criminologists or correctional administrators maintain the illusion that incarceration has either broad therapeutic benefits or a strong deterrent effect. Recidivism rates in adult prisons are simply too high—more than two prisoners in three released in 1994 returned to prison within three years—to sustain beliefs in either the rehabilitative or deterrent component of adult corrections. What is the principle, and corresponding youth policy, that mandates exposure to conditions that are likely to produce failure, a failure with perhaps lasting impacts on an adolescent’s social development and well-being far into the life course? We already know that incarceration experiences in adolescence radically curtail social, economic, and psychological development over the life course. Do incapacitation or retribution concerns justify such costs? These policy goals tell us what to punish and perhaps whom, but they do not inform a policy of how to punish.

**The Public Safety Effects of Transfer Laws**

Research on the deterrent effects of transfer on public safety focuses on both general and specific deterrence. Most of the evidence on general deterrence suggests that laws that increase the threat of sentencing and incarceration as an adult have no effect on youth crime rates. Research on specific deterrence consistently finds that adolescent offenders transferred to criminal court have higher rates of re-offending than do those retained in juvenile court. Rarely do social scientists or policy analysts report such consistency and agreement under such widely varying sampling, measurement, and analytic conditions.

**General Deterrence**

Researchers investigating general deterrence
typically estimate differences in rates of offending by adolescents under varying sanctioning and punishment regimes. Study designs to test general deterrent effects sort into two approaches. Most studies use time series methods, comparing crime rates before and after the passage of laws lowering the age of majority for specific categories of offenses and offenders. Others compare youth crime rates in states with different statutory boundaries for the age of majority. Both types of studies often use econometric models to compare age-specific crime rates for states with different age thresholds for criminal court eligibility, statistically controlling also for punishment contingencies and other covariates of crime and justice system performance. The evidence tips against the claim that youthful offenders are sensitive to the age boundaries that make them eligible for punishment in the criminal courts. The consensus cuts across studies that vary in study designs, time periods, locales, and methods of analysis.

Most general deterrence studies find that offending rates among adolescents either remain unchanged or increase once they reach age-defined eligibility for the criminal court. Simon Singer and David McDowall reported no general deterrent effects when New York State passed the JO Law in 1978, despite widespread publicity and enforcement of the law statewide. That finding is surprising, because young people in New York evidently were well aware of the law, a fundamental prerequisite for deterrence. Nevertheless, the findings were mixed, especially among older cohorts of youth who were closer to the age of majority. The results were uneven across the state, as well, with little effect on youth crime rates in the higher-crime areas, including New York City. Two other single-state studies—one in Idaho and one in Washington—reported similar findings. Eric Jensen and Linda Metsger used time series analysis to estimate differences in juvenile crime rates three years before and five years after Idaho passed a law that mandated transfer for youth aged fourteen to seventeen charged with any of five violent crimes. Juvenile crime rates in Idaho actually rose after the law was passed, while crime rates in neighboring states were declining. Robert Barnowski used time series models to estimate changes in juvenile crime rates before and after passage of Washington’s 1994 Violence Reduction Act and a 1997 amendment expanding the law. He analyzed juvenile arrest rates for youth aged ten to seventeen from 1989 to 2000 and compared state trends with national trends. He found no differences in the two trends; juvenile arrest rates for the target crimes peaked in 1994 for each.

Only one study, by Steven Levitt, reported that adolescent offenders are sensitive to the age boundary for adult punishment. Levitt estimated significantly lower age-specific crime rates for adolescents between 1978 and 1993 in states where the age of majority was seventeen than in states where offenders were eligible for criminal court at age eighteen. But the finding was not true across the board: the effects of jurisdictional age were conditioned on the comparative likelihood of incarceration in the respective courts. Juvenile crime rates were lower in states with higher juvenile incarceration rates, and marginal increases in the juvenile incarceration rate had greater leverage on juvenile crime rates than did the age of jurisdiction. Levitt’s analysis suggests that strengthening the correctional response in the juvenile system can improve public safety without exacting the social and crime costs of transfer.
Across all these studies, the great majority of the evidence agrees that young offenders seem unresponsive to sharp changes in the risk of harsher penalties and that the age at which they are exposed to these penalties seems to matter little if at all. The appetites of adolescents for crime and its rewards seem invariant to punishment threats. David Lee and Justin McCrary characterize young offenders as myopic, unfazed by the threat of short prison sentences and discounting the consequences and likelihood of longer ones. It is hardly unreasonable to assume that knowledge of changes in the law diffuses efficiently through adolescent peer networks that are, in effect, information markets to manage a variety of adolescent risk behaviors. Yet in these highly localized and efficient networks, teens seem to discount changes in the law’s consequences in a manner that typifies adolescent reasoning and planning. A generalized change in the risk environment seems unable to leverage changes in behavior.

Specific Deterrence
As a policy matter, the critical test for transfer is whether it enhances public safety. Recent research on transfer suggests that, for youth with comparable individual characteristics and correctional experiences, recidivism rates are either the same or significantly higher for transferred youth than for youth retained in the juvenile court. Accordingly, studies on the specific deterrent effects of criminal court sanctions show no evidence of public safety benefits from transfer.

Another single-state study, in Florida, combined age of majority and changes in sanctioning probabilities to estimate the effects of reaching the age of majority on age-specific crime rates. Lee and McCrary used panel methods to estimate the probabilities of rearrest for a sample of youth arrested before age seventeen between 1989 and 2002 in Florida. The authors constructed complete criminal histories going back to the date of first arrest and tracked them over time, controlling for punishment experiences. Again, they found little change in offending rates once youth turned age eighteen and faced more severe and longer terms of punishment as adults. They also found no effects of transfer to criminal court. They concluded that none of the mechanisms to toughen punishment for adolescents—whether transfer to criminal court, or longer sentences or even aging out of the juvenile jurisdiction—show marginal deterrent effects.

The Task Force on Community Preventive Services, a standing committee including policy experts from government, academia, and private research, reviewed seven studies and concluded that youth transferred to adult court subsequently commit violent crime at higher rates than do those retained in juvenile court. Figure 4, which is taken from the Task Force report, illustrates graphically the range of the effects of transfer on recidivism in several of the studies. Some studies suggest that transfer to the criminal court worsens criminal behavior and increases public safety risks. Again, the consistency of the findings, across a variety of sampling, measurement, and analytic conditions, is rare in policy science.

The studies typically compared court outcomes and recidivism rates for matched groups of transferred and retained youth. Some studies compared the criminal records of similar groups of youth either from the same time period or from different time periods before and after law changes. Some studies used designs that are similar to experiments to compare waived and retained youth. These designs are approximations of true experiments, where the youth in juvenile
and criminal court are matched on several factors, such as the number and severity of prior offenses, and then compared on their criminal records after they are sentenced and punished. Other studies compared youth from adjoining jurisdictions with different statutes. The studies also vary in how they test the effects of the different court jurisdictions. Most limit their tests to a simple test of what happens in one court compared with the other, while some others control for what court the case is heard in and what correctional sentence the youth receives. The outcome measures sometimes are specific crimes, such as violence or drug offenses, and sometimes all types of crimes. The studies vary in the lengths of the follow-up periods, with some reporting short-term differences that disappear after several years.

How confident can we be in these studies and the conclusions of the Task Force? Some critics of these studies think that there are weaknesses in the designs that may undermine the conclusions. For example, most of the studies introduce selection biases that prevent a true comparison of the two types of proceedings and sanctions. That is, the process of selection for transfer—whether judicial, prosecutorial, or legislative—may be based on pre-existing indices for criminal propensity that may then affect the outcomes. Accordingly, differences in the samples may reflect more about that pre-existing propensity than about the differential effects of court jurisdiction. Also, comparisons from one court jurisdiction to the next may introduce important contextual influences that may interact with the deterrent effects of punishment.

Only a portion of the studies cited by the Task Force addressed these selection issues. Two studies of youth in Florida used different
procedures to control for selection. Lawrence Winner and several colleagues matched cases in the juvenile and adult courts on seven criteria. The use of matching routines adds confidence to these studies and reflects well on the consistency of their findings with those of other studies lacking rigorous controls. Matches were successful for the first six variables, but transfers including matches by race were less successful. Only two-thirds of the white transfers could be matched to white non-transfers, and only about half of the non-white transfers could be matched to non-white non-transfers. When the race criterion was relaxed, successful matches were obtained in 92 percent of the cases. There were no controls for court or community context.

Lonn Lanza-Kaduce and several colleagues computed a risk index based on twelve items and used propensity score matching to adjust for selection effects in the transfer process. He was able to match 475 pairs overall and 315 “best matched pairs” that excluded transferred youth whose criminal history was longer or more severe than a matched contemporary in the retained sample. The differences in recidivism rates using these two design strategies produced similar results that both show substantially higher recidivism rates for transferred youth, particularly in the initial three to five years following sentencing.

A study by Fagan and another by Fagan and two colleagues compared recidivism rates among samples of youth recruited from New York City whose cases originated in the criminal court with samples from bordering areas in northeastern New Jersey whose cases were processed in the juvenile court. In each study, the researchers estimated a selection parameter, or a “propensity score,” to control for differences in the samples. The propensity score was included as a predictor in the analyses of recidivism rates.

Even among the few studies that address selection issues, findings are consistent and strong. When joined with other studies showing similar findings, they offer robust evidence of the perverse effects of both wholesale and retail transfer to the criminal court. Moreover, these studies reject the notion that these effects are limited to the subset of transferred youth who are incarcerated in adult prisons. Fagan and Fagan and colleagues as well as Lee and McCrary, specifically test for incarceration effects and find no evidence that either the fact of incarceration or its length significantly predicts recidivism. Several other studies made similar findings. Increasing the risk or length of confinement offers no return to crime control for transferred youth.

Summary

In her review of two decades of research on transfer, Donna Bishop condemns the “recent and substantial expansion of transfer” as harmful and ineffective. Richard Redding says that “[t]he short-term benefits gained from transfer and imprisonment may be outweighed by the longer-term costs of (increased) criminal justice system processing” from higher recidivism rates. Without exception the research evidence shows that policies promoting transfer of adolescents from juvenile to criminal court fail to deter crime among sanctioned juveniles and may even worsen public safety risks. The weight of empirical evidence strongly suggests that increasing the scope of transfer has no general deterrent effects on the incidence of serious juvenile crime or specific deterrent effects on the re-offending rates of transferred youth. In fact, compared with youth retained in juvenile court, youth prosecuted as adults had higher rates of rearrest for serious felony crimes such as robbery and assault. They were also rearrested more quickly and were more often returned to incarceration.
Worse, the broad reach of new transfer laws and policies captures not only those youth whose crimes and reoffending risks may merit harsher punishment, but also many more who are neither chronic nor serious offenders, who pose little risk of future offending, and who seem to be damaged by their exposure to the adult court. Whatever the gains of short-term incapacitation, they are more than offset by the toxic effects of adult punishment for the larger group of adolescent offenders.

**Principles for Transfer Policy**

The proliferation of promiscuous transfer regimes over the past three decades calls into question the very rationale for a juvenile court. The new legislative activism has rolled back the age at which maturity is assumed to a threshold that strains the credibility of the new laws themselves. But there is almost no evidence that justifies this decades-long experiment.

**Three Strikes against the New Transfer**

All scientific evidence suggests that transferring early adolescent youth to adult courts inverts assumptions about their cognitive and behavioral capacities before the law and in nearly every other age-graded social task. Wholesale transfer laws such as New York’s JO Law or California’s Proposition 21 assume a level of maturity and responsibility among young adolescents that is sharply at odds with new social and scientific facts. To be sure, retributive interests benefit from wholesale transfer regimes, but at the cost of vastly multiplying the number of individual injustices from proportionality miscalculations.

The new transfer measures fail to enhance public safety, despite repeated assertions to the contrary by prosecutors and legislators. Instead, prosecuting adolescents as adults, no matter what the pathway to adult court, leads to more, not less, crime, inviting avoidable public safety risks. More youth, it is true, are incapacitated for longer periods once in the criminal court—in many instances, for the rest of their lives. Yet there is no evidence that incarcerating minors for any length of time deters crime either by those locked up or by others.

**Without exception the research evidence shows that policies promoting transfer of adolescents from juvenile to criminal court fail to deter crime among sanctioned juveniles and may even worsen public safety risks.**

Had the large-scale legal mobilization to increase transfer been subject to federal (and university) standards for the ethical treatment of human subjects, it would have been shut down long ago. One might argue that the benefits of penal proportionality and incapacitation justify the overreach in moving youth to adult court, but even here, the calculus fails. Transfer, whether retail or wholesale, runs a high risk of exposing to harm not just its subjects, but also the public that hosts these measures. These harms are multiplied by the corrosive effects of a criminal record on the possibility of reformation or prosocial development. A transfer regime calibrated at age seventeen may overreach or underreach at the margins, but transfer policies that move youth into criminal court at age sixteen will categorically be overreaching and
weighted toward over-punishment. These policies endure in the face of good evidence of the possibility of such harms, perhaps animated by deep biases about youth among legislators if not the public. The racial skew in transfer and its effects, a result in part of the conflation of youth crime and race in the popular and political imagination, multiplies the ethical tensions in transfer policy.

The Politics of Transfer and the Politics of Crime

Policymakers have taken notice of the robust evidence on the negative effects of transfer, creating a political space for reform as advocates and reformers have pushed back against expanded transfer. Connecticut passed legislation in July 2007 to raise the age of majority incrementally from age sixteen to age eighteen by 2010. In the past two years, legislators in Missouri, Illinois, and New Hampshire have had extensive debates over whether to raise the age to eighteen. Legislators in North Carolina have convened hearings and formed a study commission to address this issue. The debates focus less on whether to raise the age than on the strategies and details of how to do so effectively. The research evidence on transfer and the decrease in serious juvenile crime have convinced most legislators, policymakers, practitioners, and other stakeholders that eighteen may yet again be the appropriate age for juvenile court jurisdiction.

Reformers face a difficult task. Transfer and youth policy raise complex questions that are not just about youth crime. Transfer is one front in a longstanding tension between the judiciary and other branches of government during successive legislative efforts to control crime. It is also an important symbolic front in showing toughness on crime. The general hostility toward judges that was evident in the overall narrowing of judicial discretion—such as the adoption of sentencing guidelines for adults that set minimum or fixed sentences—also extended to the juvenile court, where measures to expand transfer curtailed judicial discretion. The sharp restriction of judicial authority in favor of enhanced prosecutorial power (as in Proposition 21) or legislative authority (as in the New York JO Law) resulted in the expansion of prosecutorial power at the expense of judicial authority. The accretion of authority to prosecutors in this regime is clear: the prosecutor has the unreviewable discretion to select charges and, in turn, to select jurisdiction. Although direct file provisions offer some degree of transparency, exclusion statutes (which account for a large number of transfers) offer none.

Restoring Principle to the Transfer Debate

The debate about transfer to date has been based neither on principle nor on policy, but on the need for “toughness.” It is about the substitution of toughness for principle. No scholar or practitioner or advocate denies that it is sometimes necessary to transfer some adolescents to criminal court. The public must be protected from dangerous youth who are not likely to be helped by treatment-oriented or supervisory sanctions. An unrebutable assumption of immaturity for all robbery suspects younger than age eighteen would be as silly as an unrebutable assumption of their maturity at fourteen. But delinquent youth also must be protected from the overreach of wholesale waiver. And the reduced decision-making capacity of juveniles provides a principled justification for fine-tuning the borders of the juvenile justice system to avoid unnecessary risk.

Setting these boundaries poses a dilemma for lawmakers that they simply ignore when
they retreat to the simplistic overreach of legislative exclusion or cede discretion to (elected) prosecutors. Developing transfer policy, both calibrating the threshold itself and devising the mechanism for crossing it, involves weighing competing risks. Two types of error lie in wait. One is overpredicting the likelihood of juveniles’ offending. The other is underpredicting recidivism risks. The two types of predictions are linked, and evaluating waiver or transfer as public policy requires considering both types of risk. Such is the ethical responsibility of the regulator.\(^{107}\)

Principles for transfer can produce hard choices and conflicting results. A legislative waiver regime may produce fewer racial disparities for youth under the criminal law than does individual waiver by judges. But legislative waiver raises substantial risks and social costs.\(^{108}\) Are longer sentences in the juvenile court preferable to shorter sentences in the criminal courts? When we pile on redundant reforms—blended sentences, presumptive transfer, longer juvenile court sentences—do the cumulative and cascading effects produce the intended consequences, or does some less desirable outcome develop?

The future of reform depends on the prospects for restoring principle and discipline to the legislative debate. The weight of evidence points toward returning to juvenile court judges the discretion to select juveniles for transfer. The evidence also points toward basing that selection on more criteria than age and offense. Using *Kent*-like criteria and new scientific knowledge of adolescent development in an open and transparent forum, judges, who are less influenced than legislators by the politics of crime and by electoral pressures, should be able to decide which adolescents should be transferred.\(^{109}\) A jurisprudence of discretionary decision making on transfer would also promote two ancillary goals. It would restore the accountability that is diffused when legislators surgically remove entire classes of offenders from the juvenile court. And it would take seriously the responsibility for mistakes on both sides of the decision threshold.

Returning to discretionary transfer rather than “wholesale waiver” also would minimize harm by limiting the number of youth subjected to criminal court prosecution while identifying those whose plasticity warrants juvenile court intervention. Yet it would also maintain proportional punishment for adolescents whose crimes are too serious to be adjudicated in the juvenile court.

A now extensive portfolio of empirical research suggests that past attempts to select youth individually for transfer have often failed to identify the most serious offenders and have also reinforced racial discrimination.\(^{110}\) More careful screening is crucial. New evidence on the dangers of wholesale transfer suggests that the ethical regulator must balance the risk of two types of error, not just the risks of leniency that motivate contemporary statutes and practices. Strong commitments to transparency and ongoing analysis of the patterns and rationales for such decisions can enable judges and other juvenile justice stakeholders to calibrate where the borders should be set and to track and measure the performance of those making transfer decisions.

Declining crime rates, the intellectual and political exhaustion of the “toughness” paradigm in juvenile justice, and new gains in the science of adolescent development have converged to create an opportunity for reform. Opening the transfer process to regulation and deliberation can lay the foundation for
more effective and principled policies. While the law has moved toward waiving increasingly younger teens to adult criminal court, social and biological evidence suggests moving in the other direction. Perhaps it’s time for the law to change course and follow the science.
Endnotes


8. Feld, *Bad Kids* (see note 6).


12. *New York Penal Law* § 30.00. Connecticut and North Carolina, at that time, were the others. Connecticut has since raised the age of majority for nearly all juvenile offenders to eighteen. *Connecticut General Statutes* §1-1d; *North Carolina General Statutes* § 7B-1501(7).

13. Roysher and Edelman, “Treating Juveniles as Adults” (see note 11); Sobie, “The Juvenile Offender Act” (see note 10).

15. The family court has jurisdiction over delinquency cases in New York State.

16. A fourteen-year-old offender in New York who snatches a chain from another person could be charged with robbery in the third degree and remain in the family court; if there was any use of force or threat, the offender could be charged with robbery in the second degree and fall subject to the Juvenile Offender Law, regardless of prior record or impact on the victim. The discretion lies solely with the prosecutor, whose decision is not reviewable. Similar differences exist under the JO Law for assault in the second degree.


18. See Donna Lyons, National Conference of State Legislatures, “State Legislature Report,” 1995 *Juvenile Crime and Justice State Enactments* 20, no.17 (November 1995). In 1995, Alaska, Arkansas, Delaware, Indiana, Louisiana, Minnesota, North Dakota, Oregon, Tennessee, Utah, and West Virginia added offenses for discretionary or mandatory juvenile prosecution in adult criminal court. Arkansas, Idaho, Iowa, Nevada, and Ohio enacted laws that made transfer permanent—so called “once waived, always waived” legislation—regardless of the outcome of the case in criminal court. Other states lowered the age at which juveniles may be prosecuted in criminal court. For instance, Idaho passed legislation providing for waiver of juveniles under age fourteen who commit certain felonies. Nevada lowered from sixteen to fourteen the age at which juveniles are subject to discretionary judicial waiver. West Virginia also lowered from sixteen to fourteen the age of discretionary transfer for certain juveniles charged with serious crimes. However, only two states took the simpler step of lowering the age of majority for all adolescent offenders. New Hampshire and Wisconsin lowered the maximum age of original juvenile court jurisdiction from seventeen to sixteen.


22. Feld and Podkopacz, “The End of the Line” (see note 21).


25. Bishop, “Juvenile Offenders in the Adult Criminal System” (see note 9).

26. David Rosen, Philadelphia Defender Association, personal communication. Representation for these youth is provided by each county. Not every jurisdiction has the resources to provide defense representation that can motion for reverse waiver, and disparities arise when access to services is limited by economic resources. See Laval S. Miller-Wilson and Patricia Puritz, *Pennsylvania: An Assessment of Access to Counsel and Quality of Representation in Delinquency Proceedings* (www.jlc.org/File/publications/paassessment.pdf [October 2003]).


33. Ibid.

34. Ibid. The Court’s majority also said these same qualities are the reasons why juveniles are not permitted to vote, serve on juries, or marry without parental consent. It effectively contradicted Justice Scalia’s majority opinion in *Stanford* and recent empirical work emphasizing variability in developmental trajectories for different decisional competencies. See Steinberg and Scott, “Less Guilt by Reason of Adolescence” (see note 31).

35. Ibid.


37. Ibid.

38. See the article by Laurence Steinberg and Elizabeth Scott in this volume for a review of the scientific evidence on child and adolescent development and culpability.

39. See the article by Edward Mulvey and Anne-Marie Leistico in this volume.

41. But see Schall v. Martin, 467 U.S. 253 (1984), in which Justice Powell, writing for the majority, set aside controversial social science evidence on predictions of dangerousness and said that judges were best suited to make these determinations.

42. For example, New York and North Carolina set the age of majority at sixteen; youth in criminal court in those states should not be part of an estimate of the transferred population. But youth excluded by statute at age sixteen in other states should be measured as part of the transferred population.

43. Bishop, “Juvenile Offenders in the Adult Criminal System” (see note 9).


46. But as juvenile drug arrests rose during the early part of the decade, the number of waived drug cases rose. Judicial waivers for drug offenses declined in number beginning in 1992, though the rate remained stable.

47. Snyder and Sickmund, Juvenile Offenders and Victims (see note 44), p. 236.

48. Ibid., p. 237.

49. Data were unavailable to determine whether those sentenced to prison were incarcerated in adult or juvenile facilities. See Campaign for Youth Justice, The Consequences Aren’t Minor (see note 44), citing statistics from the California Board of Corrections and the California Department of Corrections.

50. This figure is cited, for example, in Campaign for Youth Justice, The Consequences Aren’t Minor (see note 44), p. 21, note 4, quoting a 2005 report by the Coalition for Juvenile Justice, Childhood on Trial: The Failure of Trying and Sentencing Youth in Adult Criminal Court (www.appa-net.org/resources/pubs/docs/CJJ-Report.pdf [2005]).


52. See the article by Alex Piquero in this volume.


54. Campaign for Youth Justice, The Consequences Aren’t Minor (see note 44).
55. Puzzanchera and others, *Juvenile Court Statistics 1999* (see note 44), p. 44.

56. Feld, *Bad Kids* (see note 6).

57. Bishop relied on the State Courts Processing System (SCPS), which includes all cases processed in the criminal courts and disaggregates by age.

58. Feld, *Bad Kids* (see note 6).

59. Janet Lauritsen's careful review of the evidence using multiple data sources to confirm patterns observed in arrest records suggests that offending rates for non-white youth may in fact be higher for violence and weapons charges, but not for drug crimes. See Janet Lauritsen, “Racial and Ethnic Differences in Juvenile Offending,” in *Our Children, Their Children*, edited by Darnell Hawkins and Kimberly Kempf-Leonard (see note 51). This is important in the discussion of racial disparity, since drug crimes are one of the most commonly waived offenses for black youth, according to Snyder and Sickmund, *Juvenile Offenders and Victims* (see note 44), pp. 176, 187. Instead, Bishop, “The Role of Race and Ethnicity” (see note 51), suggests that racial disparities in police contacts and arrests *per crime* may be the case, based on strategic decisions about where and how to deploy police, and observed biases in police decision making. See also Bishop, “Juvenile Offenders in the Adult Criminal System” (see note 9). See, for example, Geoffrey Alpert, John MacDonald, and Roger Dunham, “Police Suspicions and Discretionary Decision Making during Citizen Stops,” *Criminology* 43 (2005): 407–34. See also Jeffrey Fagan and Garth Davies, “Street Stops and Broken Windows: Race, *Terry* and Disorder in New York City,” *Fordham Urban Law Journal* 28 (2000): 457.


64. Roysher and Edelman, “Treating Juveniles as Adults in New York” (see note 11).


67. Peter W. Greenwood, Allan Abrahamse, and Franklin Zimring, Factors Affecting Sentencing Severity for Young Adult Offenders (Santa Monica, Calif.: Rand Corporation, 1984).


72. See Patricia Torbet and others, State Responses to Serious and Violent Juvenile Crime (see note 23); Melissa Sickmund, Office of Juvenile Justice and Delinquency Prevention, “OJJDP Update on Statistics,” How Juveniles Get to Criminal Court (www.ncjrs.gov/pdffiles/juvcr.pdf [October, 1994]); Feld, Bad Kids (see note 6).


75. Fagan, “Separating the Men from the Boys” (see note 27).


77. Evidently, the success of waiver reform, which would return children to the juvenile court, depends on confidence in the programs of the juvenile court. Peter W. Greenwood, Changing Lives: Delinquency Prevention as Crime-Control Policy (Chicago University Press, 2006).

78. Data on file with author.

79. However, some criminologists, such as William Spelman, believe that there may be incapacitation effects from imprisonment, where active offenders are locked up and unable to commit new crimes on the
streets, but that few would-be offenders are deterred from crime by the threat of incarceration. See, for example, William Spelman, “The Limited Importance of Prison Expansion,” in The Crime Drop in America, edited by Alfred Blumstein and Joel Wallman (Cambridge University Press, 2000).

80. Among inmates released between age eighteen and twenty-four, 75.4 percent were rearrested within three years, 52.0 percent were re-convicted, and 52.0 percent were returned to prison. Among inmates aged fourteen to seventeen at release, the rates were higher: 82.1 percent rearrested, 55.7 percent re-convicted, and 56.6 percent returned to prison. Patrick Langan and David Levin, U.S. Department of Justice, Bureau of Justice Statistics, “Special Report,” Recidivism of Prisoners Released in 1994 (www.ojp.usdoj.gov/bjs/pub/pdf/rpr94.pdf [June, 2002]).


88. Ibid. See also Jonathan Gruber, Risky Behavior among Youth: An Economic Analysis (University of Chicago Press, 2001).

89. Lee and McCrary, “Crime, Punishment, and Myopia” (see note 87).

90. McGowan and others, “Effects on Violence” (see note 9). The committee standardized published results of transfer studies by computing point estimates for the relative change in the violent crime rates attributable to the interventions. The reviewers calculated baselines and percent changes using the following formulas for relative change. For studies with before-and-after measurements and concurrent comparison groups, the effect size was computed as:

\[
\frac{(I_{post} \div I_{pre})}{(C_{post} \div C_{pre})} - 1
\]

where:

- \(I_{post}\) = the last reported outcome rate in the intervention group after the intervention;
- \(I_{pre}\) = the reported outcome rate in the intervention group before the intervention;
- \(C_{post}\) = the last reported outcome rate in the comparison group after the intervention;
$C_{pre}$ = the reported outcome rate in the comparison group before the intervention.

If modeled results were reported from logistic regressions, odds ratios were adjusted for comparability to relative rate changes estimated from other studies:

$$RR = \frac{OR}{([1 - P_0] + [P_0 \times OR])}$$

where:

$RR$ = relative risk;

$OR$ = odds ratio to be converted;

$P_0$ = incidence of the outcome of interest in the unexposed population (that is, juveniles retained in the juvenile justice system).

91. See McGowan and others, “Effects on Violence” (see note 9), for specific citations of studies included in their analysis.

92. In a subsequent study, Fagan, Kupchik, and Liberman used a similar design with more counties and an expanded list of sampled offenses. Jeffrey Fagan, Aaron Kupchik, and Akiva Liberman, “Be Careful What You Wish for: Legal Sanctions and Public Safety among Adolescent Offenders in Juvenile and Criminal Court,” Columbia Law School, Public Law Research Paper no. 03-61 (available at SSRN: http://ssrn.com/abstract=491202 [July, 2007]). Their results were similar to the Fagan study, “Separating the Men from the Boys” (see note 27). The more recent study was not included in the Task Force analysis, which included only published studies.

93. See Fagan, “Separating the Men from the Boys” (see note 27); Fagan, Kupchik, and Liberman, “Be Careful What You Wish for” (see note 91); Bishop and others, “The Transfer of Juveniles to Criminal Court” (see note 69).


95. Lawrence Winner and others, “The Transfer of Juveniles to Criminal Court: Reexamining Recidivism Over the Long Term,” Crime and Delinquency 43 (1997): 548–63. The criteria were: (1) most serious offense for which the transfer was made, (2) the number of counts included in the bill of information for the committing offense, (3) the number of prior referrals to the juvenile court, (4) the most serious prior offense, (5) age at the time of committing the offense, (6) gender, and (7) race (coded dichotomously as white or non-white).


98. Fagan, “Separating the Men from the Boys” (see note 27); Fagan, Kupchik, and Liberman, “Be Careful What You Wish for” (see note 91).

99. The identification task to estimate propensity scores requires the selection of variables that approximate the matrix of information available to judges or prosecutors and the logic they use in deciding whether
The selection or propensity models estimated when researchers lack full information that is available to judges or prosecutors may be artifactual at best and, under extreme conditions, inaccurate. See, for example, Randall Salekin and others, “Juvenile Transfer to Adult Courts: A Look at Prototypes for Dangerousness, Sophistication-Maturity, and Amenability to Treatment through a Legal Lens,” Psychology, Public Policy, and Law 8, no. 4 (2002): 373–410; D. N. Brannen and others, “Transfer to Adult Court: A National Study of How Juvenile Court Judges Weigh Pertinent Kent Criteria,” Psychology, Public Policy, and Law (forthcoming).

100. Bishop and Frazier, “Consequences of Transfer,” in The Changing Borders of Juvenile Justice, edited by Fagan and Zimring (see note 7); Bishop, “Juvenile Offenders in the Adult Criminal System” (see note 9).


105. North Carolina is one of the nation's two remaining states that set the age of majority for criminal responsibility at sixteen. Connecticut legislators used the study commission model to create political space for reform and to build consensus among stakeholders during the three-year planning process.

106. Even as juvenile crime rates had begun their decade-long decline, inaccurate facts were cited to militate for yet tougher measures. For example, Representative Bill McCollum, chair of the House Subcommittee on Crime in the 106th Congress, argued for tougher transfer laws by stating that “in America, no population poses a greater threat to public safety than juvenile offenders.” House Committee on the Judiciary, Putting Consequences Back into Juvenile Justice at the Federal, State, and Local Levels: Hearings before the Subcommittee on Crime, 106th Congress, 1999, p. 5.


110. See Bishop, “Juvenile Offenders in the Adult Criminal System” (see note 9).
The Supreme Court in Roper v. Simmons [FN1] interpreted the Eighth Amendment to prohibit states from executing offenders for crimes they committed when younger than eighteen years of age. The Court relied on objective indicators of “evolving standards of decency,” such as state statutes and jury decisions to support its judgment that a national consensus existed against executing adolescents. The Justices also conducted an independent proportionality analysis of youths’ criminal responsibility and concluded that their reduced culpability warranted a categorical prohibition of execution. Juveniles’ immature judgment, susceptibility to negative peer influences, and transitory personality development diminished their criminal responsibility. Because of their reduced culpability, the Court held that they could never deserve or receive the most severe sentence imposed on adults.

By contrast, the Court’s non-capital proportionality jurisprudence focuses on the seriousness of the offense, rather than the culpability of the offender, to assess whether a punishment is excessive. Focusing only on the gravity of the offense--the harm caused--precludes consideration of adolescents’ diminished responsibility when they commit serious crimes for which they receive life without parole (LWOP) sentences. In many jurisdictions, LWOP sentences are mandatory and preclude any individualized consideration of the offender. About ten times as many adolescents receive LWOP sentences every year as ever faced the death penalty, and after Roper those numbers only will increase. Moreover, many youths receive LWOP sentences for crimes--such as rape or felony-murder, or those that were committed when younger than sixteen years of age--that would not have been death-eligible prior to Roper. As a result, many more and younger juveniles receive the penultimate penalty without any individualized consideration of their lesser culpability and without constitutional recourse.

Despite the disjunction between the Court’s death penalty and non-capital proportionality jurisprudence, the same developmental features that reduce adolescents’ criminal responsibility for purposes of the death penalty should mitigate the sentences they receive for other serious crimes as well. The seriousness of an offense reflects both the harm caused and the culpability of the actor that produced it, and proportionality analyses require a method by which to recognize and accommodate young offenders’ diminished responsibility. This article proposes that states formally recognize youthfulness as a mitigating factor by applying a “youth discount” to adult sentence lengths. Such a policy provides a straight-forward method by which to apply Roper’s categorical diminished responsibility rationale more broadly. Because the Court is unlikely to extend its Roper proportionality
analyses to non-capital sentences imposed on adolescents, state legislatures should enact these reforms as a matter of just and sensible penal policy.

Part I of the article briefly analyzes the Court's juvenile death penalty cases and its recent Roper v. Simmons decision. Although Roper asserted that juveniles lacked the necessary culpability to justify the death penalty, the Court provided minimal social science support for its categorical conclusion. Part II reviews developmental psychological research that bolsters Roper's conclusion that adolescent offenders' culpability differs qualitatively from that of adults. Part III analyzes the Court's non-death penalty proportionality framework which focuses on the seriousness of the offense without regard to the culpability of the offender. The Court's exclusion of juveniles' diminished responsibility from proportionality analyses allows legislatures to enact, trial courts to impose, and appellate courts to affirm, LWOP and other draconian sentences inflicted on very young and manifestly immature offenders. Part IV adapts Roper's categorical approach to adolescents' reduced culpability and proposes a "youth discount" to formally mitigate the sentences of young offenders. It proposes that states use age as a proxy for culpability to provide substantial fractional reductions in sentence lengths for younger offenders. The article concludes with a plea to state legislators to recognize, as did the Court in Roper, “what any parent knows”--kids are different and deserve less severe punishment for their crimes.

I. The Death Penalty, Roper v. Simmons, and Diminished Responsibility

States annually try more than 200,000 chronological juveniles as adults simply because their juvenile court jurisdiction ends at fifteen or sixteen years of age, rather than at seventeen. [FN2] States try an additional 55,000 youths a year in criminal courts who were within the age jurisdiction of their juvenile courts through various transfer mechanisms. [FN3] Although states' transfer laws vary considerably, all rely on variations of three general strategies--judicial waiver, legislative offense exclusion, and prosecutorial direct file--to prosecute children in criminal courts. [FN4] Judicial waiver allows juvenile court judges to waive jurisdiction after conducting a hearing to determine whether a youth is amenable to treatment or poses a danger to public safety. [FN5] By contrast, legislatures may define juvenile courts' jurisdiction simply to exclude youths charged with serious offenses from their jurisdiction without any hearing. [FN6] Finally, in more than a dozen states, juvenile and criminal courts share concurrent jurisdiction and prosecutors can "direct file" or prosecute youths charged with serious crimes in either system without any judicial review of their charging/forum-selection decision. [FN7]

Increase in youth violence and homicide in the late-1980s and early-1990s impelled nearly every state to “get tough” and transfer more and younger juveniles to criminal court. [FN8] States lowered the minimum age for transfer, increased the number of offenses excluded from juvenile court jurisdiction, and shifted discretion from the judicial branch--judges in a waiver hearing--to the executive branch--prosecutors making charging decisions. [FN9] Although fourteen is the minimum age for transfer in most jurisdictions, some states permit waiver of youths as young as ten years or specify no minimum age and others require adult prosecution of children as young as thirteen. [FN10] By 1999, more than half of states had enacted mandatory transfer provisions for some serious offenses. [FN11] Even though most states formally have judicial waiver statutes, prosecutors actually transfer the vast majority of youths without a hearing. [FN12] Prosecutors in some states charged about 10% of chronological juveniles as adults. [FN13] Florida prosecutors alone transferred as many juveniles to criminal courts as did juvenile court judges via waiver hearings in the entire country. [FN14] Recent statutory changes have made judicial waiver hearings the exception rather than the rule. [FN15] Prosecutors determined the adult status of 85% of youths tried as adults based solely on age and the offense charged. [FN16] As a result, states do not assess the culpability or competence of juveniles before they prosecute them in criminal courts.
And criminal court judges do not consider adolescents’ culpability when they sentence them as adults under mandatory LWOP provisions.

*15 For decades, studies have consistently reported racial disparities in waiver decisions [FN18] and that recent “get tough” reforms have exacerbated racial disparities. [FN19] As a result of successive screenings, differential processing, and cumulative disadvantage, minority youths comprise the majority of juveniles transferred to criminal court and three-quarters of all youths under age eighteen who enter prison. [FN20]

*16 Once states convict juveniles in criminal court, judges sentence them as if they were adults and send them to the same prisons as adults. [FN21] Most states provide no formal recognition of youthfulness as a mitigating factor in sentencing. Some states explicitly deny very young juveniles the protection of the common law infancy defense and many states require judges to impose mandatory LWOP sentences on children as young as twelve or thirteen years of age. [FN22] Until the Court's recent Roper decision, states executed youths for crimes they committed when they were sixteen or seventeen years of age. [FN23]

For two decades prior to Roper v. Simmons, the Court considered several cases posing the question of whether the Eighth Amendment prohibited states from executing offenders for crimes they committed as juveniles. [FN24] In Eddings v. Oklahoma, the *17 Court reversed the death penalty of a sixteen-year-old because the trial court failed to consider the emotional development and family background as mitigating factors. [FN25] In 1988, a plurality of justices in Thompson v. Oklahoma concluded that all fifteen-year-old offenders lacked the culpability necessary for imposition of the death penalty. [FN26] The following year, the Court in Stanford v. Kentucky upheld the death penalty for offenders who were sixteen or seventeen years of age when they committed a capital offense. [FN27] Although Stanford acknowledged that juveniles generally were less culpable than adults, the Court rejected a categorical ban and instead allowed juries to decide on a case-by-case basis whether a particular youth possessed sufficient culpability to warrant execution. [FN28]

*18 In 2005, the Court in Roper v. Simmons overruled Stanford and categorically barred states from executing youths for crimes committed prior to eighteen years of age. [FN29] Several years prior to Roper, the Court in Atkins v. Virginia held that the Eighth Amendment barred states from executing criminal defendants with mental retardation. [FN30] In Atkins, the Court found a national consensus existed because thirty states barred the practice, legislative changes increasingly disfavored executing defendants with mental retardation, and few states actually executed mentally impaired offenders. [FN31] The Atkins Justices also conducted an independent proportionality analysis and concluded that defendants suffering from mental retardation lacked the culpability necessary to warrant execution. [FN32] Commentators immediately noted the constitutional implications of Atkins' proportionality analyses for executing juvenile offenders. [FN33]

Like its Atkins analyses, empirical and normative factors informed the Roper Court's assessment of “the evolving standards of decency that mark the progress of a maturing society.” [FN34] State legislation and jury sentencing decisions provided corresponding evidence of a national consensus against executing juveniles. [FN35] The number of states opposed to executing juveniles equaled the number of states in Atkins that opposed executing defendants with mental retardation. [FN36] Moreover, even after Stanford allowed states to execute sixteen- and seventeen-year-old offenders, not a single capital state lowered the age of youths' eligibility for the death penalty, with five states raising it. [FN37] Similarly, in the decade prior to Roper, only three states actually executed offenders for crimes committed as juveniles. [FN38] National and international legal, professional, religious, and social organizations universally opposed executing juveniles. [FN39]
In addition to the objective indicators of a national consensus, the Justices also conducted a proportionality analysis of adolescents’ culpability to decide whether the death penalty ever could be an appropriate punishment for juveniles. Speaking for the majority, Justice Kennedy offered three reasons, based simply upon age, why states could not punish criminally responsible juvenile offenders as severely as adult offenders. [FN40] First, juveniles’ culpability cannot be equated with that of adults. Juveniles’ immature judgment and lesser self-control cause them to commit acts impulsively and without full appreciation of the consequences. [FN41] Second, juveniles are more susceptible than adults to negative peer influences. [FN42] Moreover, juveniles’ greater dependence on parents and community spreads responsibility for their delicts more broadly. [FN43] Third, juveniles’ personalities are more transitory and less well formed compared to adults’ personalities, with juveniles’ crimes providing less reliable evidence of depraved character. [FN44] Because juveniles’ character is transitional, “[f]rom a moral standpoint it would be misguided to equate the failings of a minor with those of an adult, for a great possibility exists that a minor’s character deficiencies will be reformed.” [FN45] These normal developmental characteristics of adolescents correspond with traditional justification for mitigation of punishment such as diminished capacity, duress and provocation, and the absence of bad character. [FN46] The Court’s rationale recognized both adolescents’ reduced moral culpability and their capacity for growth and change—their diminished responsibility for past offenses and their unformed and perhaps redeemable character. [FN47] Additionally, the Court noted that juveniles’ immature judgment, susceptibility to negative influence, and transitory character also negate the retributive and deterrent justifications for the death penalty. [FN48] Although Roper spared the lives of more than seventy young offenders on death row, the decision effectively converted those capital sentences to life without the possibility of parole. [FN49]

Justice O’Connor, who provided the swing vote which produced the contradictory outcomes in Thompson and Stanford, dissented from the Court’s ruling in Roper. [FN50] While she conceded that adolescents, as a class, are less mature or culpable than adults, she objected that the majority provided no evidence to contradict state legislatures’ judgments that “at least some seventeen-year-old murderers are sufficiently mature to deserve the death penalty in an appropriate case.” [FN51] She strongly questioned whether the differences in culpability between a seventeen-year-old juvenile and an eighteen-year-old adult are “universal enough and significant enough to justify a bright-line prophylactic rule against capital punishment of the former.” [FN52] She also disputed the majority’s categorical conclusion that capital sentencing juries could not adequately assess an individual youth’s culpability or give appropriate weight to youthfulness as a mitigating factor. [FN53]

In a separate dissent, Justice Scalia criticized the majority’s calculus for finding a national consensus against executing juveniles when only eighteen states—47% of those that allowed capital punishment—prohibited it. [FN54] He attributed the infrequency of juvenile death sentences to the relative uncommonness of juvenile capital crimes and to jurors’ ability properly to consider youthfulness as a mitigating factor. [FN55] Justice Scalia further disparaged the majority’s selective reliance on social science research that was never introduced into evidence to support its categorical conclusion that all juveniles lacked sufficient culpability ever to warrant execution. [FN56] Finally, Justice Scalia condemned the majority’s rejection of individualized jury consideration of a youth’s culpability in favor of a categorical prohibition. [FN57] He chided the majority for providing no evidence that “juries cannot be trusted with the delicate task of weighing a defendant’s youth” and objected that such a view “undermines the very foundations of our capital sentencing system, which entrusts juries with ‘mak[ing] the difficult and uniquely human judgments that defy codification.’” [FN58]

The majority and dissenting Justices differed on several issues: the proper denominator to use when calculating the existence of a national consensus against executing juveniles—i.e., all states or only those with death penalty laws; [FN59] the role of international law in interpreting domestic constitutional provisions; [FN60] and
the majority's failure to rebuke the Missouri Supreme Court for anticipatorily overruling Stanford. [FN61] The most substantial difference among the Justices concerned whether to bar the death penalty categorically or to allow juries to conduct individualized assessments of young offenders' culpability. [FN62] Although both the *24 O'Connor and Scalia dissents argued for individualized culpability assessments, Justice Kennedy opted for a categorical ban:

The differences between juvenile and adult offenders are too marked and well understood to risk allowing a youthful person to receive the death penalty despite insufficient culpability. An unacceptable likelihood exists that the brutality or cold-blooded nature of any particular crime would overpower mitigating arguments based on youth as a matter of course, even where the juvenile offender's objective immaturity, vulnerability, and lack of true depravity should require a sentence less severe than death. [FN63]

Justice Kennedy noted that the psychiatric profession prohibited itself from diagnosing any patient younger than eighteen years of age with “antisocial personality disorder” because they lacked clinical bases with which to differentiate between an immature juvenile's crime and the “rare juvenile offender whose crime reflects irreparable corruption.” [FN64] Roper concluded that the Court should not require or allow lay jurors to make culpability determinations that trained professionals eschewed. Justice Kennedy apparently feared that jurors would ignore the mitigating role of youthfulness when the circumstances of a brutal, cold-blooded murder aroused their passions. To the extent that jurors associate youthfulness with innocence, the viciousness of a death-eligible crime might prevent them from identifying with a young offender. [FN65] Rather than considering a juvenile's age as a mitigating factor, jurors might instead erroneously treat it as an aggravating factor. [FN66] The accuracy of Justice Kennedy's intuition is reflected in the vehemence with which some commentators have *25 used egregious facts of juveniles' crimes to criticize the Court's reasoning and holding. [FN67] To avoid these risks, the Court used age as a conclusive proxy for culpability to align how the law treats youthful offenders with how the law and our culture believe we should treat them. [FN68]

II. Developmental Psychology and Adolescents' Reduced Culpability

Roper offered three reasons--immature judgment, susceptibility to negative peer and environmental influences, and transitional identities--to justify its conclusion that juveniles are less criminally responsible than adults. Although its conclusions about the differences between adolescents and adults seem intuitively obvious, [FN69] the Court provided surprisingly little scientific evidence to support its assertions. [FN70] Several of the sixteen amicus briefs presented developmental psychological and neurobiological research bolstering Roper's rationale of juveniles' reduced culpability, but the Court neither presented nor analyzed that social science evidence. [FN71] We know much more about adolescents' judgment, decision making, and self-control, and that research has important implications for understanding youths' criminal responsibility and formulating sentencing policy.

Retributive sentencing theory proportional punishment to the seriousness of the offense. [FN72] Two separate elements--harm *27 and culpability--define the seriousness of a crime and the punishment deserved. [FN73]

The degree of blameworthiness of an offense is generally assessed according to two kinds of elements: the nature and seriousness of the harm caused or threatened by the crime; and the offender's degree of culpability in committing the crime, in particular, his or her degree of intent (mens rea), motives, role in the offense, and mental illness or other diminished capacity. [FN74] An offender's age does not affect the amount of harm caused--a fifteen-year-old can inflict the same injuries
as an adult. [FN75] However, culpability subsumes an offender's ability to appreciate the wrongfulness of her actions and to control her behavior. [FN76] Because youthfulness directly affects culpability, it necessarily influences assessments of blameworthiness and ultimately the seriousness of a crime. [FN77] Roper emphasized that youthfulness affects judgment, reasoning ability, and self-control and reduces the culpability of juveniles who fail to exhibit adult-like qualities. [FN78] Although states may hold youths accountable for the harms they cause, Roper explicitly limited the severity of the sentence a state could impose on them because of their diminished responsibility. [FN79] Even after youths develop the nominal ability to distinguish right from wrong, their bad decisions lack the same degree of moral blameworthiness as those of adults and warrant less severe punishment. [FN80]

*29 For decades, developmental psychologists have studied how children's thinking and behaviors change as they mature. [FN81] By mid-adolescence, most youths can distinguish right from wrong and reason similarly to adults. [FN82] For example, youths and adults use comparable reasoning processes when they make informed consent medical decisions. [FN83] But the ability to make good choices when provided with complete information under laboratory conditions differs from the ability to make good decisions under stressful conditions with incomplete information. [FN84] Emotions play a significant role in decision making, and researchers distinguish between “cold cognition” and “hot cognition.” [FN85] For adolescents, in particular, mood volatility, an appetite for risk and excitement, and stress adversely affect the quality of decision making. [FN86]

In the mid-1990s, the John D. and Catherine T. MacArthur Foundation sponsored a decade-long research network on Adolescent Development and Juvenile Justice (ADJJ) to study juveniles' decision making and judgment, adjudicative competence, and criminal culpability. Over the next decade, the ADJJ Network produced a series of books and articles, and convened a national conference to present its research findings on adolescent development and the implications of adolescent development for juvenile and criminal justice system policies. [FN87]

*32 The ADJJ research reports a disjunction between youths' cognitive abilities and the quality of their judgment. [FN88] Even though adolescents by age sixteen exhibit intellectual and cognitive abilities comparable with adults, [FN89] they do not develop the psycho-social maturity, ability to exercise self-control, and competence to make adult-quality decisions until their early-twenties. [FN90] The “Immaturity Gap” represents the sharp cleavage between adolescents' intellectual maturity, which reaches near-adult levels by age sixteen, and their psycho-social maturity of judgment that does not emerge for nearly another decade. [FN91] This latter deficit provides the basis for finding the reduced criminal responsibility of youths.

Roper attributed youths' diminished culpability to a “lack of maturity and . . . underdeveloped sense of responsibility . . . [that] often result in impetuous and ill-considered actions and decisions.” [FN92] The Court focused on adolescents' immaturity of judgment to reduce culpability, rather than simple cognitive ability to distinguish right from wrong which is the typical criminal law inquiry. [FN93] Youths' immature judgment manifests itself in several domains--perceptions of risk, appreciation of future consequences, capacity for self-management, and ability to make autonomous choices--that distinguishes them from adults. [FN94] Because all youths' differences in knowledge and experience, short-term versus long-term time perspectives, attitude toward risk, and impulsivity are elements of normal development, their bad choices are categorically less blameworthy than those of adults. [FN95]

*34 A. Immature Judgment, Risky Behavior, and Impulsivity

“As any parent knows,” kids do stupid, dangerous, and destructive things. To exercise good judgment and self-control, a person must be able to think ahead, delay gratification, and restrain impulses. Adolescents act more impulsively, fail to consider long-term consequences, and engage in riskier behavior than adults. [FN96] Their propensity to take risks is reflected in higher incidence of accidents, suicides, homicides, unsafe sexual practices, and the like. [FN97]

To calculate risks, a person has to identify potential positive and negative outcomes, estimate their likelihood, and then apply value preferences to optimize outcomes. [FN98] To a greater extent than adults, adolescents underestimate the amount and likelihood of risks, employ a shorter timeframe in their calculus, and focus on potential gains rather than losses. [FN99] Juveniles fifteen years of age and younger act much more impulsively than do older adolescents, but even sixteen- and seventeen-year-old youths fail to exhibit adult levels of self-control. [FN100] Because of their youth and inexperience, adolescents may possess less information [FN101] or consider fewer options than adults when they make decisions. [FN102] Similarly, youths and adults use about the same amount of time to solve simple problems, but the length of time used to solve complex problems increases with age. [FN103]

The ADJJ Research Network studied juveniles' ability to delay gratification, to evaluate risks, and to exercise self-control. [FN104] It reports that adolescents' risk perception actually declines during mid-adolescence and then gradually increases into adulthood--sixteen- and seventeen-year-old youths perceive fewer risks than do either younger or older research subjects. [FN105] Mid-adolescents are the most "present-oriented" of all the age groups studied; future orientation gradually increases into the early twenties. [FN106] Youths weigh costs and benefits differently than adults and give different subjective values to outcomes which affect their ultimate choices. [FN107] A study of people's ability to delay gratification reported that adolescents more often opted for an immediate, but much smaller payout, whereas adults delayed a reward unless the immediate value was only slightly discounted. [FN108] Youths also view not engaging in risky behaviors differently than adults, which also leads to riskier choices by adolescents. [FN109]

Youths engage in risky behavior because it provides heightened sensations, excitement, and an “adrenaline rush.” [FN110] Their preferences for risk [FN111] and sensation-seeking [FN112] peak at sixteen and seventeen years of age and then sharply decline with adulthood. The widest divergence between the perception of and the preference for risk occurs during mid-adolescence when youths' criminal activity also increases. All of these risk proclivities are heightened by youths' feelings of “invulnerability” and “immortality.” [FN113]

Adolescents' and adults' differences in thinking and behavior reflect basic developmental differences in the human brain which does not fully mature until the early twenties. [FN114] Adolescents simply do not have the physiological capacity of adults to exercise judgment or control impulses. [FN115] The prefrontal cortex (PFC) of the frontal lobe of the brain operates as the “chief executive officer” to control advanced cerebral activities. [FN116] Executive functions include reasoning, abstract thinking, planning, anticipating consequences, and impulse control. [FN117] During adolescence and into the early twenties, increased myelination [FN118] of the PFC improves cognitive function and reasoning ability. [FN119] By contrast, the amygdala--the lymbic system located at the base of the brain--controls instinctual behavior, such as the “fight or flight” response. [FN120] Adolescents rely more heavily on the amygdala and less heavily on the PFC than do adults when they experience stressful situations. [FN121] Their impulsive behavior reflects a “gut reaction” rather than sober reflection. [FN122] Novel circumstances and aroused emotions especially challenge youths' ability to exercise self-control and to resist impulsive decisions.
Neuroscience research provides a hard-science explanation for social scientists’ observations about adolescents’ behavior and self-control. Adolescents’ immature brains do not provide a biological deterministic excuse for criminal behavior, however. Scientists have not established a direct link between immature adolescent brain structure and function and its impact on real-life decisions and behavior under stressful conditions or a basis on which to individualize among young offenders on the basis of brain development. [FN123] Rather, the neuroscience research enhances our understanding of how and why juveniles think and behave differently from adults and furnishes a basis for mitigating punishment. [FN124]

B. Peer Group and Community Influences

Roper also ascribed juveniles’ diminished responsibility to their greater susceptibility than adults to negative peer group influences. [FN125] To a greater extent than do adults, juveniles commit their crimes in groups, and group offending increases youths’ risks of accessorial criminal liability for serious crimes they did not necessarily intend or personally commit. [FN126] Their *41 susceptibility to peer influences interacts with their propensity to take risks, and they engage in riskier behavior when they are together than when they are alone. [FN127] Youths’ ability to resist peer influences only approaches adult levels of self-control in the late teens and early twenties. [FN128] While failing to resist peer pressures does not excuse criminal liability, this normal developmental characteristic provides another basis on which to lessen their criminal responsibility compared with adults. [FN129] Because youths disproportionately commit their crimes in groups, more juveniles may be prosecuted as accessories and *42 states convict many youths serving LWOP sentences as accessories, rather than principals, to felony-murder. [FN130]

The opportunity to learn positive behavior and to acquire self-control is socially constructed, and children’s families, schools, and communities affect their developmental prospects, life chances, and risks of criminal involvement. [FN131] Political economy and community structure contribute to higher crime rates in urban inner-cities, [FN132] and subcultural norms expose some minority youths to far greater pressures to engage in criminal activity than most youths confront. [FN133] Roper recognized that *43 juveniles are unable to escape from these criminogenic environments as readily as adults because of their greater dependency. [FN134]

In summary, Roper relied on intuition—“what any parent knows”—rather than the substantial body of recent developmental psychological research. However, the Court correctly identified the normal developmental characteristics of adolescents that impair their judgment, reduce their culpability, and diminish their criminal responsibility compared with adults. The Court recognized that youths are more impulsive, seek exciting and dangerous experiences, and prefer immediate rewards to delayed gratification. They misperceive and miscalculate risks and discount the likelihood of bad consequences. They succumb to negative peer and adverse environmental influences. All of these normal characteristics increase their likelihood of causing devastating injuries to themselves and to others. Although they are just as capable as adults of causing great harm, their immature judgment and lack of self-control reduces their culpability and warrants less-severe punishment.

III. Adolescent Criminal Responsibility and Life Without Parole (LWOP) Sentences

Roper categorically barred the death penalty for juveniles because of their reduced culpability. However, the Court’s rationale has broader applicability for sentencing youths. Juveniles’ criminal responsibility is just as diminished when states sentence them to life without parole (LWOP) as it is when it executes *44 them. [FN135] Although the Court’s capital punishment jurisprudence insists that “death is different,” [FN136] there is no prin-
cipated penal basis to distinguish between juveniles' diminished responsibility that precludes the death penalty from their equally reduced culpability for other severe sentences. [FN137]

Lionel Tate exemplifies disproportionate sentences that states impose when they try young offenders in criminal court and punish them as if they are the moral equals of adults. A grand jury indicted twelve-year-old Tate for first-degree murder for brutal “wrestling” injuries he inflicted on a six-year-old girl. [FN138] Once the grand jury indicted Tate for a capital crime, state law required the prosecutor to try him as an adult. [FN139] Moreover, Florida, like several other states, prohibited Tate from raising the common law infancy defense which would have required consideration of his diminished responsibility. [FN140] After the jury convicted him of first-degree murder, the judge imposed a mandatory LWOP sentence without regard to his youthfulness or reduced culpability. [FN141] The Court of Appeals later reversed his *45 conviction because the trial court failed to consider whether his youthfulness rendered him incompetent to stand trial. [FN142] However, the court rejected his contention that a mandatory LWOP sentence imposed on a twelve-year-old child was disproportionate or “cruel and unusual punishment.” [FN143] Forty-two states permit judges to impose LWOP sentences on all offenders--adults or juveniles--convicted of certain serious offenses, such as murder. In twenty-seven of those states, the LWOP sentence is mandatory for all offenders convicted of those crimes and judges do not conduct any proportionality evaluation or consider individual circumstances, such as youthfulness, prior to its imposition. [FN144]

For decades, the Court has vacillated about whether the Eighth Amendment contains a “narrow proportionality principle” that “applies to non-capital sentences” and, if so, how to define grossly disproportionate sentences that violate the Constitution. [FN145] The Court in Rummel v. Estelle held that a state could sentence a three-time, minor, property offender to life in prison with the possibility of parole without running afoul of the Eighth Amendment. [FN146] Several years later, Solem v. Helms held that a sentence of life without possibility of parole for a recidivist convicted of a minor property crime violated the Constitution. [FN147] To *46 decide whether a sentence is so disproportionate that it violates the Eighth Amendment, the Court focused on three proportionality factors: “(i) the gravity of the offense and the harshness of the penalty; (ii) the sentences imposed on other criminals in the same jurisdiction; and (iii) the sentences imposed for commission of the same crime in other jurisdictions.” [FN148] Subsequently, in Harmelin v. Michigan, a fractured Court upheld against a proportionality challenge a sentence of life without parole imposed on a first-time drug offender. [FN149]

Justice Kennedy’s Harmelin concurrence asserted that “[t]he Eighth Amendment proportionality principle also applies to non-capital sentences,” [FN150] and his decision provides the operative test to assess disproportionate sentences. [FN151] Four factors contribute to the Court’s reluctance to conduct proportionality reviews: the primacy of legislative judgments about penalties, the multiplicity of legitimate penal goals, the Court’s limited constitutional role to oversee state criminal sentences, and the importance of objective factors to guide judicial proportionality review. [FN152] With these imperatives for judicial restraint, courts will conduct a comparative Solem evaluation only if a sentence clearly *47 crosses the “grossly disproportionate” threshold. [FN153] The Court applied those factors in Ewing v. California and upheld a sentence of twenty-five years to life for the theft of three golf clubs. [FN154]

Although Roper barred the death penalty for juveniles, the Court has never applied proportionality principles to other juvenile sentences or found a minimum age below which states may not impose LWOP sentences. [FN155] As a result, appellate courts consistently refuse to conduct proportionality reviews of LWOP sentences because judges imposed them on juveniles rather than adults. [FN156] Although penal proportionality requires a principled relationship between the seriousness of a crime--harm and culpability--and the sentence imposed,
courts focus solely on the gravity of the crime--harm--rather than the culpability of the actor. [FN157] Courts use a circular logic and reason that a serious crime is serious because of the harm the actor caused without any consideration of culpability. Although prior to Roper, death-eligible juveniles received an individualized culpability assessment, they enjoy no comparable consideration of personal culpability prior to the imposition of a mandatory LWOP sentence. The Ninth Circuit, in Harris v. Wright, rejected a fifteen-year-old juvenile's constitutional challenge to a mandatory LWOP sentence imposed for murder. [FN158] Harris held that the Eighth Amendment bars only “grossly disproportionate” sentences [FN159] and asserted:

Youth has no obvious bearing on this problem: If we can discern no clear line for adults, neither can we for youths. Accordingly, while capital punishment is unique and must be treated specially, mandatory life imprisonment without parole is, for young and old alike, only an outlying point on the continuum of prison sentences. Like any other prison sentence, it raises no inference of disproportionality when imposed on a murderer. [FN160]

Similarly, the Seventh Circuit, in Rice v. Cooper, affirmed a mandatory LWOP sentence imposed on an illiterate, mildly retarded sixteen-year-old murderer, even though the statute excluded consideration of any mitigating factors, including youthfulness. [FN161] The court found no constitutional barrier to imposing a mandatory LWOP sentence as long as the youth possessed the criminal intent necessary to commit the crime. [FN162] Defining the seriousness of an offense solely by the harm caused excludes from a proportionality review any individualized consideration of diminished responsibility. [FN163]

Many states have adopted mandatory LWOP sentencing statutes that preclude consideration of youthfulness as a mitigating factor. Several states have abrogated the common-law infancy defense for very young children and removed the only substantive criminal law protections based on youthfulness prior to conviction. [FN164] Appellate courts very rarely find LWOP sentences disproportional [FN165] and routinely uphold them against juveniles' pleas to consider their youthfulness as a mitigating factor. [FN166] The Florida court in Tate v. State “reject[ed] the argument that a life sentence without the possibility of parole is cruel or unusual punishment on a twelve-year-old child . . . .” [FN167] The North Carolina Supreme Court in State v. Green approved a mandatory LWOP sentence imposed on a thirteen-year-old convicted of rape. [FN168] Green reasoned that states often transfer very young offenders to criminal court, [FN169] that age and reduced culpability do not bear on “whether a punishment is grossly disproportionate to the crime,” [FN170] and that even young offenders may deserve harsh punishment and require incapacitation. [FN171] In Edmonds v. State, the Mississippi Court of Appeals approved an LWOP sentence imposed on a youth convicted of murder committed at thirteen years of age. [FN172] The South Carolina Supreme Court in State v. Standard upheld a “two-strike” LWOP sentence imposed on a fifteen-year-old convicted of burglary based on his prior juvenile conviction for a serious felony. [FN173] Standard reasoned that because other jurisdictions impose similarly draconian sentences on juveniles, such sentences do not offend our “contemporary standards of decency.” [FN174]

Even states that do not formally impose LWOP sentences on juveniles allow judges to create “virtual lifers.” After the court of appeals overturned an invalid LWOP sentence imposed on a fifteen-year-old juvenile, the trial judge in People v. Demirdjian simply resentenced him to two consecutive life sentences. [FN175] The Tenth Circuit, in Hawkins v. Hargett, upheld a 100-year sentence imposed on a thirteen-year-old juvenile for burglary, rape, and robbery. [FN176]

Juveniles lack recourse to proportionality reviews or individualized culpability assessments and courts regularly uphold LWOP sentences and extremely long terms of imprisonment imposed on twelve- through sixteen-year-old youths. [FN177] About one of every six juveniles who received an LWOP sentence was fifteen years of
age or younger when they committed their crimes. [FN178] More than half (59%) of juveniles received an LWOP sentence for their first-ever criminal conviction. [FN179] More than one-quarter (26%) of youths received an LWOP sentence for a felony murder to which they were an accessory, rather than the principal. [FN180] Although the Supreme Court's death penalty jurisprudence treats youthfulness as a mitigating factor, trial judges perversely treat it as an aggravating factor and sentence juveniles *53 more severely than their adult counterparts. [FN181] Youths convicted of murder are more likely to enter prison with LWOP sentences than are adults convicted of murder. [FN182]

Appellate courts' refusal to conduct proportionality analyses of non-capital sentences poses an even greater challenge for those seeking justice for children than the death penalty. [FN183] Prior to the 1970s, virtually no states imposed LWOP sentences on criminals and most used indeterminate sentencing systems that allowed for parole release. [FN184] The "get tough" policies that gathered momentum in the 1970s included both the resumption of capital punishment and the adoption of LWOP sentences. [FN185] During the 1980s and 1990s, states reduced judicial sentencing discretion, enacted mandatory minimum sentence provisions, *54 adopted LWOP sentences, and reduced or eliminated parole eligibility. [FN186] By 2005, forty-eight states and the District of Columbia had enacted LWOP sentences. [FN187] Ironically, death penalty abolitionists provided bipartisan support for LWOP sentences as a "humane" alternative to capital punishment. [FN188] However, the number of people sentenced to death has increased marginally despite the near-universal adoption of LWOP sentences, while judges impose LWOP sentences on many more defendants who would not be eligible for the death penalty. [FN189] Thus, LWOP statutes have had a substantial "net-widening" impact that extends well beyond the narrow category of death-eligible defendants. [FN190] Between 1992 and 2003, the number of inmates on death row increased from 2575 to 3374, a 31% rise, while the number of prisoners serving life without parole sentences grew from 12,453 to 33,633, a 170% increase. [FN191]

By 2004, 2225 people were serving LWOP sentences for crimes they committed as children, and after Roper, many more youths will join their cumulative ranks every year. [FN192] Prior to 1980, children rarely received LWOP sentences; judges now sentence youths to LWOP three times as frequently as they did in 1990. [FN193] The average age at which juveniles committed the crimes for which they received an LWOP sentence is sixteen years, but judges may impose such sentences on children as *55 young as twelve or thirteen years of age. [FN194] We do not know how many more juveniles are serving "virtual life" sentences, but we can safely assume that those numbers are even larger than those who received LWOP sentences. The majority of juveniles who received an LWOP sentence had no prior adult or juvenile convictions. [FN195] Although states may not impose the death penalty on a felony-murderer who did not intend or actually participate in the killing, [FN196] more than one-quarter of juveniles received their LWOP sentence for a felony-murder. [FN197] A survey in Michigan reported that nearly half the juveniles serving LWOP sentences were convicted as accessories to their crimes, rather than as principals. [FN198] Judges impose LWOP sentences on black juveniles at a rate about ten times greater than they do white youths, and blacks comprise the substantial majority of all youths serving LWOP sentences. [FN199] In Michigan, more than two-thirds (69%) of all juveniles serving LWOP sentences are black, despite comprising only 15% of the youth population. [FN200] The LWOP disparity is a culmination of the effects of every discretionary decision in the juvenile and criminal justice systems that treats black youths more harshly. [FN201]

IV. “Youth Discount”: Youthfulness as a Categorical Mitigating Factor

The Supreme Court's proportionality jurisprudence does not require states to enact, or courts to conduct, in-
individualized culpability assessments, or to formally recognize youthfulness as a mitigating factor in sentencing. But, states should adopt and apply the principle of youthfulness as a mitigating factor as part of a just and fair sentencing policy. As the Supreme Court repeatedly has recognized,

> [Y]outh is more than a chronological fact. It is a time and condition of life when a person may be most susceptible to influence and to psychological damage. Our history is replete with laws and judicial recognition that minors, especially in their earlier years, generally are less mature and responsible than adults. Particularly “during the formative years of childhood and adolescence, minors often lack the experience, perspective, and judgment” expected of adults. [FN202]

The principle of youthfulness as a mitigating factor should apply both to capital and non-capital sentences. It holds youths accountable and recognizes their diminished responsibility, without excusing their criminal conduct. [FN203] Even when they produce the same harms, the crimes of children are not the moral equivalents of those of adults because of their reduced culpability. [FN204] Sentencing policy can recognize this developmental reality and protect young people from the adult consequences of their immature decisions. [FN205]

Roper opted to treat adolescents' diminished responsibility categorically rather than individually. Despite the Court's general preference for individualized culpability assessments, it adopted a categorical prohibition because “[t]he differences between juvenile and adult offenders are too well marked and well understood to risk allowing a youthful person to receive the death penalty despite insufficient culpability.” [FN206] The Court feared that a heinous crime would overwhelm a jury's ability to properly consider youthfulness as a mitigating factor. [FN207] Roper concluded that neither clinicians nor jurors could accurately distinguish between the vast majority of immature juveniles, who deserve leniency, and the rare youth who might exhibit adult-like culpability. [FN208]

Although some commentators advocate individualized culpability assessments prior to imposing an LWOP sentence on a juvenile, [FN209] a bright-line rule like Roper's that categorically treats youthfulness as a mitigating factor is preferable to a system of guided discretion. Roper endorsed a categorical bright-line even though it recognized individual variability in culpability.

The qualities that distinguish juveniles from adults do not disappear when an individual turns 18. By the same token, some under 18 have already attained a level of maturity some adults will never reach.

. . . The age of 18 is the point where society draws the line for many purposes between childhood and adulthood. It is, we conclude, the age at which the line for death eligibility ought to rest. [FN210]

Despite individual variability, the Court reasoned that a rule which occasionally “under-punishes the rare, fully-culpable adolescent still will produce less aggregate injustice than a discretionary system that improperly, harshly sentences many more undeserving youths.” [FN211]

Treating adolescents' reduced culpability categorically rests on Roper's moral foundation of lesser blameworthiness and represents a normative judgment about deserved punishment. [FN212] Because all adolescents share characteristics of immature judgment, impulsiveness, and lack of self-control that systematically reduce their culpability, all young offenders should receive categorical reductions of adult sentences. [FN213] The principle of youthfulness as a mitigating factor represents a moral and criminal policy judgment that no child deserves to be sentenced as severely as an adult convicted of a comparable crime, that is, causing the same harm. [FN214] “Even if there are a few juveniles who could be among the worst of society's offenders, jurors will make errors of unacceptable frequency and magnitude. For this reason, we cannot trust ourselves to decide that a child is culpable enough to be punished as an adult . . . .” [FN215]
A categorical rule of mitigation is preferable to individualized sentencing discretion for two reasons. [FN216] The first is our inability either to define or identify what constitutes adult-like culpability among offending youths. [FN217] Development is highly variable--a few youths may be mature prior to becoming eighteen years of age, while many others may not attain maturity even as adults. [FN218] Despite developmental differences, clinicians lack the tools with which to assess youths' impulsivity, foresight, or preference for risk in ways that relate to maturity of judgment and criminal responsibility. [FN219] Because the vast majority of juveniles are less culpable than adults, the inability to define and measure immaturity or validly to identify the few responsible *60 ones would introduce a systematic bias toward punishing less-culpable youths. [FN220] A categorical approach reduces the risk of erroneous over-punishment of less blameworthy youths. [FN221] Every other area of law uses categorical, age-based lines to approximate the level of maturity required for particular activities--e.g., voting, driving, and consuming alcohol--and restricts youths because of their immaturity and inability to make competent decisions. [FN222]

The second reason to treat youthfulness categorically is the inability of judges or juries to fairly weigh an abstract consideration*61 of youthfulness as a mitigating factor against the aggravating reality of a horrific crime. [FN223] Roper recognized that “the brutality or cold-blooded nature of any particular crime would overpower mitigating arguments based on youth as a matter of course, even where the juvenile offender's objective immaturity, vulnerability, and lack of true depravity should require a sentence less severe than death.” [FN224] When assessing the seriousness of a crime--harm and culpability--the Court rightly feared that jurors could not adequately distinguish between the person's moral responsibility for causing the harm and the harm itself, and that they would not weigh diminished responsibility sufficiently. In surveys of jurors, the heinousness of a crime invariably trumped a youth's immaturity when deciding whether to impose the death penalty. [FN225]

I long have advocated a categorical “youth discount” that provides adolescents with fractional reductions in sentence-lengths based on age as a proxy for culpability. [FN226] In addition to recognizing youths' diminished responsibility, a “youth discount” recognizes that same-length sentences exact a greater “penal bite” from younger offenders than older ones. [FN227] A judge would *62 take the “youth discount” off of the appropriate sentence that she would impose on an adult offender. A youth would establish her eligibility for and the amount of discount only with a birth certificate. The “youth discount” includes a sliding scale of diminished responsibility and gives the largest sentence reductions to the youngest, least mature offenders. [FN228] On a sliding scale of diminished responsibility that corresponds with developmental differences, a fourteen-year-old offender might receive a maximum sentence that is perhaps twenty-five percent of the sentence an adult would receive, and a sixteen-year-old defendant might receive a maximum sentence no more than half the adult length. The deeper discounts for younger offenders correspond with their greater developmental differences in maturity of judgment and self-control. [FN229] By definition, a “youth discount” would *63 preclude imposing LWOP and other “virtual life” sentences. [FN230] Because the length of an LWOP is indeterminate, states can assume an actual sentence length of about forty years against which to apply a “youth discount” based on the average age at which adult murderers enter prison and their projected, often reduced, life expectancy. [FN231] Apart from adolescents’ diminished responsibility, the likelihood of recidivism decreases with age and the costs of confining geriatric inmates increase substantially. [FN232] The specific amount by which to discount the sentences of young offenders is the proper subject of political and legislative debate. Although some legislators may find it difficult to resist the temptation to “get tough” and to engage in demagoguery, [FN233] states can achieve all of their legitimate penal goals by sentencing youths to no more than twenty or thirty years for even the most serious crimes.

Roper also emphasized that because juveniles' personalities are more transitory and less-fixed, their crimes
provide less reliable evidence of moral reprehensibility or “irretrievably depraved character,” and that “a greater possibility exists that a minor’s character deficiencies will be reformed.” [FN234] A “youth discount” enables young offenders to survive serious mistakes with a semblance of their life chances intact. [FN235] We can hold juveniles accountable, manage the risks they pose to others, and provide them with “room to reform” without extinguishing their lives. [FN236] Because young offenders eventually will return to the community, the state bears a responsibility to provide them with resources with which to reform as they mature.

Conclusion

Roper’s diminished responsibility rationale provides a broader foundation to formally recognize youthfulness as a categorical mitigating factor in sentencing. Because adolescents lack the judgment, appreciation of consequences, and self-control of adults, they deserve shorter sentences when they cause the same harms. Adolescents’ personalities are in transition, and it is unjust and irrational to continue harshly punishing a fifty- or sixty-year-old person for the crime that an irresponsible child committed several decades earlier. [FN237]

Roper’s categorical holding provides the rationale for a “youth discount” when criminal courts sentence young offenders. The Court used age as a proxy for culpability because no better, more reliable, or accurate bases exist on which to individualize sentences. Culpability is a normative construct, it is not an objective thing. Proportioning sentences to culpability involves a moral judgment about deserved punishment, and there is nothing that clinicians, jurors, or judges can measure or quantify to determine how much culpability a young offender possesses. Roper feared that efforts to individualize and refine culpability judgments, when no objective bases exist on which to do so, would introduce a systematic bias in which youthfulness might function as an aggravating, rather than mitigating, factor. A substantial “youth discount” off of the sentences imposed on adults provides a sliding scale of severity that corresponds with the increasingly diminished responsibility of younger offenders. A “youth discount” provides a reasonable approximation of “what any parent knows”--kids are different and engage in stupid and dangerous behavior because they are kids.

It will take political courage for legislators to enact laws that benefit powerless, easily demonized groups, such as juvenile murderers. It will take even greater political courage when enacting responsible penal policy exposes a politician to a charge by her opponent that she is “soft on crime.” Politicians over-reacted during the “crime panic” of the 1990s and enacted “get tough” waiver and criminal sentencing laws --offense exclusion, prosecutorial direct file, and mandatory LWOP sentences --that are irrational, inhumane, unjust, and counterproductive. Political leaders bear the responsibility to restore rationality, humanity, and decency to the justice systems. Public opinion supports policies to rehabilitate serious young offenders to reduce future crime rather than simply to incarcerate them for longer periods. [FN238] Our greater scientific understanding of adolescent development, positive public support for less punitive policies, and low crime rates may strengthen progressive legislators’ resolve to promote just and sensible youth crime policies. [FN239]
5 (2007), available at http://www.buildingblocksforyouth.org/justiceforsome/jfs.pdf (reporting that in thirteen states, juveniles sixteen and seventeen years of age automatically are in criminal court because of jurisdictional age thresholds); see also Campaign for Youth Justice, The Consequences Aren't Minor 6 (2006) (reporting that in states in which juvenile court jurisdiction ends at fifteen or sixteen years of age, the vast majority of youths (70-96%) are prosecuted for non-violent offenses); Howard Snyder & Melissa Sickmund, U.S. Dep't of Justice, Juvenile Offenders and Victims 110-16 (2006) (summarizing states' age jurisdiction of juvenile courts).

[FN3]. Amnesty Int'l & Human Rights Watch, The Rest of Their Lives 19 n.30 (2005), available at http://www.amnestyusa.org/countries/usa/clwop/report.pdf (estimating that states tried 55,000 waived juveniles as adults in 1996). Jurisdictional waiver refers to the process by which states transfer youths to criminal court for prosecution as an adult. See also Patrick Griffin, Patricia Torbet & Linda Szymanski, Trying Juveniles as Adults in Criminal Court 3-10 (1998); Snyder & Sickmund, supra note 2, at 112-14 (discussing judicial waiver, concurrent jurisdiction, and statutory offense exclusion as three legislative methods to transfer juveniles for criminal prosecution).


[FN6]. See generally Feld, Legislative Exclusion, supra note 5, at 83-98, 102-03; Benjamin Steiner et al., Legislative Waiver Reconsidered: General Deterrent Effects of Statutory Exclusion Laws Enacted Post-1979, 23 Just. Q. 34, 49-51 (2006) (describing deterrent rationale of legislative offense exclusion and reporting that adoption of such laws has no effect); Zimring, Punitive Necessity, supra note 5.

[FN7]. Manduley v. Super. Ct. of San Diego, 41 P.3d 3, 33 (Cal. 2002) (upholding Proposition 21 creating prosecutorial direct file statute against due process and equal protection challenges); Snyder & Sickmund, supra
note 2, at 113-14 (summarizing prosecutorial “direct file” laws); Donna M. Bishop & Charles S. Frazier, Transfer of Juveniles to Criminal Court: A Case Study and Analysis of Prosecutorial Waiver, 5 Notre Dame J.L. Ethics & Pub’y 281 (1991) (criticizing administration of “direct file” laws); Feld, Legislative Exclusion, supra note 5, at 117-19; Francis Barry McCarthy, The Serious Offender and Juvenile Court Reform: The Case for Prosecutorial Waiver of Juvenile Court Jurisdiction, 38 St. Louis U. L.J. 629 (1994) (arguing that prosecutors can act as more objective gatekeepers than either “soft” judges or “get tough” legislators); Benjamin Steiner & Emily Wright, Assessing the Relative Effects of State Direct File Waiver Laws on Violent Juvenile Crime: Deterrence or Irrelevance?, 96 J. Crim. L. & Criminology 1451, 1467-68 (2006) (reporting states that adopted prosecutorial direct file laws, analyzing juvenile arrest rates before and after adoption, and concluding that such laws have no deterrent effect).


[FN9]. See Amnesty Int’l, supra note 3, at 3 (arguing that politicians sought electoral advantage by “lowering the minimum age for criminal court jurisdiction, authorizing automatic transfers from juvenile to adult courts, and increasing the authority of prosecutors to file charges against children directly in criminal court rather than proceeding in the juvenile justice system”); Jolanta Juszkiewicz, Youth Crime/Adult Time (2000), http://www.buildingblocksforyouth.org/ycat/ycat.html; Feld, Legislative Exclusion, supra note 5, at 124-29.

[FN10]. Campaign for Youth Justice, supra note 2, at 71 (reporting North Carolina transfer law requiring mandatory prosecution of youths thirteen years or older charged with Class A felonies for which, if convicted, they can receive life without parole sentences); Snyder & Sickmund, supra note 2, at 112-14 (summarizing minimum ages for transfer by judges and prosecutors and noting that some states require adult prosecution of youths as young as thirteen years old charged with murder and other serious crimes).


[FN12]. Amnesty Int’l, supra note 3, at 19 (estimating that of the 55,000 waived juveniles tried as adults in 1996, about 36% had a judicial transfer hearing compared with only 13% in 2000); Snyder & Sickmund, supra note 2, at 110-14 (summarizing statutory waiver mechanisms and processes).

[FN14]. See Vincent Schiraldi & Jason Ziedenberg, The Florida Experiment: Transferring Power from Judges to Prosecutors, 15 Crim. Just. 46, 47 (Spring 2000) (“Florida is leading the nation in using prosecutors to make the decision to try children as adults. In 1995 alone... Florida prosecutors sent 7,000 cases to adult court, nearly matching the number of cases judges sent to the criminal justice system nationwide that year.”); see also Bishop & Frazier, supra note 7; Charles E. Frazier et al., Juveniles in Criminal Court: Past and Current Research in Florida, 18 QLR 573, 579 (1999) (“The number of juveniles transferred to criminal court in Florida grew dramatically from several hundred cases per year prior to the introduction of prosecutor direct file provisions, to several thousand per year today. Transfers increased from roughly 1.3% of the total juvenile filings per year prior in 1979 to a high of 9.6% in 1993.”).

[FN15]. Juszkiewicz, supra note 9 (reporting analyses of 2584 transferred cases from eighteen urban counties in eleven states drawn from a larger sample of forty of the most populous seventy-five counties in the country).

[FN16]. Id. at 2. “First, 85% of determinations of whether to charge [sic] a juvenile as an adult were not made by judges, but by prosecutors or by legislatures through statutory exclusions from juvenile court.” Id. at 4. In 45% of cases, prosecutors simply filed charges against youths in criminal court--a rate three times that of judicial waiver; in another 40% of cases, prosecutors charged youths with statutorily excluded offenses. Id. at 17.

[FN17]. See, e.g., Patricia Torbet et al., Nat'l Ctr. for Juvenile Justice, State Responses to Serious and Violent Juvenile Crime, at xii (1996) (describing trend in early 1990s for more states to exclude serious offenses from juvenile court jurisdiction); Katherine Hunt Federle, Emancipation and Execution: Transferring Children to Criminal Court in Capital Cases, 1996 Wis. L. Rev. 447, 487-94 (1996) (questioning adequacy of waiver procedures to conduct individualized culpability assessments); Feld, Legislative Exclusion, supra note 5, at 85-86, (analyzing legislative trends and providing statutory table of offenses excluded from juvenile court jurisdiction). Moreover, waiver statutes typically focus on “amenability to treatment” or “public safety” rather than maturity or culpability. See Kent v. United States, 383 U.S. 541, 566-67 (1966); Feld, Violent Youth, supra note 8, at 1029-34 (analyzing changes in statutory waiver criteria from “amenability to treatment” to “public safety”).

[FN18]. See, e.g., Amnesty Int'l, supra note 3, at 15-16 (reporting that, since 1984, black juveniles have comprised the majority of juveniles admitted to prison); U.S. Gen. Accounting Office, supra note 13, at 59 (examining the effects of race on judicial waiver decisions); Donna M. Hamparian et al., Youth in Adult Court 104-05 (1982) (explaining that, nationally, 39% of all youths transferred in 1978 were black and, in eleven states, minority youths constituted the majority of juveniles waived); M. A. Bortner et al., Race and Transfer: Empirical Research and Social Context, in The Changing Borders of Juvenile Justice, supra note 4, at 277 (analyzing racial disparity in juvenile transfer proceedings); Jeffrey Fagan et al., Racial Determinants of the Judicial Transfer Decision: Prosecuting Violent Youth in Criminal Court, 33 Crime & Delinq. 259, 276 (1987) (“[I]t appears that the effects of race are indirect, but visible nonetheless.”).

[FN19]. See Campaign for Youth Justice, supra note 2, at 11 (reporting that youths of color are disproportionately waived at rates two to five times greater than their proportion of the youth population); Poe-Yamagata & Jones, supra note 2, at 17 (stating that the minority proportion of youths transferred to criminal court was five times the make-up of the general population in Connecticut, Massachusetts, Pennsylvania, and Rhode Island); Juszkiewicz, supra note 9, at 5 (reporting, for example, that black juveniles accounted for approximately three out of ten felony arrests, but eight out of ten felony cases filed in criminal court); Mike Males & Dan Macallair, The Color of Justice 7-8 (2000) (studying juvenile transfer and criminal court sentencing practices in Los Angeles and reporting that “[c]ompared to white youths, minority youths are 2.8 times as likely to be arrested
for a violent crime, 6.2 times as likely to wind up in adult court, and 7 times as likely to be sent to prison by adult courts”); Nat’l Council On Crime & Delinquency, supra note 2, at 16-19; Nat’l Research Council, supra note 8, at 216 (“A high proportion of the juveniles transferred to adult court are minorities.... The preponderance of minorities among transferred juveniles may be explained in part by the fact that minorities are disproportionately arrested for serious crimes.”); Bortner, supra note 18, at 277 (analyzing sources of racial disparity in juvenile transfer proceedings).

[FN20] See, e.g., Poe-Yamagata & Jones, supra note 2, at 220 (“In 1997, minorities made up three-quarters of juveniles admitted to adult state prisons, with blacks accounting for 58%, Hispanics 15%, and Asians and American Indians 2%.”); Bortner, supra note 18, at 277 (analyzing cumulative consequences of racial disparities in transfer decisions). One study reported that criminal court judges imprisoned transferred black youths at a rate eighteen times greater than that of white offenders and Hispanic youth at seven times the rate of white youths. Males & Macallair, supra note 19, at 9. Another study of waiver practices in eighteen urban counties in eleven states reported that minority youths comprised 82% of all juveniles tried in criminal courts and white juveniles only 18%. Juszkiewicz, supra note 9 (reporting that African-American youths constituted more than half (57%) of youths prosecuted in criminal courts and Latino youths constituted another quarter (23%)); see also Poe-Yamagata & Jones, supra note 2, at 25-26 (providing numbers to support the claim that a disproportionate number of minorities were in adult prison in 1996).

[FN21] See James Austin et al., U.S. Dept’ of Justice, Juveniles in Adult Prisons and Jails, at iii, x (2000), available at http://www.ncjrs.org/pdffiles1/bja/182503.pdf (reporting about 14,500 juveniles confined in adult facilities); Hillary J. Massey, Disposing of Children: The Eighth Amendment and Juvenile Life Without Parole After Roper, 47 B.C. L. Rev. 1083, 1089 (2006) (“[O]nce children are prosecuted as adults, they become subject to the same penalties as adults, including life without the possibility of parole.”); Victor Streib & Bernadette Schrempp, Life Without Parole for Children, 21 Crim. Just. 4, 6 (Winter 2007) (“[Apart from the death penalty], essentially every other criminal sentence is available. Indeed, one of the political arguments to abolish the death penalty for juveniles was that they would remain eligible for LWOP, a sufficiently harsh punishment even without the death penalty.”); Rowe, supra note 11, at 294 (“Once a juvenile offender is in adult court, sentences may be more severe, and the worst offenders may be sentenced to life in prison without possibility of parole.”).

[FN22] Campaign for Youth Justice, supra note 2, at 13 (“Youth tried as adults face the same punishments as adults. They can be placed in adult jails pre- and post-trial, sentenced to serve time in adult prisons, or be placed on adult probation with few to no rehabilitative services. Youth also are subject to the same sentencing guidelines as adults and may receive mandatory minimum sentences or life without parole.”); Marc Mauer et al., The Meaning of “Life”: Long Prison Sentences in Context 17 (2004) (“A life sentence mandated for any adult defendant who committed a particular crime applied in full force to juveniles convicted in adult court for that crime.”); Feld, Responses to Youth Violence, supra note 8, at 212-20 (summarizing state correctional responses to juveniles sentenced as adults).


[FN24] U.S. Const. amend. VIII (“Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted.”). Earlier decisions adverted to the importance of considering youthfulness as a mitigating factor in capital sentencing. See, e.g., Eddings v. Oklahoma, 455 U.S. 104, 115-16 (1982) (remanding sixteen-year-old defendant for resentencing after trial court's failure properly to consider youthfulness as a mitigating factor and noting that “youth is more than a chronological fact” and “minors, especially in
their earlier years, generally are less mature and responsible than adults."); Lockett v. Ohio, 438 U.S. 586, 608-09 (1978) (requiring sentencing jury to consider all relevant mitigating factors including age of defendant); Roberts v. Louisiana, 431 U.S. 633, 637 (1977) (per curiam) (holding that a statute allowing for no consideration of particularized mitigating factors in deciding whether the death sentence should be imposed violated the Eighth and Fourteenth Amendments).

[FN25]. Eddings, 455 U.S. at 115-117 (1982). The Court found that the trial judge did, however, consider age as a mitigating factor. Id. at 115.

[FN26]. Thompson v. Oklahoma, 487 U.S. 815, 822-23 (1988) (plurality opinion). The Thompson plurality's proportionality analysis considered both objective indicators of “evolving standards of decency”—e.g., state statutes, jury practices, and the views of national and international organizations—and the Justices' own subjective sense of “civilized standards of decency.” Id. at 830. The Thompson Court emphasized that deserved punishment must reflect individual culpability and concluded that “[t]here is also broad agreement on the proposition that adolescents as a class are less mature and responsible than adults.” Id. at 834. The Court asserted:

[There]ess culpability should attach to a crime committed by a juvenile than to a comparable crime committed by an adult.... Inexperience, less education, and less intelligence make the teenager less able to evaluate the consequences of his or her conduct while at the same time he or she is much more apt to be motivated by mere emotion or peer pressure than is an adult. The reasons why juveniles are not trusted with the privileges and responsibilities of an adult also explain why their irresponsible conduct is not as morally reprehensible as that of an adult.

Id. at 835.


[FN28]. Id. at 375-76. The Court argued that juvenile waiver and capital sentencing procedures were adequate to determine individual culpability unless there was a national consensus, “not that seventeen or eighteen is the age at which most persons, or even almost all persons, achieve sufficient maturity to be held fully responsible for murder; but that seventeen or eighteen is the age before which no one can reasonably be held fully responsible.” Id. at 376.


[FN31]. Id. at 314-16 (counting state statutes and emphasizing that “[i]t is not so much the number of these States that is significant, but the consistency of the direction of change” that enabled the Court to find the existence of a national consensus).

[FN32]. Id. at 315-16.

characteristics that render mentally retarded offenders less blameworthy than competent adult offenders also characterize the immaturity of judgment and reduced culpability of adolescents and should likewise prohibit their execution.

[FN34]. Roper, 543 U.S. at 561 (quoting Trop v. Dulles, 356 U.S. 86, 100-01 (1958)).

[FN35]. Id. at 564-66 (noting that legislative trends prohibiting executing children corresponded with those in Atkins in which the Court held that the Eighth Amendment barred execution of defendants with mental retardation). See also Feld, supra note 33, at 489-98 (analogizing between state laws and jury practices in executing defendants with mental retardation and juveniles).

[FN36]. Roper, 543 U.S. at 564.

[FN37]. Id. at 565.

[FN38]. Id. at 564-65.

[FN39]. Id. at 575-78.

[FN40]. Id. at 569-72.

[FN41]. Id. at 569 (“[A] lack of maturity and an underdeveloped sense of responsibility are found in youth more often that in adults and are more understandable among the young. These qualities often result in impetuous and ill-considered actions and decisions.” (quoting Johnson v. Texas, 509 U.S. 350, 367 (1993))); see Daniel R. Williams, Roper v. Simmons and the Limits of the Adjudicatory Process, 2005 Mich. St. L. Rev. 1113, 1127 (2005) (endorsing the Court’s immaturity rationale).

With responsibility philosophically tied to the capacity for choosing, we tend to see youths as less responsible, less accountable, because we understand youth as a time when this capacity to choose wisely is still underdeveloped. Empirical claims about adolescent risk-taking, poor judgment, and impulsiveness gained analytical traction in the public debate over juvenile executions because they rooted the abolitionist argument about diminished responsibility in the inferior capacity of juveniles to choose.

Id. at 1127.

[FN42]. Roper, 543 U.S. at 569 (“Juveniles are more vulnerable or susceptible to negative influences and outside pressures, including peer pressure.”).

[FN43]. Id. (noting that juveniles are more susceptible to negative influences because they “have less control, or less experience with control, over their own environment”). The Court explained, “Their own vulnerability and comparative lack of control over their immediate surroundings mean juveniles have a greater claim than adults to be forgiven for failing to escape negative influences in their whole environment.” Id. at 570.

[FN44]. Id. at 570 (“[T]he character of a juvenile is not as well formed as that of an adult.”).

[FN45]. Id.

We cannot execute him for his crime because we cannot say, given his incomplete beingness, his yet-to-be-formed character, that his evil deed reflects his irredeemable evil being.... That is why all the talk about unformed frontal lobes and adolescent risk-taking and bad judgment speaks to the issue of culpability. It is not that the adolescents are less responsible, but that they are, like the mentally retarded, less complete as persons.... [P]erhaps the most difficult job for a capital jury is to accept the idea that juvenile offenders have greater redemptive possibilities than adult offenders, that they are more likely to reform themselves precisely because they are unformed persons when the crime occurred.”); see also Ellen Marrus & Irene Merker Rosenberg, After Roper v. Simmons: Keeping Kids Out of Adult Criminal Court, 42 San Diego L. Rev. 1151 (2005).

Roper rejected retribution or deterrence as justification for execution:

Once the diminished culpability of juveniles is recognized, it is evident that the penological justifications for the death penalty apply to them with lesser force than to adults. We have held there are two distinct social purposes served by the death penalty: “‘retribution and deterrence of capital crimes by prospective offenders.’”

Id. (quoting Atkins v. Virginia, 536 U.S. 304, 319 (2002)). The Roper Court continued:

Whether viewed as an attempt to express the community's moral outrage or as an attempt to right the balance for the wrong to the victim, the case for retribution is not as strong with a minor as with an adult.... Retribution is not proportional if the law's most severe penalty is imposed on one whose culpability or blameworthiness is diminished, to a substantial degree, by reason of youth and immaturity.” Id.

Similarly, the Court concluded that juveniles' immaturity of judgment decreased the likelihood that the threat of execution would deter them, arguing that “the absence of evidence of deterrent effect is of special concern because the same characteristics that render juveniles less culpable than adults suggest as well that juveniles will be less susceptible to deterrence.” Id.

See Elizabeth Cepparulo, Note, Roper v. Simmons: Unveiling Juvenile Purgatory: Is Life Really Better than Death?, 16 Temp. Pol. & Civ. Rts. L. Rev. 225, 225 (2006) (noting that the impact of Roper was to convert capital sentences to sentences of life without the possibility of parole because, “[I]n many states, life without parole and death are the only two options when sentencing homicide offenders’’); see also Davis v. Jones, 441 F. Supp. 2d 1138, 1149 (M.D. Ala. 2006) (finding that defendant was seventeen years old at the time of his conviction and capital sentence, and, as a result of Roper, “the sentence of death is no longer constitutionally valid, [so] the only sentencing alternative is life without parole’’); Duncan v. State, 925 So. 2d 245, 281 (Ala. Crim. App. 2005) (holding that, because of Roper, case remanded with instructions to “set aside the appellant's death sentence and resentenced him to imprisonment for life without the possibility of parole’’); Duke v. State, 922 So. 2d 179, 181 (Ala. Crim. App. 2005) (holding that following Roper, the case of a sixteen-year-old convicted of capital crime must be remanded “to set aside Duke's sentence of death and to resentence him to life imprisonment without the possibility of parole--the only other sentence available for a defendant convicted of capital murder’’); Lecroy v. State, 954 So. 2d 747, 748 (Fla. Dist. Ct. App. 2007) (affirming the trial court's decision to conform the defendant's sentence to the state supreme court's specifications: life without the possibility of parole for twenty-five years); State v. Craig, 944 So. 2d 660, 662 (La. Ct. App. 2006) (rejecting seventeen-year-old capital defendant's claim that post-Roper resentencing to life imprisonment at hard labor without benefit of parole violated state constitutional prohibition of excessive punishment); State v. Chapman, 611 S.E.2d 794, 832 (N.C. 2005) (remanding juvenile convicted of capital murder for resentencing).
Roper, 543 U.S. at 587 (O'Connor, J., dissenting). In her Roper dissent, Justice O'Connor reviewed her rationale to explain the different outcomes in Thompson and Stanford. Id. at 590-92.

Id. at 588. Justice O'Connor elaborated:

The Court adduces no evidence whatsoever in support of its sweeping conclusion that it is only in “rare” cases, if ever, that seventeen-year-old murderers are sufficiently mature and act with sufficient depravity to warrant the death penalty. The fact that juveniles are generally less culpable for their misconduct than adults does not necessarily mean that a seventeen-year-old murderer cannot be sufficiently culpable to merit the death penalty. But an especially depraved juvenile offender may nevertheless be just as culpable as many adult offenders considered bad enough to deserve the death penalty.

Id. at 599-600.

Id. at 601.

Id. at 602. Justice O'Connor objected that the Court's rejection of individualized culpability assessments was contrary to its death penalty jurisprudence that rejected arbitrary, categorical rules in favor of “individualized sentencing in which juries are required to give appropriate mitigating weight to the defendant's immaturity, his susceptibility to outside pressures, his cognizance of the consequences of his actions, and so forth.” Id. at 602-03.

Id. at 609 (Scalia, J., dissenting) (“Words have no meaning if the views of less than 50% of death penalty States can constitute a national consensus.”).

Id. at 614.

Id. at 617-18.

Id. at 620.

Id. (quoting McCleskey v. Kemp, 481 U.S. 279, 311 (1987)). See also Wayne Myers, Roper v. Simmons: The Collision of National Consensus and Proportionality Review, 96 J. Crim. L. & Criminology 947, 991 (2006) (“[T]he central defect in the majority's... analysis [is] its complete failure to support the contention that a jury cannot adequately account for youth as a mitigating factor in sentencing decisions.”).

Roper, 543 U.S. at 595-96 (O'Connor, J., dissenting) (contrasting state laws rejecting execution of defendants with mental retardation in Atkins with laws regarding executing juveniles); id. at 609-11 (Scalia, J., dissenting) (arguing that relevant reference groups are policies of states that employ the death penalty for some offenders).

Roper, 543 U.S. at 575-78 (majority opinion) (noting that “the United States is the only country in the world that continues to give official sanction to the juvenile death penalty” and referring to “the laws of other countries and to international authorities as instructive for its interpretation of the Eighth Amendment”), with id. at 604-05 (O'Connor, J., dissenting) (acknowledging limited role of international law because the “Nation's evolving understanding of human dignity certainly is neither wholly isolated from, nor inherently at odds with, the values prevailing in other countries”), and id. at 624 (Scalia, J., dissenting) (arguing that the majority's premise that American law should reflect views of the rest of the world “ought to be rejected out of hand”).

Id. at 593-94 (O'Connor, J., dissenting) (criticizing Court's failure to reprove Missouri Supreme Court
for failing to follow Stanford); id. at 628-29 (Scalia, J., dissenting) ("To add insult to injury, the Court affirms the Missouri Supreme Court without even admonishing that court for its flagrant disregard of our precedent in Stanford.").

[FN62] Compare id. at 572-73 (majority opinion) ("The differences between juvenile and adult offenders are too marked and well understood to risk allowing a youthful person to receive the death penalty despite insufficient culpability"), with id. at 602-03 (O'Connor, J., dissenting) ("[T]hese [Eighth Amendment] concerns may properly be addressed not by means of an arbitrary, categorical age-based rule, but rather through individualized sentencing in which juries are required to give appropriate mitigating weight to the defendant's immaturity, his susceptibility to outside pressures, his cognizance of the consequences of actions, and so forth."), and id. at 620 (Scalia, J., dissenting) ("[The majority's] startling conclusion undermines the very foundations of our capital sentencing system, which entrusts juries with 'mak[ing] the difficult and uniquely human judgments that defy codification and that build[d] discretion, equity, and flexibility into a legal system.'" (quoting McCleskey v. Kemp, 481 U.S. 279, 311 (1987))).

[FN63] Roper, 543 U.S. at 572-73 (majority opinion) (emphasis added).

[FN64] Id. at 573.

[FN65] Emens, supra note 46, at 83 ("[T]o the extent we see or want to see childhood as a time of innocence, cognitive dissonance may prompt us to reconceive a child who does terrible things as an adult.").

[FN66] Id. at 52 (noting that the prosecutor in Roper improperly urged the defendant's age as an aggravating, rather than mitigating, factor); Norman J. Finkel, Prestidigitation, Statistical Magic, and Supreme Court Numerology in Juvenile Death Penalty Cases, 1 Psychol., Pub. Pol'y & L. 612, 636 (1995) (reporting social science studies showing that "[w]hen heinousness increases, it exerts a more powerful effect than age"); Williams, supra note 41, at 1131 ("[T]he tendency to regard youth as an aggravating consideration, to see the juvenile offender as a super-predator who has many years ahead to commit other dangerous acts, threatens to eclipse the mitigating quality of youth."); Rowe, supra note 11, at 311 ("By taking these sentencing decisions out of a jury's hands, the Court implicitly doubted American citizens' ability to weigh a body of evidence and recommend an appropriate sentence for a sixteen-year-old or seventeen-year-old defendant who kills in cold blood.").

[FN67] See, e.g., Mitchel Brim, A Sneak Preview into How the Court Took Away a State's Right to Execute Sixteen and Seventeen Year Old Juveniles: The Threat of Execution Will No Longer Save an Innocent Victim's Life, 82 Denv. U. L. Rev. 739, 753 (2005) (beginning with a recitation of a horrific crime committed by juveniles and concluding that "[i]t is a grave injustice, not only to the victim and the victim's family, but also to society as a whole because the Court is able to disrespect the victim and the victim's family by not basing its decision on the respondent's moral culpability but rather on the Justices' individual perceptions and biases"); Moin A. Yahya, Deterring Roper's Juveniles Using a Law and Economics Approach to Show that the Logic of Roper Implies that Juveniles Require the Death Penalty More than Adults, 111 Penn St. L. Rev. 53, 106 (2006) ("If Roper is correct in assuming that juveniles are reckless, voracious consumers of the present, who have little fear of punishment because of their underdeveloped brains, then harsher punishments are needed to control them."); Benyomin Forer, Comment, Juveniles and the Death Penalty: An Examination of Roper v. Simmons and the Future of Capital Punishment, 35 Sw. U. L. Rev. 161, 171-75, 180 (2006) (summarizing facts of egregious cases and concluding that "the Court's analysis and determinations were deficient" and "overruled existing case law on flimsy grounds"); Rowe, supra note 11, at 319 ("[T]he Court interfered with the function of both state legis-
latures and sentencing juries, using its subjective views to declare what the law should be and implying that neither legislatures nor juries are competent to correctly assess the culpability of juveniles and determine appropriate sentences.”); Steven J. Wernick, Comment, Constitutional Law: Elimination of the Juvenile Death Penalty--Substituting Moral Judgment for a True National Consensus, 58 Fla. L. Rev. 471 (2006).

[FN68]. Emens, supra note 46, at 53 (“[W]e think we favor youth, and we think we should favor youth, but in reality we may disfavor youth. Kennedy's reasoning thus suggests that... the law must embrace a categorical rule to align how we treat young people under law with how we think we do and should treat them.”). Emens posits a three-step logic to justify Kennedy's categorical conclusion:

First, youth is a rational proxy for diminished culpability. Second, jurors will sometimes fail to consider youth as mitigating because they may have negative stereotypes and, worse yet, negative attitudes toward youth. Indeed, they may treat youth as aggravating, thus creating a peculiarly troubling type of error: treating an individual less favorably on the basis of the trait, youth, that should prompt more favorable treatment. Third, such errors are sufficiently weighty that the Eighth Amendment requires a prophylactic rule that removes such decisions from the jury.

Id. at 101. Professor Williams makes a similar argument to justify denying juries the opportunity to execute juveniles:

A categorical exemption for juvenile offenders, being overinclusive in the sense that some juvenile offenders exempted from execution are no less responsible for their crimes than adult offenders who actually have been executed for comparable crimes, reflects an aversion to the “risk [of] allowing a youthful person to receive the death penalty despite insufficient culpability.” We take away the capital decision-making prerogative from the jury when it comes to juvenile offenders because we simply don't trust juries enough to reliably decide, over time and across jurisdiction, that moral question rightly.

Williams, supra note 41, at 1130 (quoting Roper v. Simmons, 543 U.S. at 572-73).

[FN69]. Roper, 543 U.S. 551, 569 (observing summarily that “as any parent knows,” juveniles are immature and irresponsible).

[FN70]. Id. at 617-19 (Scalia, J., dissenting) (criticizing majority's selective and inconsistent use of social science studies as “look[ing] over the heads of the crowd and pick[ing] out its friends”); Deborah W. Denno, The Scientific Shortcomings of Roper v. Simmons, 3 Ohio St. J. Crim. L. 379, 396 (2006) (“[A]lthough Roper was correct in its result, the Court's use of social science research was, at times, limited and flawed. Even when the Court attempts to examine research that is widely accepted and highly regarded, the Court does not always appear to have the tools necessary to provide a sufficiently firm social sciences foundation.”).

[FN71]. Denno, supra note 70, at 382-87 (arguing that while the Court relies on the “scientific and sociological studies respondent and his amici cite,” it fails to identify which studies or data supported its conclusions about the differences between adolescents and adults).

[FN73]. See Stanford v. Kentucky, 492 U.S. 361, 393 (1989) (Brennan, J., dissenting) (“[T]he proportionality principle takes account not only of the ‘injury to the person and to the public’ caused by a crime, but also of the ‘moral depravity’ of the offender.” (quoting Coker v. Georgia, 433 U.S. 584, 598 (1977))); Enmund v. Florida, 458 U.S. 782, 815 (1982) (O'Connor, J., dissenting) (arguing that the offender's culpability--“the degree of the defendant's blameworthiness”--is central to determining the penalty); Wayne A. Logan, Proportionality and Punishment: Imposing Life Without Parole on Juveniles, 33 Wake Forest L. Rev. 681, 707 (1998) (“A sentence must correspond to the crime--not just to the harm caused by the offense, but also to the culpability of the offender.”); Elizabeth S. Scott & Laurence Steinberg, Blaming Youth, 81 Tex. L. Rev. 799, 822 (2003) (“Only a blameworthy moral agent deserves punishment at all, and blameworthiness (and the amount of punishment deserved) can vary depending on the attributes of the actor or the circumstances of the offense.”); Franklin E. Zimring, Penal Proportionality for the Young Offender: Notes on Immaturity, Capacity, and Diminished Responsibility, in Youth on Trial 271 (Thomas Grisso & Robert Schwartz eds., 2000) (“But dessert is a measure of fault that will attach very different punishment to criminal acts that cause similar amounts of harm.”).  

[FN74]. Frase, supra note 72, at 590.  

[FN75]. See, e.g., Ernest van den Haag, Punishing Criminals 174 (1975) (arguing that the victim of a crime is just as victimized, regardless of the age of the perpetrator, and the need for social defense is the same).  

[FN76]. Zimring, supra note 73, at 271; see also David O. Brink, Immaturity, Normative Competence and Juvenile Transfer: How (Not) to Punish Minors for Major Crimes, 82 Tex. L. Rev. 1555, 1557 (2004) (“[J]uveniles tend to be less competent in discriminating right from wrong and in being able to regulate successfully their actions in accord with these discriminations. If they are less competent, then they are less responsible.”).  

[FN77]. Just desserts theory and criminal law grading principles base the degree of deserved punishment on the actor's culpability. For example, a person may cause the death of another individual with premeditation and deliberation, intentionally, “in the heat of passion,” recklessly, negligently, or accidentally. See Jerome Hall, General Principles of Criminal Law 105-45 (2d ed. 1960). The criminal law treats the same objective harm--for example, the death of a person--quite differently depending on the actor's culpability.  

[FN78]. See Amnesty Int'l, supra note 3, at 113 (arguing that penal proportionality requires consideration of both the nature of the offense and the culpability of the offender). The report also noted:  

Children can commit the same acts as adults, but by virtue of their immaturity, they cannot be as blameworthy or as culpable. They do not have adults' developed abilities to think, to weigh consequences, to make sound decisions, to control their impulses, and to resist group pressures; their brains are anatomically different, still evolving into the brains of adults.  

Id.; see also, Peter Arenella, Character, Choice and Moral Agency: The Relevance of Character to Our Moral Culpability Judgments, 7 Soc. Phil. & Pol'y 59, 67-68 (1990) (arguing that the criminal law treats children differently than adults because they are not “full moral agents, despite their capacity for practical reason and their freedom to act on the basis of their reasoned choices”); Elizabeth S. Scott & Thomas Grisso, The Evolution of Adolescence: A Developmental Perspective on Juvenile Justice Reform, 88 J. Crim. L. & Criminology 137, 176 (1997) (“[Adolescents'] criminal choices are presumed less to express individual preferences and more to reflect the behavioral influences characteristic of a transitory developmental stage that are generally shared with others in the age cohort. This difference supports drawing a line based on age, and subjecting adolescents to a categorical presumption of reduced responsibility.”); Laurence Steinberg & Elizabeth Cauffman, The Elephant in the Courtroom: A Developmental Perspective on the Adjudication of Youthful Offenders, 6 Va. J. Soc. Pol'y
& L. 389, 407-09 (1999) (explaining that youths lack “ability to control [their] impulses, to manage [their] behav-
ior in the face of pressure from others to violate the law, or to extricate [themselves] from a potentially prob-
lematic situation,” and that these deficiencies render them less blameworthy).

[FN79]. Zimring uses the term “diminished responsibility” to refer to adolescents who possess “the minimum
abilities for blameworthiness and thus for punishment... [whose] immaturity... still suggests that less punishment
is justified.” Zimring, supra note 73, at 273; see also Scott & Steinberg, supra note 73, at 830 (arguing that com-
pared with adults, youths act more impulsively, weigh consequences differently from adults, and discount risks
because of normal developmental processes that “undermine [their] decision-making capacity in ways that are
accepted as mitigating culpability”).

[FN80]. Brink, supra note 76, at 1570 (emphasizing both cognitive and volitional aspects of responsibility). Ac-
cording to Brink, “Normative competence involves the cognitive ability to discriminate right from wrong, but
also the affective and cognitive abilities to regulate one's emotions, appetites, and actions in accordance with
this normative knowledge. One central ingredient in normative competence is impulse control.” Id.

[FN81]. See, e.g., Steinberg & Cauffman, supra note 78, at 391 (“Developmental psychology, broadly defined,
concerns the scientific study of changes in physical, intellectual, emotional, and social development over the life
cycle. Developmental psychologists are mainly interested in the study of ‘normative’ development (i.e., patterns
of behavior, cognition, and emotion that are regular and predictable within the vast majority of the population of
individuals of a given chronological age), but they are also interested in understanding normal individual differ-
ences in development (i.e., common variations within the range of what is considered normative for a given
chronological age) as well as the causes and consequences of atypical or pathological development (i.e., devel-
opment that departs significantly from accepted norms).”).

[FN82]. See, e.g., Gary B. Melton, Toward “Personhood” for Adolescents: Autonomy and Privacy as Values in
Public Policy, 38 Am. Psychologist 99, 100 (1983). For example, when youths make informed consent medical
decisions, adolescents fourteen years of age or older make decisions comparable to those of adults. See id. at
100-01; see also Gary B. Melton, Children's Competence to Consent: A Problem in Law and Social Science, in
Children's Competence to Consent 1, 15 (Gary B. Melton et al. eds., 1983); Cynthia V. Ward, Punishing Chil-
dren in the Criminal Law, 82 Notre Dame L. Rev. 429, 434-36 (2006) (arguing that the cognitive competence of
adolescents enables them to form the mens rea to commit a crime and essentially refutes claims that the criminal
law should treat them differently than adults). Developmental psychological research on adolescents' cognitive
decision-making ability suggests that “for most purposes, adolescents cannot be distinguished from adults on the
ground of competence in decision making alone.” Id. But see Elizabeth Cauffman et al., Justice for Juveniles:
(criticizing cognitive studies as methodologically limited and failing to assess real-life decision making); Eliza-
abeth S. Scott, Judgment and Reasoning in Adolescent Decisionmaking, 37 Vill. L. Rev. 1607, 1609 (1992)
(criticizing researchers who find no differences between adolescents' and adults' decision making for focusing
too narrowly on cognitive as opposed to judgmental factors).

[FN83]. Roper v. Simmons, 543 U.S. 551, 617-21 (2005) (Scalia, J., dissenting) (arguing that the Court cited re-
search on adolescents' competence to make informed consent decisions in the context of abortion); Stephen J.
Morse, Immaturity and Irresponsibility, 88 J. Crim. L. & Criminology 15, 52-53 (1998) (concluding that cog-
itive capacity and formal reasoning ability of mid-adolescents does not differ significantly from that of adults).
Research on young peoples' ability to make informed medical decisions tends to support equating adolescents'
and adults' cognitive abilities. See Thomas Grisso & Linda Vierling, Minors’ Consent to Treatment: A Developmental Perspective, 9 Prof. Psychol. 412, 423 (1978) (finding that little research evidence exists to support that adolescents aged fifteen or older possess less competence than adults to provide knowing, intelligent, and voluntary informed consent); Lois A. Weithorn & Susan B. Campbell, The Competency of Children and Adolescents to Make Informed Treatment Decisions, 53 Child Dev. 1589, 1595 (1982) (noting that fourteen-year-olds' choices did not differ significantly from those of adults in terms of “evidence of choice, reasonable[ness of] outcome, rational[ity of] reason[ing], and understanding” when responding to medical and psychological treatment hypotheticals). A review of several psychological studies of adolescents’ reasoning processes and understanding and use of medical information about their conditions and treatment options found that adolescents and adults generally made qualitatively comparable decisions. See Scott, supra note 82, at 1627-30.

[FN84] See Elizabeth Cauffman & Laurence Steinberg, The Cognitive and Affective Influences on Adolescent Decision-Making, 68 Temp. L. Rev. 1763, 1770 (1995) [hereinafter Cauffman & Steinberg, Cognitive and Affective Influences]; Scott & Steinberg, supra note 73, at 812-13 (“These findings from laboratory studies are only modestly useful, however, in understanding how youths compare to adults in making choices that have salience to their lives or that are presented in stressful unstructured settings (such as the street) in which decision-makers must rely on personal experience and knowledge.”); L.P. Spear, The Adolescent Brain and Age-Related Behavioral Manifestations, 24 Neuroscience & Biobehavioral Revs. 417, 423 (2000) (“[T]he decision making capacity of adolescents may be more vulnerable to disruption by the stresses and strains of everyday living than that of adults. That is, unlike adults, adolescents may exhibit considerably poorer cognitive performance under circumstances involving everyday stress and time-limited situations than under optimal test conditions.”); Laurence Steinberg & Elizabeth Cauffman, Maturity of Judgment in Adolescence: Psychosocial Factors in Adolescent Decision Making, 20 Law & Hum. Behav. 249, 250 (1996) [hereinafter Steinberg & Cauffman, Maturity of Judgment] (“[T]he informed consent model is too narrow in scope... because it overemphasizes cognitive functioning (e.g., capacity for thinking, reasoning, understanding) and minimizes the importance of noncognitive, psychosocial variables that influence the decision-making process (i.e., aspects of development and behavior that involve personality traits, interpersonal relations, and affective experience.”).

[FN85] See, e.g., Jay D. Aronson, Brain Imaging, Culpability and the Juvenile Death Penalty, 13 Psychol. Pub. Pol’y & L. 115, 119 (2007) (“[A]dolescents are much less capable of making sound decisions when under stressful conditions or when peer pressure is strong. Psychosocial researchers have referred to cognition in these different contexts as cold versus hot. The traits that are commonly associated with being an adolescent---short-sightedness (i.e., inability to make decisions based on long-term planning), impulsivity, hormonal changes, and susceptibility to peer influence---can quickly undermine one's ability to make sound decisions in periods of hot cognition.” (citation omitted)); Ronald E. Dahl, Affect Regulation, Brain Development, and Behavioral/Emotional Health in Adolescence, 6 CNS Spectrums 60, 61 (2001) (“Cold cognition refers to thinking under conditions of low emotion and/or arousal, whereas hot cognition refers to thinking under conditions of strong feelings or high arousal. The cognitive processes involved in hot cognition may, in fact, be much more important for understanding why people [--especially youths--] make risky choices in real-life situations.”).

[FN86] See, e.g., Cauffman & Steinberg, Cognitive and Affective Influences, supra note 84, at 1780; Scott, supra note 82, at 1645 (“[Youths’ impulsiveness] disables the young individual from considering alternatives or weighing and comparing consequences according to his or her subjective utility. More likely, impulsiveness might simply affect the care with which actual decisions are made....”); Dahl, supra note 85, at 62 (“[D]ecision-making sequences regarding risky behavior in adolescence cannot be fully understood without considering the role of emotions, with key aspects of these ‘decision’ processes involving interactions between
thinking and feeling processes.”); Steinberg & Cauffman, Maturity of Judgment, supra note 84, at 259 (“[S]ensation seeking increases during adolescence, leading to increased risk taking as a means of achieving excitement. Another viewpoint posits that hormonal and physiological changes that accompany puberty result in higher levels of impulsivity and recklessness. Finally, a third perspective emphasizes the influence of emotion and mood on decision making.”).


[FN89]. See id. (graph entitled, “Basic Intellectual Abilities Are Mature by Age 16”).

[FN90]. See Scott & Steinberg, supra note 73, at 813 (“Psycho-social development proceeds more slowly than cognitive development. As a consequence, even when adolescent cognitive capacities approximate those of adults, youthful decision-making may still differ due to immature judgment.”); Elizabeth Scott et al., Evaluating Adolescent Decision Making in Legal Contexts, 19 Law & Hum. Behav. 221, 224 (1995) [hereinafter Scott et al., Legal Contexts]; Kim Taylor-Thompson, States of Mind/States of Development, 14 Stan. L. & Pol'y Rev. 143, 152 (2003) (“[F]or all the importance of cognitive development, aspects of behavior that involve interpersonal and affective experience may offer even more information about an adolescent's decision-making processes.”). Contra Ward, supra note 82, at 446-56 (arguing that even very young children possess sufficient rationality to act instrumentally and therefore no reasons exist to punish them differently than adults).


[FN93]. See Cauffman & Steinberg, Cognitive and Affective Influences, supra note 84, at 1765; Scott et al., Legal Contexts, supra note 86, at 227; Scott & Grisso, supra note 78, at 157. Psycho-social factors affecting adolescents' decisions to engage in crime include “peer influence, temporal perspective (a tendency to focus on short-term versus long-term consequences), and risk perception and preference.... We designate these psychosocial influences as ‘judgment’ factors, and argue that immature judgment in adolescence may contribute to choices about involvement in crime.”). Id.; see also Steinberg & Cauffman, Maturity of Judgment, supra note
84, at 252; Steinberg & Cauffman, supra note 78, at 407-08 (explaining that the quality of adolescent decision-making subsumes three categories of psycho-social factors: “responsibility (the capacity to make a decision in an independent, self-reliant fashion), perspective (the capacity to place a decision within a broader temporal and interpersonal context), and temperance (the capacity to exercise self-restraint and control one’s impulses”).

[FN94]. See, e.g., Morse, supra note 83, at 53 (describing characteristics of youths that distinguish their decision-making capabilities from those of adults); Scott & Steinberg, supra note 73, at 813 (“E[ven when adolescent cognitive capacities approximate those of adults, youthful decision-making may still differ due to immature judgment. The psycho-social factors most relevant to differences in judgment include: (a) peer orientation, (b) attitudes toward and perception of risk, (c) temporal perspective, and (d) capacity for self-management.... [I]mmature judgment can affect outcomes because these developmental factors influence adolescent values and preferences that drive the cost-benefit calculus in the making of choices.”); Scott et al., Legal Contexts, supra note 90, at 229-35 (describing psycho-social and developmental factors that contribute to juveniles’ immature judgment); Steinberg & Cauffman, Maturity of Judgment, supra note 84, at 252 (emphasizing temperance, perspective, and judgment as ways in which adolescents’ thinking diverges from adults); Taylor-Thompson, supra note 90, at 144 (“[A]dolescents think differently than mature adults.... They fixate on an initial possibility in the decision-making process and fail to adjust as new information becomes available.”).

[FN95]. See Scott, supra note 82, at 1610; Scott & Grisso, supra note 78, at 160-61 (noting that psycho-social developmental factors affecting judgment and criminal responsibility in adolescents include: “(1) conformity and compliance in relation to peers, (2) attitude toward and perception of risk, and (3) temporal perspective”); Scott & Steinberg, supra note 73, at 813; Scott et al., Legal Contexts, supra note 90, at 227 (proposing “judgment” framework to evaluate quality of adolescent decision-making that includes not only cognitive capacity, but also influence of factors such as “conformity and compliance in relation to peers and parents, attitude toward and perception of risk, and temporal perspective”); Steinberg & Cauffman, Maturity of Judgment, supra note 84, at 258-62.

[FN96]. See Scott & Steinberg, supra note 73, at 814 (“Future orientation, the capacity and inclination to project events into the future, may also influence judgment, since it will affect the extent to which individuals consider the long-term consequences of their actions in making choices. Over an extended period between childhood and young adulthood, individuals become more future-oriented.”).

[FN97]. See William Gardner, A Life-Span Rational-Choice Theory of Risk Taking, in Adolescent Risk Taking 66, 67 (Nancy J. Bell & Robert W. Bell eds., 1993); Marrus & Rosenberg, supra note 4, at 1162-63 (describing various ways in which juveniles engage in risky behavior--unprotected sex, drugs, drinking, driving recklessly, and the like). Teenagers’ greater proclivity to engage in unprotected sex and to speed and drive recklessly reflects various forms of risk-taking with respect to health and safety. See John H. Laub & Robert J. Sampson, Understanding Desistance from Crime, 28 Crime & Just. 1, 38-48 (2001) (summarizing criminological research reporting peak of criminal involvement in mid-to-late adolescence with sharp desistance thereafter and attributing youthful involvement to normal developmental transition to adulthood); Elizabeth S. Scott, Criminal Responsibility in Adolescence: Lessons from Developmental Psychology, in Youth on Trial, supra note 73, at 291, 300-301 [hereinafter Scott, Lessons] (“Many adolescents become involved in criminal activity in their teens and desist by the time they reach young adulthood. [C]riminologists... conclude that participation in delinquency is ‘a normal part of teen life.’ For most adolescent delinquents, desistance from antisocial behavior also seems to be a predictable part of the maturation process.”); Scott et al., Legal Contexts, supra note 90, at 230; Spear, supra note 84, at 421 (“[W]ith half or more of adolescents exhibiting drunk driving, sex without contraception,
use of illegal drugs, and minor criminal activities, ‘reckless behavior becomes virtually a normative characteristic of adolescent development.’” (quoting Jeffrey Arnett, Reckless Behavior in Adolescence, 12 Developmental Rev. 339, 344 (1992)).

[FN98]. See Lita Furby & Ruth Beyth-Marom, Risk Taking in Adolescence: A Decision-Making Perspective, 12 Developmental Rev. 1, 3-4 (1992); see also Thomas Grisso, Society's Retributive Response to Juvenile Violence: A Developmental Perspective, 20 Law & Hum. Behav. 229, 241 (1996) (“We need to examine the extent to which midadolescents typically might not yet have achieved adultlike ways of framing problems... and generating alternative responses to stressful situations or weighing the potential consequences of their alternatives.” (citations omitted)).

[FN99]. See Furby & Beyth-Marom, supra note 98, at 19 (“[A]dolescents [may] judge some negative consequences in the distant future to be of lower probability than do adults or to be of less importance than adults do.”); Thomas Grisso, What We Know About Youths’ Capacities as Trial Defendants, in Youth on Trial, supra note 73, at 139, 161 (“[A]dolescents... may differ from adults in the weights that they give to potential positive and negative outcomes... [and] are more likely than adults to give greater weight to anticipated gains than to possible losses or negative risks.”); Scott, Lessons, supra note 97, at 305-06 (“[A]dolescents... could differ from adults in the subjective value that is assigned to perceived consequences... [and] may weigh costs and benefits differently, sometimes even viewing as a benefit what adults would consider to be a cost.”).


[FN101]. See Thompson v. Oklahoma, 487 U.S. 815, 835 (1988) ( “Inexperience, less education, and less intelligence make the teenager less able to evaluate the consequences of his or her conduct while at the same time he or she is much more apt to be motivated by mere emotion or peer pressure than is an adult.”); Scott, Lessons, supra note 97, at 304-05 (“Adolescents, perhaps because they have less knowledge and experience, are less aware of risks than are adults.... [T]he fact that adolescents have less experience and knowledge than adults seems likely to affect their decision making in tangible and intangible ways.” (citation omitted)); Taylor-Thompson, supra note 90, at 153 (“Adolescents assess risk differently than adults. This may result from adolescents being unaware of risks that adults typically perceive, having incorrect information about risks, or calculating the probability or magnitude of the risk in ways that adults would not.” (footnotes omitted)).

[FN102]. See Taylor-Thompson, supra note 90, at 153 (“In situations where adults will likely perceive and weigh multiple alternatives as part of rational decision-making, adolescents typically see only one option. This inflexible ‘either-or-mentality’ becomes especially acute under stressful conditions.”).


[FN104]. Id.

[FN105]. Id. (graph entitled, “Risk Perception Declines and Then Increases After Mid-Adolescence”).

[FN106]. Id. (graph entitled, “Future Orientation Increases with Age”).

1607, 1608, 1645-47 (1992) (discussing how youths' perceptions of and preferences for risk differ from those of adults). Young people may discount negative future consequences because they have more difficulty than adults integrating a future consequence into their more limited experiential baseline. See William Gardner & Janna Herman, Adolescents' AIDS Risk Taking: A Rational Choice Perspective, in Adolescents and the AIDS Epidemic 17, 17-19 (William Gardner et al. eds., 1990); Taylor-Thompson, supra note 90, at 154 (“Adolescents, more than adults, tend to discount the future and to afford greater weight to short-term consequences of decisions.”).


[FN109]. See Scott & Steinberg, supra note 73, at 815 (“[A]dolescents are less risk-averse than adults, generally weighing rewards more heavily than risks in making choices. In part, this may be due to limits on youthful time perspective; taking risks is more costly for those who focus on the future.”); Scott & Grisso, supra note 78, at 163; Taylor-Thompson, supra note 90, at 153 (“[A]dolescents experience greater concern--and anxiety--over the consequences of refusing to engage in risky conduct than adults do, thanks to greater fear of being socially ostracized.”).

[FN110]. See Scott & Grisso, supra note 78, at 163 (arguing that adolescents are more willing to take physical and social risks for the sake of experiencing novel and complex sensations); Spear, supra note 84, at 422 (“Individuals engaging in risk taking may do so to attain the positive arousal produced by the sensations of novelty, complexity, change or intensity of experience.... Perceived risks of risk taking decline with age during adolescence, so it is possible that the level of risk taking necessary to attain an ‘adrenaline rush’ of danger may rise as well, perhaps leading to an escalation of risk-taking behaviors in certain individuals, particularly those with poor prospects for attaining other reinforcers.” (quoting D. Wilson and M. Daly, Lethal Confrontational Violence Among Young Men, in Adolescent Risk Taking, supra note 97, at 84)); Taylor-Thompson, supra note 90, at 153 (arguing that sensation-seeking activity increases for youths between sixteen and nineteen years of age).


[FN112]. Id. (graph entitled, “Sensation-Seeking Declines with Age”).

[FN113]. See Lawrence D. Cohn et al., Risk-Perception: Differences Between Adolescents and Adults, 14 Health Psychol. 217, 221 (1995) (arguing that adolescents engage in “health-threatening activities” because they “do not regard [such] behavior as extremely risky or unsafe,” rather than because of “unique feelings of invulnerability”); Furby & Beyth-Marom, supra note 98, at 19-21.

[FN114]. See Scott & Steinberg, supra note 73, 86. Summarizing some of the preliminary research on brain development and its implications for adolescent self-control, Scott and Steinberg write:

[R]egions of the brain implicated in processes of long-term planning, regulation of emotion, impulse control, and the evaluation of risk and reward continue to mature over the course of adolescence, and perhaps well into young adulthood. At puberty, changes in the limbic system--a part of the brain that is central in the processing and regulation of emotion--may stimulate adolescents to seek higher levels of novelty and to take more risks; these changes also may contribute to increased emotionality and vulnerability to stress. At the same time, patterns of development in the prefrontal cortex, which is active during the performance of complicated tasks involving planning and decision-making, suggest that these higher-order cognitive capacities may be immature well into middle adolescence.

[FN115]. See Dahl, supra note 85, at 60 (arguing that affect regulation relates to the control of feelings and behavior and “involves some inhibition, delay, or intentional change of emotional expression or behavior to conform with learned social rules, to meet long-term goals, or to avoid future negative consequences”); Staci A. Gruber & Deborah A. Yurgelun-Todd, Neurobiology and the Law: A Role in Juvenile Justice, 3 Ohio St. J. Crim. L. 321, 330 (2006) (“An adolescent’s level of cortical development may therefore be directly related to her or his ability to perform well in situations requiring executive cognitive skills. Younger, less cortically mature adolescents may be more at risk for engaging in impulsive behavior than their older peers....”).

[FN116]. See Principles of Neural Science 9 (Eric R. Kandel et al. eds., 4th ed. 2000) (describing specialized functions of lobes of the brain and reporting that “[t]he frontal lobe is largely concerned with planning future action and with the control of movement”); Gruber & Yurgelun-Todd, supra note 115, at 323 (“The frontal cortex has been shown to play a major role in the performance of executive functions including short term or working memory, motor set and planning, attention, inhibitory control and decision making.”); Sowell et al., Mapping Continued Brain Growth, supra note 114, at 8819 (describing brain growth in post-adolescents “in the superior frontal regions that control executive cognitive functioning”); Frontline: Inside the Teenage Brain-- Interview with Jay Giedd (PBS television broadcast Mar. 31, 2002), http://www.pbs.org/wgbh/pages/frontline/shows/teenbrain/interviews/giedd.html (“The frontal lobe is often called the CEO, or the executive of the brain. It’s involved in things like planning and strategizing and organizing, initiating attention and stopping and starting and shifting attention.”).

[FN117]. See, e.g., Sarah Spinks, Frontline: Inside the Teenage Brain-- Adolescent Brains Are Works in Progress (PBS television broadcast Mar. 31, 2002), http://www.pbs.org/wgbh/pages/frontline/shows/teenbrain/work/adolescent.html (“The prefrontal cortex sits just behind the forehead. It is particularly interesting to scientists because it acts as the CEO of the brain, controlling planning, working memory, organization, and modulating mood. As the prefrontal cortex matures, teenagers can reason better, develop more control over impulses and make judgments better. In fact, this part of the brain has been dubbed ‘the area of sober second thought’.”); see also Aronson, supra note 85, at 119 (“The frontal lobe does play an important role in aggressiveness, impulse control, regulation of emotion, and executive decision-making functions.”).

[FN118]. Myelin is a white, fatty substance that forms a sheath that surrounds and insulates the axons of certain neurons and allows for more rapid and efficient neurotransmission. Myelination and brain growth in the frontal cortex during adolescence improve brain function by acting like the insulation of a wire to increase the speed of
neural electro-conductivity. See Nat'l Inst. of Mental Health, supra note 114 (“A layer of insulation called myelin progressively envelops these nerve fibers, making them more efficient, just like insulation on electric wires improves their conductivity.”).

[FN119]. See Principles of Neural Science, supra note 116, at 147-48 (describing the role of myelination of axons in speeding conduction velocity and noting that “conduction in myelinated axons is typically faster than in nonmyelinated axons of the same diameter”); Gruber & Yurgelun-Todd, supra note 115, at 325 (“The significant correlation between white matter volume and processing speed are consistent with evidence suggesting that increased myelination of axons produces faster conduction velocity of neural signals and more efficient processing of information, and further suggests that some of the increased cognitive abilities characteristic of adult maturation may be associated with developmental increases in relative white matter volume.”); Paus et al., supra note 114, at 1908 (“The smooth flow of neural impulses throughout the brain allows for information to be integrated across the many spatially segregated brain regions involved in these functions. The speed of neural transmission depends not only on the synapse, but also on structural properties of the connecting fibers, including the axon diameter and the thickness of the insulating myelin sheath.”); Sowell et al., Mapping Continued Brain Growth, supra note 114, at 8828 (“It is likely that the visuospatial functions typically associated with parietal lobes are operating at a more mature level earlier than the executive functions typically associated with frontal brain regions.”).

[FN120]. See, e.g., Principles of Neural Science, supra note 116, at 986-93 (describing role of amygdala in mediating between emotions and cognition).

[FN121]. See Abigail A. Baird et al., Functional Magnetic Resonance Imaging of Facial Affect Recognition in Children and Adolescents, 38 J. Am. Acad. Child & Adolescent Psychiatry 195, 198 (1999) (showing that processing of emotions shifted from the amygdala to the frontal lobe over the course of the teenage years); Nat'l Inst. of Mental Health, supra note 114 (“[A]reas of the frontal lobe showed the largest differences between young adults and teens. This increased myelination in the adult frontal cortex likely relates to the maturation of cognitive processing and other ‘executive’ functions.”).

[FN122]. See David E. Arredondo, Child Development, Children's Mental Health and the Juvenile Justice System, 14 Stan. L. & Pol'y Rev. 13, 15 (2003) (“Adolescents tend to process emotionally charged decisions in the limbic system, the part of the brain charged with instinctive (and often impulsive) reactions. Most adults use more of their frontal cortex, the part of the brain responsible for reasoned and thoughtful responses. This is one reason why adolescents tend to be more intensely emotional, impulsive, and willing to take risks than their adult counterparts.”); Dahl, supra note 85, at 64 (“These affective influences are relevant... to many day-to-day ‘decisions’ that are made at the level of gut feelings about what to do in a particular situation (rather than any conscious computation of probabilities and risk value). These gut feelings appear to be the products of affective systems in the brain that are performing computations that are largely outside conscious awareness (except for the feelings they evoke).”).

[FN123]. Aronson, supra note 85, at 136 (emphasizing “lack of clear causal pathway from brain structure to behavior”); Stephen J. Morse, New Neuroscience, Old Problems, in Neuroscience and the Law: Brain, Mind and the Scales of Justice 157 (Brent Garland ed., 2004) (explaining that as long as the law assumes that people are rational, the biological causes of their behavior are legally irrelevant).

[FN124]. But see Stephen J. Morse, Brain Overclaim Syndrome and Criminal Responsibility: A Diagnostic
Note, 3 Ohio St. J. Crim. L. 397, 405-06 (2006) (arguing that the simple fact of neuron-anatomical differences between adolescent and adult brains do not compel differences in how the law responds to them); Ward, supra note 82, at 460-65 (arguing that neurobiological explanations for adolescent behavior do not provide a basis for punishing them differently than adults).

[FN125]. See Roper v. Simmons, 543 U.S. 551, 569-70 (2005) (noting adolescent susceptibility to negative peer influences); Scott, supra note 82, at 1643-44 (describing adolescent responsiveness to peer influences); Scott & Steinberg, supra note 73, at 813 (“[T]eens are more responsive to peer influence than are adults. Susceptibility to peer influence increases between childhood and early adolescence as adolescents begin to individuate from parental control. This susceptibility peaks around age fourteen and declines slowly during the high-school years.”); Steinberg & Cauflman, Maturity of Judgment, supra note 84, at 253-54.

[FN126]. Police arrest two or more juveniles for committing a single crime more often than they do adults. See, e.g., Snyder & Sickmund, supra note 2, at 77 (1999) (showing percentages of various crimes committed in groups by juveniles between 1973 and 1997); Franklin E. Zimring, Kids, Groups and Crime: Some Implications of a Well-Known Secret, 72 J. Crim. L. & Criminology 867, 870 (1981) (noting that 64% of robberies committed by people under age twenty-one were committed in groups while only 39% of robberies committed by people twenty-one and older were committed in groups). This group offending increases their prospects for prosecutions as accessories and exposes them to the same criminal penalties as principals. See, e.g., Franklin E. Zimring, American Youth Violence 152 (Michael Tonry & Norval Morris eds., 1998) [hereinafter Zimring, American Youth Violence] (“Accessorial liability can interact with the vulnerability of adolescents to group pressure to create very marginal conditions for extensive criminal sanctions.”); Scott & Grisso, supra note 78, at 162 (“Peer influence seems to operate through two means: social comparison and conformity. Through social comparison, adolescents measure their own behavior by comparing it to others. Social conformity... influences adolescents to adapt their behavior and attitudes to that [sic] of their peers.”); Taylor-Thompson, supra note 90, at 153-54 (“The choice to engage in antisocial conduct is often linked to the adolescent's desire for peer approval. Prodding by peers can substitute for, and even overwhelm, an adolescent's own ‘better’ judgment about whether to engage in certain conduct.”).

[FN127]. See Scott & Steinberg, supra note 73, at 815 (“[A] synergy likely exists between adolescent peer orientation and risk-taking; considerable evidence indicates that people generally make riskier decisions in groups than they do alone.”); Zimring, supra note 73, at 282 (“That social settings account for the majority of all youth crime suggests that the capacity to deflect or resist peer pressure is a crucially necessary dimension of being law-abiding in adolescence.... Kids who do not know how to deal with such pressure lack effective control of the situations that place them most at risk of crime in their teens.”).

[FN128]. MacArthur Found. Research Network, supra note 88 (graph entitled, “With Age, Individuals Become More Resistant to Peer Influence”); Zimring, supra note 73, at 280 (“A teen may know right from wrong and may even have developed the capacity to control his or her impulses while alone, but resisting temptation while alone is a different task than resisting the pressure to commit an offense when adolescent peers are pushing for misbehavior and waiting to see whether or not the outcome they desire will occur.”).

[FN129]. See, e.g., Zimring, supra note 73, at 282 (“But if social experience in matters such as anger and impulse-management also counts, and a fair opportunity to learn to deal with peer pressures is regarded as important, expecting the experienced-based ability to resist impulses and peers to be fully formed prior to age eighteen or nineteen would seem on present evidence to be wishful thinking.”).
The capacities of critical self-reflection and self-revision are not simply some individual properties that some individuals have the moral luck to possess. Their acquisition and development depend on an interpersonal process between the agent and other human beings. The ability to control one's character is a process that often requires some form of socially created transformational opportunity being made available to an individual who has the capacity to take advantage of it.

Id.; see also Arredondo, supra note 122, at 16-17 (2003) (arguing that children require attention as part of normal brain development and that if they become attention-deprived, they will engage in both positive and negative behaviors to satisfy their needs); Jeffrey Fagan, Context and Culpability in Adolescent Crime, 6 Va. J. Soc. Pol'y & L. 507, 535-39 (1998) [hereinafter Fagan, Context and Culpability] (suggesting that criminogenic social context contributes to young gang members' criminal behavior); Jeffrey Fagan, Context of Choice by Adolescents in Criminal Events, in Youth on Trial, supra note 73, at 371, 376 [hereinafter Fagan, Choice by Adolescents] (noting that social context contributes to adolescents' violent behavior); Elizabeth S. Scott, The Legal Construction of Adolescence, 29 Hofstra L. Rev. 547, 547 (2000) (“[C]hildren are assumed to need care, support, and education in order to develop into healthy productive adults. The obligation to provide the services critical to children’s welfare rests first with parents and ultimately with the state.”); Deanna L. Wilkinson & Jeffrey Fagan, The Role of Firearms in Violence “Scripts”: The Dynamics of Gun Events Among Adolescent Males, 59 Law & Contemp. Probs. 55, 63-66 (1996) (describing how peer interactions create “scripts” that prescribe how youths should respond to disrespect and that lead to violent confrontations).

[FN132]. See Robert J. Bursik, Jr. & Harold G. Grasmick, Neighborhoods and Crime 58 (1993) (“[L]ow levels of systemic control increase the likelihood of crime, high levels of crime decrease the effectiveness of systemic control, and the entire process spirals onward.”); Arredondo, supra note 122, at 16 (arguing that delinquent youths typically come from chaotic homes and unresponsive neighborhoods and that, as a result, they have “not had the necessary developmental opportunity of internalizing [lessons learned from] consistently benevolent, reliable, and fair adult authority figures”); Philip J. Cook & John H. Laub, The Unprecedented Epidemic in Youth Violence, 24 Crime & Just. 27, 51, 53-58 (1998) (attributing increase in adolescent homicide rates to increased gun use associated with the crack cocaine industry in urban, inner-city neighborhoods).

[FN133]. See, e.g., Elijah Anderson, Streetwise (1990) (describing subcultural norms and the “code of the street” that sustains violence in urban settings); Elijah Anderson, The Social Ecology of Youth Violence, 24 Crime & Just. 65, 82-88 (1998) (describing the “code of the street” that requires youths to respond violently to disrespect or to suffer loss of face); Fagan, Choice by Adolescents, supra note 131, at 374 (using a social context framework “to show how the unique demands of adolescence interact with social contexts to motivate decisions to engage in crime and violence”); Fagan, Context and Culpability, supra note 131, at 535-39 (1999); Jeffrey Fagan & Deanna Wilkinson, Guns, Youth Violence and Social Identity, 24 Crime & Just. 105, 124 (1998) (“Violence ‘scripts,’ developed in a neighborhood context that values toughness and displays of violence,... may limit the behavioral and strategic options for resolving disputes....”).

[FN134]. Roper v. Simmons, 543 U.S. 551, 569 (2005) (“[J]uveniles have less control, or less experience with control, over their own environment.”); see Scott & Steinberg, supra note 73, at 818 (“[A]dolescents are subject to legal and practical restrictions on their ability to escape these criminogenic settings. Financially dependent on their parents or guardians and subject to their legal authority, adolescents cannot escape their homes, schools,
and neighborhoods.... Because adolescents lack legal and practical autonomy, they are in a real sense trapped in whatever social setting they occupy and are more restricted in their capacity to avoid coercive criminogenic influences than are adults.


[FN136] See, e.g., Harmelin v. Michigan, 501 U.S. 957, 994 (1991) ( "Proportionality review is one of several respects in which we have held that 'death is different,' and have imposed protections that the Constitution nowhere else provides."); Eddings v. Oklahoma, 455 U.S. 104, 110, 113 (1982); Rummel v. Estelle, 445 U.S. 263, 272 (1980) (The Court's death penalty cases have limited applicability "[b]ecause a sentence of death differs in kind from any sentence of imprisonment, no matter how long"); Lockett v. Ohio, 438 U.S. 586, 605 (1978).

[FN137] Professor Zimring argues:

   "Doctrines of diminished responsibility have their greatest impact when large injuries have been caused by actors not fully capable of understanding and self-control. The visible importance of diminished responsibility in these cases arises because the punishments provided for the fully culpable are quite severe, and the reductive impact of mitigating punishment is correspondingly large. But if the doctrine of diminished responsibility means anything in relation to the punishment of immature offenders, its impact cannot be limited to trivial cases. Diminished responsibility is either generally applicable or generally unpersuasive as a mitigating principle.

   Zimring, American Youth Violence, supra note 127, at 84.


[FN140] See Tate, 864 So. 2d at 53; Andrew M. Carter, Age Matters: The Case for a Constitutionalized Infancy Defense, 54 U. Kan. L. Rev. 687, 688-89 (2006) (reporting that several jurisdictions, including Florida, abrogated the common law infancy defense and required criminal courts to sentence twelve-and thirteen-year-old defendants as if they were thirty-five-year-old adults).

[FN141] See Fla. Stat. Ann. § 985.225(1) (West 2001 & Supp. 2004); see also Tate, 864 So. 2d. at 48; David S. Tanenhaus & Steven A. Drizin, "Owing to the Extreme Youth of the Accused": The Changing Legal Response to Juvenile Homicide, 92 J. Crim. L. & Criminology 641, 678-81 (2002) (summarizing waiver procedures, rejected plea offers, and failed defense strategy that ultimately led both prosecutor and judge to recommend that Governor Jeb Bush commute Tate's mandatory LWOP sentence, which both found to be manifestly unjust for a twelve-year-old).

[FN142] See Tate, 864 So. 2d at 48 ("[A] competency evaluation was constitutionally mandated to determine whether Tate had sufficient present ability to consult with his lawyer with a reasonable degree of rational understanding and whether he had a rational, as well as factual, understanding of the proceedings against him.").

[FN143] See id. at 54 (discussing other Florida cases affirming sentences of life without parole imposed on defendants convicted of murder at ages thirteen and fourteen years).

[FN144] Amnesty Int'l, supra note 3, at 25 n.44 (listing states' LWOP sentencing provisions).
[FN145]. See generally Frase, supra note 72, at 576-88 (reviewing Supreme Court's criminal sentencing proportionality decisions); see also Harmelin v. Michigan, 501 U.S. 957, 996-97 (1991) (Kennedy, J., concurring in part and concurring in judgment) (elaborating upon principles of “narrow proportionality” review in non-capital cases).


[FN147]. See Solem v. Helms, 463 U.S. 277, 281, 303 (1983). The Court noted that the Eighth Amendment's ban on cruel and unusual punishments “prohibits... sentences that are disproportionate to the crime committed,” and that the “constitutional principle of proportionality has been recognized explicitly in this Court for almost a century.” Id. at 284, 286.

[FN148]. Id. at 292. Despite the elements of recidivism, the distinguishing factor in Solem was the imposition of an LWOP sentence for a minor property crime. See id. at 297.

[FN149]. Compare Harmelin, 501 U.S. at 994 (Scalia, J.) (announcing opinion of the Court and arguing that proportionality principle only limited application of death penalty but did not constitute a general feature of Eighth Amendment analysis), with id. at 997, 1009 (Kennedy, J., concurring) (upholding sentence by finding it proportional under an Eighth Amendment analysis). Neither opinion's legal reasoning was agreed to by a majority of the Court.

[FN150]. Id. at 997 (Kennedy, J., concurring).

[FN151]. Id. at 1001 (arguing that the Eighth Amendment prohibits “only extreme sentences that are ‘grossly disproportionate’ to the crime”); Frase, supra note 72, at 581-83 (analyzing Harmelin and the factors Justice Kennedy proposed).

[FN152]. See Harmelin, 501 U.S. at 998-1001 (Kennedy, J., concurring). According to Justice Kennedy:

All of these principles--the primacy of the legislature, the variety of legitimate penological schemes, the nature of our federal system, and the requirement that proportionality review be guided by objective factors---inform the final one: The Eighth Amendment does not require strict proportionality between crime and sentence. Rather, it forbids only extreme sentences that are “grossly disproportionate” to the crime.

Id. at 1001.

[FN153]. See Frase, supra note 72, at 581-83 (analyzing the factors Kennedy proposed in Harmelin and the limited utility they provide defendants challenging a disproportionate sentence).

[FN154]. See Ewing v. California, 538 U.S. 11, 19, 30-31 (2003) (“We hold that Ewing's sentence of twenty-five years to life in prison, imposed for the offense of felony grand theft under the three strikes law, is not grossly disproportionate and therefore does not violate the Eighth Amendment's prohibition on cruel and unusual punishments.”).


[FN156]. See generally Cepparulo, supra note 49, at 225 (“For juveniles no longer facing death, the opportunity to introduce mitigating evidence is lost.... [J]uvenile offenders, because of their age and immaturity at the time
of the offense, should be afforded greater protection from permanent incarceration than adult offenders.”); Logan, supra note 73, at 703-09 (reviewing cases upholding LWOP sentences on juveniles).

[FN157]. For example, see State v. Massey, where the court upheld a mandatory sentence of life without parole imposed on a thirteen-year-old convicted of aggravated murder:

The test is whether in view of contemporary standards of elemental decency, the punishment is of such disproportionate character to the offense as to shock the general conscience and violate principles of fundamental fairness. That test does not embody an element or consideration of the defendant's age, only a balance between the crime and the sentence imposed. Therefore, there is no cause to create a distinction between a juvenile and an adult who are sentenced to life without parole for first degree aggravated murder.

State v. Massey, 803 P.2d 340, 348 (Wash. Ct. App. 1991) (citation omitted); see also State v. Stinnett, 497 S.E.2d 696, 701-02 (N.C. Ct. App. 1998) (upholding mandatory LWOP sentence imposed on fifteen-year-old convicted of murder and noting that “when a punishment does not exceed the limits fixed by statute, the punishment cannot be classified as cruel and unusual in a constitutional sense”).

[FN158]. See Harris v. Wright, 93 F.3d 581, 583-85 (9th Cir. 1996).

[FN159]. See id. at 584 (“Disproportion analysis, however, is strictly circumscribed; we conduct a detailed analysis only in the ‘rare case in which a threshold comparison of the crime committed and the sentence imposed leads to an inference of gross disproportionality.’” (quoting Harmelin v. Michigan, 501 U.S. 947, 1005 (1991))).

[FN160]. Id. at 585.

[FN161]. Rice v. Cooper, 148 F.3d 747, 752 (7th Cir. 1998) (“A sentence of natural life in prison... is exceptionally severe when the defendant is a minor and suffers from deficits of understanding, even if they are not such deficits as would preclude him from being forced to stand trial and from being convicted. But we cannot find any basis in decisions interpreting the Eighth Amendment, or in any other sources of guidance to the meaning of ‘cruel and unusual punishments,’ for concluding that the sentence in this case was unconstitutionally severe.”).

[FN162]. Id. (“[Rice was] morally responsible in the further sense of having sufficient mental capacity to form the intent required to be found guilty of the crime. When the severity of the sentence is not disproportionate to the gravity of the crime, and... the defendant is fully responsible in both the moral and the legal sense for the crime, there is no basis for deeming the sentence unconstitutionally severe.”). Even though the sentencing judge indicated that he would have preferred to impose a less severe sentence, “[t]he Supreme Court has rejected the argument that mandatory penalties, including life imprisonment without parole... are unconstitutional just because... they prevent the consideration of mitigating factors.” Id.

[FN163]. See Brink, supra note 76, at 1576 (“[E]ven if juveniles cause the same harm as their adult counterparts, they are less culpable, because less responsible, because less normatively competent.”); Logan, supra note 73, at 703 (“By divorcing ‘crime’ from offender culpability in proportionality analysis, these courts subscribe to an essentially circular inquiry: because murder, for instance, is a very ‘serious’ crime in the eyes of the legislature, it can be met with a very ‘serious' statutory punishment.”). Justice Stevens has advocated proportionality analyses that include an evaluation of the offender's culpability:

Proportionality analysis requires that we compare “the gravity of the offense,” understood to include not only the injury caused, but also the defendant's culpability, with the “harshness of the penalty.” ... [J]uveniles so generally lack the degree of responsibility for their crimes that is a predicate for the constitutional imposition of the death penalty that the Eighth Amendment forbids that they receive that punishment.

[FN164]. Carter, supra note 140, at 689-92 (reporting that several states--Washington, Florida, North Carolina, Illinois, and Colorado--expressly bar consideration of infancy defense and deem twelve- and thirteen-year-old defendants the moral and legal equivalents of adults). Carter reports that in four of these states, sentencing statutes require judges to impose mandatory sentences without regard to the age of the defendant even if the child was less than fourteen years of age at the time of the crime. Id. at 740-41.

[FN165]. See, e.g., Workman v. Commonwealth, 429 S.W.2d 374, 378 (Ky. 1968) (Life sentence for fourteen-year-old convicted of rape violated Eighth Amendment because “[t]he intent of the legislature in providing a penalty of life imprisonment without benefit of parole... was to deal with dangerous and incorrigible individuals who would be a constant threat to society. We believe that incorrigibility is inconsistent with youth.”); Naovarath v. State, 779 P.2d 944 (Nev. 1989) (finding that LWOP sentence imposed on thirteen-year-old convicted of murder violated state constitution provisions against cruel and unusual punishment, but granting only limited right to be considered for parole eligibility in the distant future). The Court in Naovarath did not necessarily endorse a categorical prohibition and emphasized the youth's mental and emotional disabilities as well:

To say that a thirteen-year-old deserves a fifty or sixty year long sentence, imprisonment until he dies, is a grave judgment indeed if not Draconian. To make judgment that a thirteen-year-old must be punished with this severity and that he can never be reformed, is the kind of judgment that, if it can be made at all, must be made rarely and only on the surest and soundest of grounds.

Id. at 947. A few courts have reduced youths’ lengthy sentences because of their age or immaturity. See, e.g., People v. Dillon, 668 P.2d 697, 726-27 (Cal. 1983) (reducing life sentence imposed on seventeen-year-old convicted of felony murder because he “was an unusually immature youth”); People v. Miller, 781 N.E.2d 300, 308 (Ill. 2002) (rejecting as disproportional an LWOP sentencing imposed on a fifteen-year-old, passive accessory to a felony-murder and holding that “a mandatory sentence of natural life in prison with no possibility of parole grossly distorts the factual realities of the case and does not accurately represent defendant's personal culpability such that it shocks the moral sense of the community”).

[FN166]. See, e.g., State v. Foley, 456 So. 2d 979, 984 (La. 1984) (affirming LWOP sentence imposed on fifteen-year-old juvenile convicted of rape); State v. Pilcher, 655 So. 2d 636, 644 (La. Ct. App. 1995) (upholding LWOP sentence imposed on fifteen-year-old); Swinford v. State, 653 So. 2d 912, 918 (Miss. 1995) (upholding LWOP sentence imposed on fourteen-year-old convicted of aiding and abetting murder); State v. Green, 502 S.E.2d 819, 832 (N.C. 1998) (upholding life imprisonment sentence for thirteen-year-old convicted of rape, recognizing that “the chronological age of a defendant is a factor that can be considered in determining whether a punishment is grossly disproportionate to the crime,” but emphasizing that Green was morally responsible for the crime because he possessed sufficient mental capacity to form criminal intent); Amnesty Int'l, supra note 3, at 1 (noting that when courts sentence children as adults, “the punishment is all too often no different from that given to adults”); Massey, supra note 21, at 1089 (“[O]nce children are prosecuted as adults, they become subject to the same penalties as adults, including life without the possibility of parole.”). But see Hawkins v. Hargett, 200 F.3d 1279, 1284 (10th Cir. 1999) (“[A]ge is a relevant factor to consider in a proportionality analysis....” (citing State v. Green, 502 S.E.2d 819, 832 (N.C. 1998))).

[FN167]. Tate v. State, 864 So. 2d 44, 54 (Fla. Ct. App. 2003). Tate cited other recent Florida cases approving LWOP sentences imposed on young offenders. Id. at 54-55. See, e.g., Phillips v. State, 807 So. 2d 713, 717-18 (Fla. Ct. App. 2002) (approving LWOP sentence imposed on fourteen-year-old convicted of murder and reject-
ing the idea that an LWOP sentence for first-degree murder could ever be so “grossly disproportionate” as to re-
quire a finding of unconstitutionality); Blackshear v. State, 771 So. 2d 1199, 1200-02 (Fla. Ct. App. 2000)
(approving three consecutive life sentences imposed for three robberies committed when Blackshear was thir-
ten years of age and noting that “[s]entences imposed on juveniles of life imprisonment are not uncommon in
Florida Courts”).

[FN168]. See Green, 502 S.E.2d at 827-28; see also Paul G. Morrissey, Do the Adult Crime, Do the Adult Time:
Due Process and Cruel and Unusual Implications for a 13-Year-Old Sex Offender Sentenced to Life Imprison-
ment in State v. Green, 44 Vill. L. Rev. 707, 738 (1999) (“Green's young age does not lend itself to a per se rul-
ing of unconstitutionality. Once a juvenile of any age is transferred to superior court, charged with a violation
of state law and convicted, the juvenile must be ‘handled in every respect as an adult.’” (quoting Fla. Stat. Ann. §
985.225(1) (West 1997))).

[FN169]. See Green, 502 S.E.2d at 831 (finding that because at least eighteen other states permit waiver of of-
fenders thirteen or younger to criminal court, the North Carolina practice did not violate “evolving standards of
decency”).

[FN170]. Id. at 832.

[FN171]. See id. at 833 (emphasizing judicial deference to legislative sentencing policy judgments and conclud-
ing that “the adult justice system, with its primary goals of incapacitation and retribution, is the appropriate
place for violent youthful offenders, such as defendant”).

instruction as to sentencing consequences if convicted and finding that LWOP sentence does not need to take ac-
count of the degree of culpability of the actor).


[FN174]. Id. (noting that nineteen states allow LWOP sentences for thirteen-year-old convicted of serious
crimes). The court reasoned that the prevalence of such penalties “‘is evidence of changing public sentiment to-
ward modern society's violent youthful offenders, and that “sentencing a thirteen-year-old defendant to mandat-
ory life imprisonment... is within the bounds of society's current and evolving standards of decency.”’ Thus,
modern society apparently condones the severe punishment of individuals who commit serious crimes at young
ages.”’ Id. (quoting Hawkins v. Hargett, 200 F.3d 1279, 1285 (10th Cir. 1999) (citation omitted)).

[FN175]. People v. Demirdjian, 50 Cal. Rptr. 3d 184, 188-89 (Ct. App. 2006) (noting that while California law
prohibits sentencing juveniles under sixteen years of age to life without parole, the court dismissed the juvenile's
reliance on Roper v. Simmons and emphasized the clear difference between death and lesser sentences).

[FN176]. See Hawkins, 200 F.3d at 1285 (rejecting, on habeas appeal of state conviction, argument that impos-
ing consecutive sentences for crimes committed as a thirteen-year-old constituted cruel and unusual punish-
ment).

1994) (holding that sentence of life imprisonment with possibility of parole after forty years was not cruel and
unusual punishment when imposed on juvenile convicted of robbery and murder); Brennan v. State, 754 So. 2d

[FN178]. Amnesty Int'l, supra note 3, at 1.

[FN179]. Id.

[FN180]. Id. at 1-2.

[FN181]. In Roper v. Simmons, defense counsel urged the jury to consider the defendant's youthfulness as a mitigating factor "in deciding just what sort of punishment to make." 543 U.S. 551, 558 (2004). In rebuttal, the prosecutor responded, "Age, he says. Think about age. Seventeen-years-old. Isn't that scary? Doesn't that scare you? Mitigating? Quite the contrary I submit. Quite the contrary." Id. The prosecutor's view of youthfulness as an aggravating factor is reflected in sentencing practices. See Bishop & Frazier, supra note 7, at 236-37 (comparing the sentences imposed on youths transferred to criminal courts with those of adults). Bishop and Frazier note that, "[T]ransferred youths are sentenced more harshly, both in terms of the probability of receiving a prison sentence and the length of the sentences they receive. In other words, we see no evidence that criminal courts recognize a need to mitigate sentences based on considerations of age and immaturity." Id.; see also Tanenhaus & Drizin, supra note 141, at 665 (citing the impact of “get tough” politics and arguing that “[b]y the mid-1990's [sic], youth had ceased to be a mitigating factor in adult court, and instead had become a liability”).

[FN182]. Amnesty Int'l, supra note 3, at 33 (reporting that judges imposed LWOP sentences on juveniles convicted of murder more frequently than they did adults and concluding that “states have often been more punitive toward children who commit murder than adults,” and that “age has not been much of a mitigating factor in the sentencing of youth convicted of murder”).

[FN183]. Massey, supra note 21, at 1100-06 (describing courts' nearly universal rejection of juveniles' constitutional challenges to LWOP sentences); see also Mauer et al., supra note 22, at 5-8 (arguing that LWOP defendants do not receive close appellate scrutiny or automatic appointment of counsel on appeal as do those who receive capital sentences.) Mauer notes that “unlike defendants in capital cases, persons sentenced to life have no right to post-conviction counsel in most states.” Id. at 20.

[FN184]. Mauer et al., supra note 22, at 5-8 (explaining that indeterminate sentences and parole meant that many prisoners sentenced to “life” typically served terms of five, fifteen, or twenty years); Michael Tonry, Sentencing


[FN186]. See generally Mauer et al., supra note 22, at 1 (attributing increase in length of prisoners’ sentences since the 1970s to police changes such as “mandatory sentencing, ‘truth in sentencing,’ and cutbacks in parole release”); Tonry, supra note 184, at 6-13 (summarizing changes in sentencing laws in the 1970s and 1980s).


[FN188]. Id. at 1938 (arguing that death penalty abolitionists promoted life without parole sentences as an alternative to executions); see also Mauer et al., supra note 22, at 5 (attributing increased imposition of LWOP sentences as an alternative to the death penalty).

[FN189]. Life and Death, supra note 187, at 1848-51 (attributing decline in capital sentences to decreased public and jury support for the death penalty because of greater sense of safety associated with a reduction in violent crime).

[FN190]. See id. at 1839 (“Twenty years of experience with life-without-parole statutes shows that although they have only a small effect on reducing executions, they have doubled and tripled the lengths of sentences for offenders who never would have been sentenced to death or even been eligible for the death penalty.”).

[FN191]. Id. at 1851-52.

[FN192]. Amnesty Int'l, supra note 3, at 1.

[FN193]. Id. at 2.

[FN194]. Id. at 25 (extrapolating and estimating that about 354 youths are serving LWOP sentences for crimes committed at age fifteen or younger).

[FN195]. Id. at 28.


[FN200]. LaBelle, supra note 198, at 6.
[FN201]. See Males & Macallair, supra note 19, at 8 (reporting judges eight times more likely to sentence black youths than white youths to imprisonment); Joan McCord et al., Juvenile Crime, Juvenile Justice (2001) (documenting cumulative effect of racially disparate decisions at each stage of the juvenile justice system); Poe-Yamagata & Jones, supra note 2 (finding disproportionate minority overrepresentation at each stage of the juvenile justice system); supra notes 18-20 and accompanying text.


[FN203]. See Scott & Grisso, supra note 78, at 174 (arguing that youthfulness does not excuse criminal liability, but that liability should not be equivalent to that of adults). The authors continue:

The evidence disputes the conclusion that most delinquents are indistinguishable from adults in any way that is relevant to culpability, and supports the creation of two distinct culpability categories--although, of course, there will be outliers [sic] in both groups. In short, the predispositions and behavioral characteristics that are associated with the developmental stage of adolescence support a policy of reduced culpability for this category of offenders.

Id.; see also Scott, Lessons, supra note 97, at 309 (“[Adolescents' choices] reflect immaturity and inexperience and are driven by developmental factors that will change in predictable and systemic ways. A legal response that holds young offenders accountable, while recognizing that they are less culpable than their adult counterparts, serves the purposes of criminal punishment without violating the underlying principle of proportionality.”); Zimring, supra note 73, at 278 (“[E]ven after a youth passes the minimum threshold of competence that leads to a finding of capacity to commit crime, the barely competent youth is not as culpable and therefore not as deserving of a full measure of punishment as a fully qualified adult offender.”).

[FN204]. See Zimring, American Youth Violence, supra note 126, at 144 (“[W]henever a young offender's need for protection, education, and skill development can be accommodated without frustrating community security, there is a government obligation to do so.”); Feld, Legislative Exclusion, supra note 5, at 99; Scott & Grisso, supra note 78, at 182 (“Subjecting thirteen-year-old offenders to the same criminal punishment that is imposed on adults offends the principles that define the boundaries of criminal responsibility.”); Streib & Schrempp, supra note 21, at 11 (“[Adolescents'] crimes may be the same as those of adults, but these offenders simply are not adults and should not be sentenced as if they were.”).

[FN205]. See Scott, supra note 82, at 1656 (“[I]f the values that drive risky choices are associated with youth, and predictably will change with maturity, then our paternalistic inclination is to protect the young decision-maker... from his or her bad judgment.”); see also Zimring, American Youth Violence, supra note 126, at 96, 142-45.


[FN207]. See id. at 573 (“An unacceptable likelihood exists that the brutality or cold-blooded nature of any particular crime would overpower mitigating arguments based on youth as a matter of course, even where the juvenile offender's objective immaturity, vulnerability, and lack of true depravity should require a sentence less severe than death.”).

[FN208]. See id. (“It is difficult even for expert psychologists to differentiate between the juvenile offender whose crime reflects unfortunate yet transient immaturity, and the rare juvenile offender whose crime reflects irreparable corruption.”).
[FN209]. See, e.g., Massey, supra note 21, at 1109-14 (advocating for individualized proportionality review prior to imposition of an LWOP sentence); Cepparulo, supra note 49, at 253 (arguing against mandatory LWOPs for juveniles and proposing that “[n]o juvenile should be given a punishment as solemn as LWOP without an individual assessment of proportionality in relation to the crime committed”).

[FN210]. Roper, 543 U.S. at 574.

[FN211]. Id. at 573 (“If trained psychiatrists with the advantage of clinical testing and observation refrain, despite diagnostic expertise, from assessing any juvenile under eighteen as having antisocial personality disorder, we conclude that States should refrain from asking jurors to issue a far graver condemnation--that a juvenile offender merits the death penalty.”).

[FN212]. In contemporary criminal law theory, penal proportionality may reflect either the quality of an actor's choice or what that choice indicates about the actor's moral character. The former focuses on the blameworthiness of the choices made, while the latter focuses on what that choice indicates about the actor's bad character. See Scott & Steinberg, supra note 73, at 801-02; see also R. A. Duff, Choice, Character, and Criminal Liability, 12 Law & Phil. 345, 367-68 (1993); Michael Moore, Choice, Character, and Excuse, in Placing Blame 548, 574-92 (1997); Morse, supra note 124, at 405 (“The criteria for responsibility are behavioral and normative, not empirically demonstrable states of the brain.”); Ward, supra note 82, at 461.

[FN213]. See Stephen J. Morse, Immaturity and Irresponsibility, 88 J. Crim. L. & Criminology 15 (1998); Scott & Steinberg, supra note 73, at 801 (“Because these developmental factors influence their criminal choices, young wrongdoers are less blameworthy than adults under conventional criminal law conceptions of mitigation.”).

[FN214]. See, e.g., Fagan, supra note 33, at 242. [Adolescence, per se, is a mitigating status because youths' developmental deficits] are not the deficits of an atypical adolescent but are ‘normal’ developmental processes common to all adolescents. To the degree that there is variation among adolescents, whether offenders or not, these differences are predictable and subject to a variety of contextual, circumstantial, and intra-individual factors. In this jurisprudence, the crimes of adolescents are a function of immaturity, compared to the crimes of adults, which are the acts of morally responsible, yet possibly cognitively and emotionally deficient, actors.

Id.

[FN215]. Emens, supra note 46, at 87.

[FN216]. Brink, supra note 76, at 1578 (arguing that age provides an imperfect boundary marker for immaturity and proposing to use age as a rebuttable presumption of incapacity to achieve individualized justice).

[FN217]. See Stanford v. Kentucky, 492 U.S. 371, 396-99 (Brennan, J., dissenting); Amnesty Int'l, supra note 3, at 48 (“[W]hile the rate at which the adolescent brain acquires adult capabilities differs from individual to individual... researchers have identified broad patterns of changes in adolescents that begin with puberty and continue into young adulthood.”); Morse, supra note 213, at 62 (observing that “there are no reliable and valid measures” of culpability that accurately can distinguish adolescents from adults).

[FN218]. See Brink, supra note 76, at 1570 (arguing that the development of normative competence is part of the maturation process from childhood to adulthood). “Though not all individuals mature at the same rate, and
some individuals never mature, this sort of normative maturation is strongly correlated with age. The reduced normative competence of juveniles provides a retributive justification for reduced punishment for juveniles.” Id.; see also Zimring, American Youth Violence, supra note 126, at 148 (“The range of individual variation among youths of the same age is notoriously large.”); Fagan, supra note 33, at 209 (“The age at which adolescents realize the developmental competencies that constitute culpability will vary: a significant number of juveniles will be immature and lacking in the developmental attributes of culpability well before age eighteen, and some may still lack these competencies after age eighteen....”).

[FN219]. Roper v. Simmons, 543 U.S. 551, 573 (2004); Zimring, American Youth Violence, supra note 126, at 148 (“[W]e lack] good data on the social skills and social experience of adolescent offenders. The important elements of penal maturity have yet to be agreed upon, let alone assessed in large numbers of cases.”).

[FN220]. See, e.g., Fagan, supra note 33, at 248 (“The difficulties and statistical error rates in measuring immaturity for juveniles invite complexity in the consistent application of the law.”). Fagan contends:

Even when individualized assessments are conducted using modern scientific and clinical tools, the risks of error due to measurement and diagnostic limitations suggest that it is neither reliable nor efficient for each court to assess the competency of each juvenile individually. The precise conditions of immaturity, incapacity, and incompetency are difficult to consistently and fairly express in a capital sentencing context. Further, cognitive and volitional immaturity might be easily concealed by demeanor or physical appearance and, more importantly, obscured by the gruesome details of a murder and its emotional impact on the victim's family.

Id. at 253; see also Robin M.A. Weeks, Note, Comparing Children to the Mentally Retarded: How the Decision Atkins v. Virginia Will Affect the Execution of Juvenile Offenders, 17 BYU J. Pub. L. 451, 479 (2003) (noting that when the Court requires individualized culpability assessments it raises difficult definitional questions: “What is the ‘normal’ adult level of culpability? How do we measure it?”).

[FN221]. Scott & Steinberg, supra note 73, at 836-37 (“[W]e currently lack the diagnostic tools to evaluate psycho-social maturity reliably on an individualized basis or to distinguish young career criminals from ordinary adolescents who, as adults, will repudiate their reckless experimentation. Litigating maturity on a case-by-case basis is likely to be an error-prone undertaking, with the outcomes determined by factors other than immaturity.” (citation omitted)).

[FN222]. See, e.g., Roper, 543 U.S. at 581-86 (providing statutory appendices listing limits on juveniles' rights to drink, drive, vote, marry, and contract as a result of immaturity); Franklin E. Zimring, The Changing Legal World of Adolescence 35-36 (1982); Donald L. Beschle, The Juvenile Justice Counterrevolution: Responding to Cognitive Dissonance in the Law's View of the Decision-Making Capacity of Minors, 48 Emory L.J. 65, 89-91 (1999) (analyzing the inconsistency between punishing adolescents like adults while denying their autonomy claims in areas outside of the criminal law); Richard O. Brooks, “The Refurbishing”: Reflections Upon Law and Justice Among the Stages of Life, 54 Buff. L. Rev. 619 (2006) (noting that the designation of diminished responsibility for juveniles is an example of our legal system's provision of legal duties and immunities based upon stages of life); Rhonda Gay Hartman, Adolescent Autonomy: Clarifying an Ageless Conundrum, 51 Hastings L.J. 1265, 1268 (2000) (arguing that presumption of decisional incapacity pervades most areas of law and conflicts with a model of adolescent autonomy); Scott, supra note 82, at 1608, 1611; Zimring, supra note 73, at 287.

[FN223]. Stanford v. Kentucky, 492 U.S. 371, 398 (1988) (Brennan, J., dissenting) (“It is thus unsurprising that individualized consideration at transfer and sentencing has not in fact ensured that juvenile offenders lacking an
adult's culpability are not sentenced to die.”).

[FN224]. Roper, 543 U.S. at 573.


[FN226]. Feld, Bad Kids, supra note 4, at 315-21 (providing rationale for youth discount and describing its administration); Barry C. Feld, Abolish the Juvenile Court: Youthfulness, Criminal Responsibility, and Sentencing Policy, 88 J. Crim. L. & Criminology 68, 121-33 (1997) (providing rationale for categorical “youth discount”) [hereinafter Feld, Abolish]; see also Joseph L. Hoffman, On the Perils of Line-Drawings: Juveniles and the Death Penalty, 40 Hastings L. J. 229, 233 (1989) (describing age as an imperfect proxy for a complex of factors, “includ[ing] maturity, judgment, responsibility, and the capability to assess the possible consequences of one's conduct,” that constitute culpability). But cf. Zimring, American Youth Violence, supra note 126, at 150 (objecting to categorical youth discount because “age is an incomplete proxy for levels of maturity during the years from age twelve to eighteen”). “The variation among individuals of the same age is great, and individualized determinations of immaturity are thus superior to averages based on aggregate patterns.” Id.

[FN227]. See Andrew von Hirsch, Proportionate Sentences for Juveniles: How Different than for Adults?, 3 Punishment & Soc'y 221, 227 (2001) (“A given penalty is said to be more onerous when suffered by a child than by an adult. Young people, assertedly, are psychologically less resilient, and the punishments they suffer interfere more with opportunities for education and personal development.” (citation omitted)); see also Arredondo, supra note 122, at 19 (“Because of differences in the experience of time, any given duration of sanction will be experienced subjectively as longer by younger children.”); Jeffrey Fagan, This Will Hurt Me More than It Hurts You: Social and Legal Consequences of Criminalizing Delinquency, 16 Notre Dame J.L. Ethics & Pub. Pol'y 1, 21-22 (2002) (describing substantive quality of punishment adolescents experience in adult incarceration as far harsher than the sanctions they experience as delinquents); Feld, Abolish, supra note 226, at 112-13 (“[Y]ouths experience objectively equal punishment subjectively as more severe.”).

[FN228]. Feld, Abolish, supra note 226, at 118-21; see also Scott & Steinberg, supra note 73, at 837 (“[A] systematic sentencing discount for young offenders in adult court[] might satisfy the demands of proportionality.”); Tanenhaus & Drizin, supra note 141, at 697-98 (“We endorse Feld's proposals [for a youth discount] because they respect the notion that juveniles are developmentally different than adults and that these differences make juveniles both less culpable for their crimes and less deserving of the harsh sanctions, which now must be imposed on serious and violent adult offenders.”); von Hirsch, supra note 227, at 226-27 (arguing for categorical penalty reductions based on juveniles' reduced culpability).

While actual appreciation of consequences varies highly among youths of the same age, the degree of appreciation we should demand depends on age: we may rightly expect more comprehension and self-control from the 17-year-old than a 14-year-old, so that the 17-year-old's penalty reduction should be smaller. Assessing culpability on the basis of individualized determinations of a youth's degree of moral development would be neither feasible nor desirable.

Id.; see also Zimring, supra note 73, at 288 (arguing that the penal law of youth crime should develop “a sliding scale of responsibility based on both judgment and the practical experience of impulse management and peer control”).

[FN229]. Brink, supra note 76, at 1572 (“[A] juvenile is less responsible for her crime than her adult counterpart
is for the same crime and that, all else being equal, the younger the juvenile the less responsible she is for her crime.”); Zimring, supra note 73, at 288 (“[A]dolescents learn their way toward adult levels of responsibility gradually. This notion is also consistent with... long periods of diminished responsibility that incrementally approach adult standards in the late teens... [and with] less-than-adult punishments that gradually approach adult levels during the late teen years.”).

[FN230]. Amnesty Int'l, supra note 3, at 8 (recommending that states abolish LWOP sentences for crimes committed by juveniles); Mauer et al., supra note 22, at 32 (recommending categorical exemption of juveniles from life sentences because they “represent an entire rejection of the longstanding traditions of our treatment of juvenile offenders, which is that rehabilitation should be considered as a primary objective when sentencing children”).


[FN232]. Amnesty Int'l, supra note 3, at 8; LaBelle, supra note 198, at 22.

[FN233]. Feld, supra note 11 (describing the politicization of crime policies and politician's use of racial code words for electoral advantage).


[FN236]. See Zimring, American Youth Violence, supra note 126, at 81-83, 142-45; Zimring, supra note 73, at 283-84.

[FN237]. Streib & Schrempp, supra note 21, at 12 (“To decide today whether or not this adolescent offender should continue to be imprisoned into those adult years and even into old age is to assume extrahuman powers to predict human behavior generations into the future.”).

[FN238]. Barry Krisberg & Susan Marchionna, Attitudes of U.S. Voters Toward Youth Crime and the Justice System 3 (2007) (reporting strong public support for rehabilitation as a strategy to prevent and reduce juvenile
crime), available at http://www.nccd-crc.org/nccd/pubs/zogby_feb07.pdf; Brink, supra note 76, at 1585 (“There is support for treating youthful offenders as juveniles and for sentencing that is rehabilitative....”); Daniel S. Nagin et al., Public Preferences for Rehabilitation Versus Incarceration of Juvenile Offenders: Evidence from a Contingent Valuation Survey, 5 Criminology & Pub. Pol'y 627, 644 (2006) (“[M]embers of the public are concerned about youth crime and want to reduce its incidence, but they are ready to support effective rehabilitative programs as a means of accomplishing that end--and indeed favor this response to imposing more punishment through longer sentences.”).


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INTRODUCTION

In the last decade, the general public has devoted significant attention to the issue of youth violence because of tragedies such as the in-school murders committed by two teenagers in Littleton, Colorado. n1 Public outcry has resulted in changes that have dismantled the juvenile justice system, a system founded on the idea that childhood is a distinct phase of life, and that juveniles are less culpable for crimes than adults and more amenable to rehabilitation. n2 The changes implemented by states have made it easier for these states to prosecute juveniles as adults, and thereby reflect the growing notion that children are indistinguishable from adults. n3 States implemented these changes to emphasize punishment and deterrence, rather than focusing on rehabilitation. n4 Today, children are not only transferred to and [1084] prosecuted in the adult system more readily than before the 1990s, but also are sentenced to its penultimate penalty--life without the possibility of parole. n5 At least 2225 people in the United States currently are

HIGHLIGHT: Abstract: In most states, juveniles may receive the sentence of life without the possibility of parole when convicted in adult court. Scientific research has shown, however, that the brains of juveniles are different from those of adults. Citing this research, the U.S. Supreme Court held in the 2005 case of Roper v. Simmons that sentencing juveniles to the death penalty violates the Eighth Amendment due to their reduced culpability. Applying the reasoning of Roper, this Note argues that sentencing juveniles to life without parole violates the Eighth Amendment on its face. In the alternative, it argues that the sentence violates the Eighth Amendment as applied in certain cases. In addition, this Note presents policy arguments for the abolition of the sentence by state and federal legislatures.
serving sentences of life without parole for crimes they committed before their eighteenth birthdays. n6

Recent research on adolescents, however, shows that there are significant psychological and neurological differences between the brains of adolescents and adults. n7 Psychologists and juvenile rights advocates use these studies to support their position that the culpability of juveniles is reduced. n8 In 2005, the U.S. Supreme Court recognized this reduced culpability when it held in \textit{Roper v. Simmons} that imposing the death penalty on juveniles violates the U.S. Constitution. n9 The Court examined the evolving standards of decency in the United States and held that the juvenile death penalty violates the Eighth Amendment on its face. n10

The Court also considered the opinions of independent associations and the practices of other countries. n11 Although sentencing juveniles to life without parole has become more common in the United States since the 1990s, the international community overwhelmingly has rejected the practice. n12 Only about fourteen other countries permit life sentences for children, and even in those countries, it is rarely imposed. n13 Also, a number of international human rights treaties reflect \[*1085] the worldwide rejection of this sentence. n14 The United States, however, either has refused to ratify these treaties, or has ratified them only with a reservation that preserves its right to incarcerate juveniles for life without parole. n15 The United States stands nearly alone in a world that identifies the sentence of juvenile life without parole as a human rights violation. n16

This Note explores the impact of \textit{Roper} on sentencing juveniles to life without the possibility of parole. n17 Given the ambiguity of the Supreme Court's Eighth Amendment analysis, it is difficult to predict how the Court would rule on the constitutionality of juvenile life without parole. n18 By applying current psychological research and the reasoning in \textit{Roper}, however, this Note concludes that the Court should find that juvenile life without parole violates the Constitution on its face or at least in certain cases where the harshness of the penalty outweighs the gravity of the offense. n19

Part I of this Note provides a history of the juvenile justice system and discusses the process by which adult court jurisdiction subjects children to life without the possibility of parole. n20 Part II surveys the state laws regarding life without the possibility of parole. n21 Part III examines the psychological and neurological differences between children and adults. n22 Part IV discusses the application of the Eighth Amendment to capital and non-capital sentences, particularly the Supreme Court's recent decision in \textit{Roper}. n23 Part V suggests that juvenile life without parole violates the Eighth Amendment on its face. n24 Even if the Court finds that the sentence does not violate the Constitution on its face, Part VI argues that juvenile life without parole violates the Eighth Amendment as applied in certain cases. n25 Part VII explores other reasons for the U.S. Congress and state legislatures to abolish \[*1086] the sentence of juvenile life without parole, including the United States's stature in international human rights law, the costs of lifetime imprisonment, and the racial disparities in sentencing. n26

I. CHILDREN IN ADULT COURT

Throughout U.S. history, the juvenile justice system has changed with societal attitudes about adolescent capabilities. n27 At the formation and in the early days of the American justice system, children were tried as adults and could be put to death. n28 The advent of juvenile courts in the early twentieth century ushered in an era during which rehabilitation was the primary goal for juvenile sentencing. n29 In the past fifteen years, however, states have changed their laws to allow again adult sentencing of juveniles in certain cases, focusing on the goals of retribution and deterrence rather than rehabilitation. n30 Today, children are more vulnerable to life without parole sentences than at any time since the nineteenth century. n31

Children always have been subject to prosecution in the U.S. justice system. n32 In the late eighteenth and early nineteenth centuries, children as young as seven were tried in adult courts and could be convicted if the government showed the child possessed the capacity to form a mens rea. n33 If convicted, children faced the full range of penalties, including the death penalty. n34
In the early twentieth century, however, child welfare advocates convinced states that children's immaturity and potential for rehabilitation should influence the response to their criminal behavior. This social reform movement argued that children were less criminally responsible than adults and more amenable to treatment and intervention. Advocates believed that criminal behavior by children resulted from external forces, such as impoverished living conditions or parental neglect. In response, states created juvenile courts that relied on a "best interest of the child" approach to tailor treatment plans to the offenders' needs. The goal of creating these courts was to treat the delinquent children and enable their return to society as productive citizens. Illinois created the first juvenile court in 1899 and other states replicated the idea across the country. After the creation of juvenile courts, judges in most states retained the discretion to waive jurisdiction and allow prosecution of children in adult criminal court. For the first half of the twentieth century, however, states almost exclusively tried children in juvenile courts.

Early juvenile court proceedings were more informal than adult court proceedings and provided few adult-like due process protections. This procedural informality raised questions about protections for juveniles and consistency in sentencing. Because juvenile courts in the early twentieth century did not recognize constitutional due process protections for children, their decisions often were arbitrary. To impose more order in juvenile delinquency hearings, in 1967 the U.S. Supreme Court in *In re Gault* extended to juveniles many of the procedural due process rights enjoyed by criminal defendants in adult courts. These included the right to notice of charges, the right to counsel, the privilege against self-incrimination, and the right to cross-examination of witnesses.

An increase in juvenile crime during the 1980s and 1990s incited public outcry demanding tougher penalties for juveniles. The rate of juvenile arrests for violent crime grew substantially beginning in the mid-1980s and peaking in the mid-1990s, including the juvenile arrest rates for murder, aggravated assault, and forcible rape. The juvenile arrest rate for robbery declined through the 1980s, but then grew rapidly to its peak in 1995.

These increases in juvenile arrests fueled a trend to "get tough" on youth crime. Supporters of this trend urged policymakers that children who committed violent offenses were inherently dangerous and destined for a life of crime. In response, all states changed their laws to make it easier to try and sentence child offenders in adult courts. States restricted the jurisdiction of juvenile courts by lowering the age for adult court jurisdiction, expanding criteria for transfer, enacting automatic transfer statutes, and granting prosecutors the discretion to file charges against children directly in adult court. Today, all states allow adult criminal prosecution of children under certain circumstances. Many states do not have a minimum age for transfer to adult court. Unless statutorily exempt, once children are prosecuted as adults, they become subject to the same penalties as adults, including life without the possibility of parole.

It is now apparent that the dramatic increases in violent crime in the 1980s and 1990s were short-lived and not indicative of a generation of "super-predators" as analysts had warned in the mid-1990s. In 2003, the juvenile arrest rates for murder, forcible rape, and robbery reached their lowest levels since 1980, and the rate for aggravated assault also declined. Nevertheless, the 1990s "get tough" trends encouraged the average person to view juvenile offenders as dangerous threats rather than wayward children in need of rehabilitation. Critics contend that the legacy of those fear-filled years is a justice system that, rather than holding juveniles accountable, holds the nation's youngest offenders disposable.

II. STATE LAWS REGARDING LIFE WITHOUT PAROLE

Though state sentencing laws vary, most states permit juvenile life without the possibility of parole. Only eight states and the District of Columbia prohibit the sentence. Four of those states--Alaska, Maine, New Mexico, and West Virginia--proscribe life without parole for all offenders, regardless of age. The other jurisdictions--Kansas, Kentucky, New York, Oregon, and the District of Columbia--prohibit the sentence for juveniles. In twenty-seven of the forty-two states that permit sentencing of juveniles to life without parole, the sentence is mandatory for anyone, child or adult, found guilty of certain enumerated crimes.
The crimes for which offenders receive sentences of life without parole vary by state. n67 Children can be sentenced to life without parole for homicide offenses, robbery, aggravated assault, and rape. n68 In most states, juvenile offenders may receive this sentence for felony murder or aiding and abetting a murder. n69

Recently, some states have considered or passed changes to their sentencing laws. n70 In 2004-2005, Colorado and Florida considered, but did not pass, bills that would ban juvenile life without the possibility of parole. n71 Texas did pass a new law in 2005. n72 Although Texas previously proscribed the sentence of life without parole for all offenders, the state changed its laws effective September 1, 2005 to permit this sentence for all offenders found guilty of a capital felony without regard to age. n73

In the forty-two states that permit juvenile life without parole, there is wide variation in the number of offenders serving the sentence. n74 For instance, three states--New Jersey, Utah, and Vermont-- permit the sentence for all offenders, but had no child offenders serving life without parole as of 2005. n75 In each of several other states, including Florida, Louisiana, Michigan, and Pennsylvania, there are currently more than 300 youths serving life without parole. n76 In total, there are currently at least 2225 child offenders serving life without parole in the United States. n77

Criminal justice policy choices influence each state's sentencing rate for life without parole. n78 The sentencing rates are higher in states that (1) make life without parole mandatory for certain crimes and (2) do not set a minimum age for adult court jurisdiction. n79 Advocates for children contend that legislators adopting such laws should consider evidence--discussed in Part III of this Note--that demonstrates significant psychological and neurological differences between children and adults. n80

III. DIFFERENCES BETWEEN CHILDREN AND ADULTS

Scientists have identified psychological and neurological differences between children and adults. n81 These differences undermine the legitimacy of imposing equal measures of retribution on the two groups. n82 In 2005, the U.S. Supreme Court found these differences significant when it held in Roper v. Simmons that the juvenile death penalty violates the Eighth Amendment; the Court stated: "These differences render suspect any conclusion that a juvenile falls among the worst offenders." n83 The Court noted that almost every state prohibits children younger than eighteen from voting, serving on juries, or marrying without parental consent, in recognition of the immaturity and irresponsibility of juveniles. n84 American law, acknowledging that children are unable to make rational decisions, adopts a paternalistic approach that finds legal rights of children meaningful only as exercised by adult agents acting with the children's best interests in mind. n85 The law assumes that children as a class are inherently different from adults. n86 Scientific research supports this assumption. n87

The literature on psychological development attributes adolescent immaturity to two types of deficiencies: cognitive and psychosocial. n88 Cognitive development refers to the way adolescents think and make decisions. n89 Psychosocial development refers to the values and preferences that inform adolescents' decision making. n90 Although researchers disagree on the extent to which adolescents and adults differ in cognitive reasoning, studies have identified strong psychosocial differences that may affect determinations of culpability. n91

The psychosocial research shows strong differences between adolescents and adults that implicate assessments of culpability. n92 Researchers have identified four psychosocial factors that affect the way adolescents make decisions, including whether to commit a crime or an antisocial act: peer influence, attitude toward risk, future orientation, and capacity for self-management. n93 In one study, adolescents on average scored significantly lower than adults on these factors and displayed less sophistication in decision making. n94 Although individual levels of these factors are more predictive of antisocial decision making than chronological age alone, researchers found that the period between ages sixteen and nineteen is an important transition point in psychosocial development. n95

Furthermore, psychosocial research confirms what every parent knows—that adolescents are more vulnerable to
peer influence and more likely to take risks than adults. n96 Adolescents are more focused on short-term consequences and less sensitive to future outcomes, a combination that can lead to risky behavior. n97 When faced with a stressful situation, adolescents fail to see more than one option due to their lack of experiences and ineffective information-processing abilities. n98 These attributes lead many adolescents to experiment with criminal conduct. n99 For most children, antisocial conduct is "adolescence-limited"; in other words, they grow out of it. n100

In addition to psychological research showing differences in the way adolescents think and react, neurological studies reveal physiological differences between their brains and the brains of adults. n101 Research using magnetic resonance imaging ("MRI") shows that the human brain continues to develop beyond adolescence. n102 The brain grows in volume and becomes more organized into a person's early twenties. n103 In particular, the frontal lobe undergoes substantial growth during adolescence. n104 It is the area responsible for impulse control, judgment, problem solving, and behavior. n105 Instead of using the frontal lobe to make decisions, adolescents rely more heavily on the amygdala, the emotional center of the brain. n106 As a result, adolescents are more prone to erratic behavior than adults. n107 As the Supreme Court recognized in Roper, this evidence of neurological differences between adolescents and adults, combined with the evidence of psychosocial differences, supports a presumption of diminished culpability for adolescent offenders. n108

IV. INTERPRETATION OF THE EIGHTH AMENDMENT

The reduced culpability of juveniles is important when courts determine whether a punishment is appropriate for a juvenile who has been found guilty of a crime. n109 Courts apply the Eighth Amendment to determine whether a punishment is so cruel and unusual that it violates the U.S. Constitution. n110 The Eighth Amendment provides: "Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted." n111 It is applicable to the states through the Fourteenth Amendment. n112

A. Proportionality Principle

The Eighth Amendment's guarantee of a right not to be subjected to excessive sanctions flows from the basic principle that a punishment should fit a crime. n113 It reaffirms the government's duty to respect the dignity of all persons, even those convicted of the most heinous crimes. n114 The Eighth Amendment prohibits both disproportionate types of punishments and sentences that are disproportionate to the crime committed. n115

Although the U.S. Supreme Court's Eighth Amendment decision making is not a model of clarity, there seem to be two tests the Court uses to determine whether a sentence violates the cruel and unusual clause of the Eighth Amendment. n116 First, the Court evaluates the sentence on its face by determining whether, when applied to a specific class of offenders, it is so disproportionate according to "evolving standards of decency" that it violates the Constitution and, therefore, the class of offenders deserves a categorical exemption from the punishment. n117 Alternatively, the Court applies a gross disproportionality test to determine whether the sentence as applied to the particular offender for the particular offense violates the Constitution. n118

Not all members of the Supreme Court agree, however, that the Eighth Amendment provides a proportionality guarantee. n119 Rather, Justices Scalia and Thomas have consistently written that the Eighth Amendment prohibits only those cruel methods of punishment not typically employed in the Anglo-American tradition, to be determined without reference to an individual offense. n120 In 1991 in Harmelin v. Michigan, Justice Scalia, in a Part joined only by Chief Justice Rehnquist, wrote that the lack of a proportionality guarantee is demonstrated by the text of the Eighth Amendment, its history, the framers' intent, the early commentary, the early judicial constructions, and the subjective nature of such analysis. n121 Due to respect for stare decisis, however, Justice Scalia recognized a right to proportionality limited to cases involving the death sentence. n122 Justice Thomas, however, recognizes no such right. n123

B. Testing a Sentence on Its Face: "Evolving Standards of Decency"
To determine whether the application of a punishment to a specific class of offenders is so disproportionate as to be cruel and unusual under the Eighth Amendment, the Court refers to “evolving standards of decency that mark the progress of a maturing society.” To determine “evolving standards of decency,” the Court reviews objective indicia, including legislative enactments and jury behavior with respect to the mode of punishment, to identify a national consensus against a particular mode of punishment. The Court also applies its own judgment to determine whether the punishment violates the Eighth Amendment. In making that judgment, the Court examines the culpability of the specific class of offenders and considers whether the application of the particular punishment to the class of offenders measurably contributes to the social purposes intended by the punishment, taking into consideration the opinions of independent associations and the practices of other countries.

The only punishment for which the Supreme Court has recognized categorical exemptions for certain classes of offenders is the death penalty. The Court has held that it violates the Constitution on its face to impose the death penalty for the crimes of rape of an adult woman and felony murder based on robbery where the defendant did not kill, attempt to kill, or intend to kill. The Court also has held that lower courts may not impose the death penalty on juveniles or the mentally retarded for any crime.

The Supreme Court first recognized a categorical exemption from the death penalty in 1988 in Thompson v. Oklahoma. There, the plurality set aside the death sentence imposed on a fifteen-year-old offender and determined that the nation’s standards of decency did not permit the execution of any offender who was under the age of sixteen at the time of the crime. It noted that the last execution for a crime committed by an offender under the age of sixteen was carried out in 1948, forty years prior.

In the 2002 case of Atkins v. Virginia, the Supreme Court applied this reasoning to create a categorical exemption from the death penalty for the mentally retarded. The Court identified a national consensus against the death penalty for the mentally retarded because at least thirty-three states prohibited the punishment and there was a consistent direction of change away from imposing the punishment. The Court decided that mental retardation diminishes personal culpability such that the death penalty is an excessive sanction for that category of offenders.

The Supreme Court’s most recent decision creating a categorical exemption from the death penalty is Roper v. Simmons. On March 1, 2005, the Court held that execution of individuals who were under eighteen years of age at the time of their crimes is prohibited by the Eighth Amendment. This decision overruled the 1989 case of Stanford v. Kentucky, in which the Court held that the death penalty may be imposed on sixteen-and seventeen-year-olds. The Court identified a national consensus against the penalty and applied its independent judgment to confirm the consensus.

1. Roper v. Simmons: National Consensus Against Juvenile Death Penalty

To identify a national consensus against the juvenile death penalty, the Court looked to the rejection of the practice in the majority of states, the infrequency of its use where it remained on the books, and the consistency in the trend toward abolition of the practice. The Court noted that, at the time, thirty states proscribed the juvenile death penalty. The Court recognized the infrequency of the practice in the twenty states that did not formally prohibit it. And in the previous ten years, the Court noted, only three states executed prisoners for crimes committed as juveniles.

In addition, the Court examined the rate of abolition of the juvenile death penalty in the states. The Court compared the number of states that allowed the juvenile death penalty at the time it decided Stanford to the number of states that allowed the practice at the time it considered Roper. The Roper Court recognized a significant, consistent direction of change demonstrated by the abandonment of the juvenile death penalty in five states during the fifteen years between Stanford and Roper. The Court concluded that these objective indicia demonstrated a national consensus against: sentencing juveniles to death.

The Court in Roper also exercised its independent judgment to determine that the death penalty is disproportionate punishment when applied to juveniles. It noted three general differences between juveniles and adults that diminish the culpability of juveniles, citing psychology publications. First, juveniles' lack of maturity and responsibility often preclude them from making rational decisions and cause them to take risks and seek thrills. Second, juveniles are more susceptible to negative influences and outside pressures, including peer pressure. Third, the character of juveniles is not as well-formed as that of adults. Because juveniles are less culpable than adults, the Court concluded that the penological justifications for the death penalty—retribution and deterrence—apply to juveniles with lesser force than adults. The Court concluded that neither retribution nor deterrence provides adequate justification for imposing the death penalty on juveniles. Therefore, the Court applied its independent judgment to confirm a national consensus against the practice.

The Court also cited the overwhelming weight of international opinion against the juvenile death penalty. The Court wrote, "The opinion of the world community, while not controlling our outcome, does provide respected and significant confirmation for our own conclusions." When the Court decided Roper, the United States was the only country in the world that gave official sanction to the juvenile death penalty. The Court noted that the United Kingdom, whose experience bears particular relevance in light of the historic ties between it and the United States, eliminated the practice fifty-six years ago. The Court also pointed to international resolutions to confirm its holding. In particular, the Court mentioned Article 37 of the United Nations Convention on the Rights of the Child (the "CRC"), which proscribes juvenile life without parole. The Court noted that every country in the world ratified this resolution except the United States and Somalia. The Court cited parallel provisions in other significant international covenants such as the International Covenant on Civil and Political Rights (the "ICCPR"), adopted by the United Nations (the "U.N." General Assembly in 1966 and signed and ratified by the United States subject to a reservation in 1992. In reservation number two, the United States reserved the right to impose capital punishment on any person other than a pregnant woman, including those persons below eighteen years of age. The Roper Court wrote that it does not reflect disloyalty to the U.S. Constitution to acknowledge and consider other nations' recognition of fundamental rights. The Court thereby created a categorical exemption from the death penalty for juveniles.

This "evolving standards of decency" test, which examines a certain punishment on its face to exempt a class of offenders, is the first test for violations of the Eighth Amendment. The Supreme Court has stated that the Eighth Amendment's proportionality principle applies to non-capital sentences such that those sentences may be tested as applied. The Court also has stated, however, that successful challenges are rare outside of the capital punishment context because the Eighth Amendment prohibits only grossly disproportionate sentences. Even if a class does not qualify for a categorical exemption, however, courts still must examine the sentence as applied to a particular offender to determine if it violates the Constitution.

C. Testing a Non-Capital Sentence as Applied

The Supreme Court has stated that the Eighth Amendment's proportionality principle applies to non-capital sentences such that those sentences may be tested as applied. The Court also has stated, however, that successful challenges are rare outside of the capital punishment context because the Eighth Amendment prohibits only grossly disproportionate sentences. Strict proportionality between crime and sentence is not required.

In 1983 in Solem v. Helm, the Supreme Court held that a sentence of life without the possibility of parole violates the Eighth Amendment as applied when imposed for a seventh nonviolent felony. In Solem, the defendant was sentenced to life in prison without the possibility of parole for writing a "no account" check for $100. The Court identified three factors relevant to disproportionality: (1) the gravity of the offense and the harshness of the penalty, (2) the sentences that could be imposed on other criminals in the same jurisdiction, and (3) the sentences imposed for the same crime in other jurisdictions. Solem was the first, and remains the only, case in which the Supreme Court
invalidated a prison sentence due to its length. n177

1. Creation of the Gross Disproportionality Test: *Harmelin v. Michigan*

Eight years after *Solem* in 1991, the Supreme Court again addressed proportionality for a non-capital offense in *Harmelin v. Michigan*. n178 There, a majority of the Court concluded that life without the possibility of parole for a first-time offender convicted of possession of 672 grams of cocaine did not violate the Eighth Amendment. n179 Members of the Court disagreed, however, on the proportionality standard for non-capital offenses. n180 Justice Scalia wrote that the individualized proportionality principle applies only to death penalty jurisprudence. n181 He stated that the Court's decision in *Solem* was wrong because the Eighth Amendment contains no proportionality guarantee. n182

[*1102] In contrast, Justice Kennedy, joined by Justices O'Connor and Souter, concurring in part and in the judgment, recognized that a non-capital sentence could violate the Eighth Amendment as applied if it was grossly disproportionate to the crime, but maintained that the facts of *Harmelin* did not meet this standard. n183 At least three circuit courts regard Justice Kennedy's test as the rule of *Harmelin* because it is the position taken by those members who concurred in the judgment on the narrowest grounds. n184 The other members of the *Harmelin* Court agreed with Justice Kennedy that the Eighth Amendment includes a proportionality guarantee for non-capital offenses, but they dissented from the judgment because they found the sentence grossly disproportionate to the crime and therefore unconstitutional. n185

In the test for gross disproportionality established by Kennedy, the reviewing court first determines whether a threshold comparison of the crime and the sentence leads to an inference of gross disproportionality. n186 If so, the court undertakes the intrajurisdictional and interjurisdictional analyses set forth in *Solem*—by comparing the sentences imposed on other criminals in the same jurisdiction and the sentences imposed for commission of the same crime in other jurisdictions—to validate the court's initial inference that a sentence is grossly disproportional to a crime. n187 Justice Kennedy rejected the idea that *Solem* announced a rigid three-part test, and instead concluded that consideration of the second and third *Solem* factors is appropriate only when the threshold comparison leads to an inference of gross disproportionality. n188

To conduct the threshold comparison, a court considers the gravity of the offense and the harshness of the penalty. n189 When determining the gravity of the offense, the court considers the culpability of the offender, the harm inflicted on society by the offender, and the criminal record of the offender. n190 In *Harmelin*, Justice Kennedy maintained that a sentence of life without the possibility of parole did not raise an inference of gross disproportionality because the offense—[*1103] possession of more than 650 grams of cocaine—threatened to cause "grave harm" to society. n191 Due to the seriousness of the offense, and because the offender's culpability was not reduced, the Court upheld the sentence. n192

2. Recent Applications of the Gross Disproportionality Test

The Supreme Court decided two cases regarding the proportionality principle for non-capital punishment on March 5, 2003. n193 In *Lockyer v. Andrade*, Justice O'Connor, writing for a majority of the Court, admitted that the Court's precedents in this area have not established "a clear or consistent path for courts to follow." n194 The Court held that a decision by the California Court of Appeal to affirm the petitioner's two consecutive terms of twenty-five years to life in prison for a "third strike" conviction was not contrary to, and did not involve an unreasonable application of, any clearly established gross disproportionality principle and thus did not warrant habeas relief. n195

In *Ewing v. California*, also decided on March 5, 2003, the plurality held that a prison term of twenty-five years to life does not violate the Eighth Amendment when imposed for felony grand theft on a repeat felon under California's three strikes law. n196 Justice O'Connor, joined by Chief Justice Rehnquist and Justice Kennedy, held that the sentence was not grossly disproportionate. n197 The plurality applied the test from Justice Kennedy's concurrence in *Harmelin* and held that the threshold comparison of the crime and sentence does not lead to an inference of gross
disproportionality. n198 The plurality concluded that the sentence of twenty-five years to life was justified by the state's public safety interest in incapacitating and deterring recidivist felons and by the offender's long and serious criminal record. n199


The Supreme Court never has considered the effect of juvenile status on proportionality within the context of non-capital sentencing, such as on life without parole. n200 Given the recent confirmations of Chief Justice Roberts and Justice Alito, it is unclear whether the Court will continue to apply the gross disproportionality test articulated in Harmelin. n201 Although a few federal courts of appeals and state courts considered sentences of juvenile life without parole prior to Roper, none of these courts has considered the constitutionality of the sentence since Roper. n202

a. Holdings of the Federal Courts of Appeals

Prior to Roper, two circuit courts held that juvenile life without parole does not violate the Eighth Amendment. n203 In 1998 in Rice v. Cooper, the U.S. Court of Appeals for the Seventh Circuit held that a sentence of life without the possibility of parole imposed on a sixteen-year-old for the first degree murder of four people did not lead to an inference of gross disproportionality, even though the court recognized that the sentence is exceptionally severe for a minor. n204

In 1996, the Ninth Circuit held in Harris v. Wright that it was not cruel and unusual within the meaning of the Eighth Amendment to sentence a fifteen-year-old first-time offender convicted of felony murder to life without the possibility of parole, even though his co-defendant fired the gun. n205 The Ninth Circuit held that the juvenile failed to show that evolving standards of decency reject the sentence of life without the possibility of parole on its face, or that the sentence [*1105] was grossly disproportionate as applied to the crime. n206 The court stated that age has no obvious bearing on a proportionality analysis in a non-capital case. n207 The court also wrote that the sentence of life without the possibility of parole raises no inference of disproportionality when imposed on a murderer, regardless of age. n208

b. State Court Holdings

Some state courts have held that juvenile life without the possibility of parole violates the federal and/or state constitutions. n209 In Naovarath v. State in 1989, the Nevada Supreme Court held that life without the possibility of parole was cruel and unusual punishment under the state and federal constitutions for a thirteen-year-old convicted of murdering a man who molested him. n210 The judge stated, "To adjudicate a thirteen-year-old to be forever irredeemable and to subject a child of this age to hopeless, lifelong punishment and segregation is not a usual or acceptable response to childhood criminality, even when the criminality amounts to murder." n211 The judge questioned whether sentencing children to life imprisonment without parole measurably contributes to the intended objectives of retribution, deterrence, and segregation from society. n212 As to retribution, the judge found that children do not deserve the degree of retribution represented by life without the possibility of parole given their lesser culpability and greater capacity for growth, and given society's special obligation to children. n213 The judge also concluded that the objective of deterrence fails given the inability of children to consider ramifications for their actions, and that segregation is not justified. n214

Other state supreme courts have overturned life without parole punishments or excessively long prison sentences under their state constitutions. n215 In 1968, the Supreme Court of Kentucky held in Workman v. Kentucky that a sentence of life without the possibility of parole imposed [*1106] on a fourteen-year-old convicted of rape violates the Kentucky Constitution. n216 In 1999, in Trowbridge v. State, the Indiana Supreme Court reduced a sentence imposed on a fifteen-year-old convicted of murder, rape, robbery, and auto theft, among other crimes, from 199 years to ninety-seven years. n217 It held that age is an element to consider in constitutional proportionality analysis. n218 The Supreme Court of Illinois reduced a mandatory sentence of life without parole imposed on a child offender. n219 In
2002, in *People v. Miller*, the court affirmed a decision to reduce a mandatory sentence of life without the possibility of parole imposed on a fifteen-year-old who acted as a lookout in the murder of two rival gang members. n220 The court held that imposing life without the possibility of parole on a child who had one minute to contemplate his involvement violates the state constitution. n221

V. JUVENILE LIFE WITHOUT PAROLE AS A FACIAL CONSTITUTIONAL VIOLATION

If the U.S. Supreme Court hears a case in which a juvenile sentenced to life without parole claims a violation of the Eighth Amendment, there are two ways the Court could overturn the sentence. n222 It could decide that the sentence is so disproportionate on its face that it always violates the Constitution, or the Court could conclude that the sentence is grossly disproportionate as applied to the particular juvenile for the particular offense. n223 This Part applies the first test to the sentence of life without parole and concludes that the Court should create a categorical exemption for juveniles, even though there may not be a strong national consensus against the practice. n224 Although the Court has recognized categorical exemptions only for the death penalty, the same reasoning it used there should apply to other sentences, such as life without the possibility of parole. n225

[*1107] A. National Consensus

The Supreme Court is unlikely to recognize a strong national consensus against juvenile life without parole. n226 Unlike the arguable consensus in *Roper v. Simmons*, where thirty states prohibited the juvenile death penalty and the twenty others rarely imposed it, many states continue to sentence juveniles to life without parole. n227 The sentence is permitted in forty-two states and required for certain crimes in twenty-seven states. n228

It is possible, however, for the Court to recognize a national consensus if it emphasizes the direction of change in sentencing rates in the past decade. n229 Although there is no strong trend toward state statutory abolition of the sentence, there is a trend toward reduced imposition of the sentence: the total number of youths sentenced to life without parole per year decreased from 152 in 1996 to fifty-four in 2004. n230 If the Supreme Court hears a juvenile life without parole case in the next few years, however, before there is time for many states to change their laws, it likely will not find a strong national consensus against the practice. n231

B. Independent Judgment of the Court

Although the Court is not likely to find a strong national consensus against juvenile life without parole, it still must apply its own judgment to determine whether the sentence is unconstitutional on its face. n232 In the past, the Court has not employed this step of the analysis to find unconstitutional a punishment that is still embraced by the states, but there is no precedent precluding it from doing so. n233 In making its independent judgment, the Court considers the culpability of the class of offenders, the social purposes intended by the punishment, the opinions of independent associations, and the practices of other countries. n234

[*1108] The Court already has decided that the psychosocial and neurological differences between adolescents and adults support a presumption of diminished culpability for adolescent offenders. n235 This presumption should influence the Court's independent judgment against the punishment of juvenile life without parole because it undermines the legitimacy of imposing equal measures on adults and children. n236

The presumption of reduced culpability also affects the Court's analysis of the social purposes of the punishment. n237 In *Ewing v. California* in 2003, the Supreme Court identified four standard justifications that inform a state's sentencing scheme: rehabilitation, deterrence, incapacitation, and retribution. n238 Although the Constitution does not mandate adoption of any one penological theory, a legitimate punishment must further at least one of these goals. n239 In *Roper*, the Court held that the juvenile death penalty is unconstitutional because neither retribution nor deterrence—the two purposes served by the death penalty—provide adequate justification for the punishment. n240 Regarding the sentence of juvenile life without parole, the Court should find that each of these justifications also fails due to the unique nature of adolescence. n241
The justifications for sentencing a juvenile to life without parole fail due to the differences between adolescents and adults. First, rehabilitation by definition is not an intended purpose of life without parole. Deterrence fails as a justification given the inability of children to consider ramifications for their actions. Incapacitation by definition obtains its goal, but the decreased culpability of juveniles does not justify life in prison. Retribution fails as a justification because children do not deserve the degree of retribution represented by life without the possibility of parole given their lesser culpability, their capacity for growth, and society's special obligation to children. Therefore, sentencing juveniles to life without parole does not measurably contribute to the social purposes intended by the punishment.

The Court also should consider international standards to confirm its judgment that juvenile life without parole is disproportionate punishment on its face. In Roper, the Court confirmed its determination that the death penalty is always disproportionate punishment for juveniles by citing the overwhelming weight of international opinion against the practice. The international community also has rejected juvenile life without parole. Only fourteen countries besides the United States permit juvenile life without parole sentences and in many countries they are rarely, if ever, imposed. Out of 145 countries examined by Human Rights Watch for its 2005 report, only four countries currently have child offenders serving life sentences—Israel, South Africa, Tanzania, and the United States. The United Kingdom, with whom the United States shares historic ties, abolished juvenile life without parole in 1996. The numbers speak for themselves: there are currently at least 2225 child offenders serving life without parole in the United States, but in the rest of the world there are only about twelve. In light of this support, the Court should find that juvenile life without parole violates the Constitution on its face.

VI. JUVENILE LIFE WITHOUT PAROLE AS A CONSTITUTIONAL VIOLATION IN CERTAIN CASES

Even if the U.S. Supreme Court does not create a categorical exemption for juveniles from life without parole, it should hold that the punishment violates the Eighth Amendment as applied in certain cases. Although the Supreme Court's "precedents in this area have not been a model of clarity," it seems as though the Court first determines whether a "threshold comparison of the crime committed and the sentence imposed leads to an inference of gross disproportionality." The Court makes the threshold comparison by considering the gravity of the offense and the harshness of the penalty. If the comparison creates an inference of gross disproportionality, the Court undertakes the jurisdictional analyses set forth in Solem v. Helm to validate its initial judgment that a sentence is grossly disproportionate to a crime. Although successful challenges under this test are exceedingly rare, the Court should find an inference of disproportionality in certain cases.

A. Gravity of the Offense

The first factor in the threshold comparison is the gravity of the offense. The Supreme Court held in Solem in 1983 that courts must weigh the gravity of an offense in light of the culpability of the offender and the harm caused to the victim or society. In Roper v. Simmons, the Supreme Court decided that juveniles are less culpable than adults. Therefore, when reviewing a sentence, the Court should assign less weight to crimes committed by juveniles.

Before Roper, the Ninth Circuit reached a different conclusion in Harris v. Wright in 1996. There, the court held that it does not violate the Eighth Amendment to sentence a fifteen-year-old first-time offender convicted of felony murder to life without the possibility of parole, even though his co-defendant fired the gun. The Ninth Circuit held that age has no obvious bearing on the proportionality analysis in non-capital cases. Given the strong evidence of psychosocial and neurological differences between adolescents and adults published since the Ninth Circuit decided Harris in 1996, and given the holding in Roper, however, the Supreme Court should find that age does have a bearing on proportionality analysis in non-capital cases. Therefore, the Court should consider the age of the offender in its threshold comparison when it weighs the gravity of the offense.
The Court should be particularly influenced by this reduced gravity when it considers sentences imposed on juveniles for felony murder.\textsuperscript{271} The precise definition of felony murder varies from state to state, but generally all persons engaged in a felony are liable for murder if one of them kills a person during the felony, even if the others did not participate in the murder or intend for the murder to occur.\textsuperscript{272} Given the reduced culpability of juveniles in general and the lack of intent or participation on the part of felony-murderers, the Court should find that these crimes are less grave when committed by juveniles.\textsuperscript{273} Certainly, offenses less serious than felony murder are also reduced in gravity when committed by juveniles.\textsuperscript{274}

**B. Harshness of the Penalty**

When the Court evaluates the second factor, the harshness of the penalty, it should recognize that a sentence of life without parole has particularly severe consequences for juveniles.\textsuperscript{275} Life sentences imposed on juveniles necessarily are longer than life sentences for adults.\textsuperscript{276} The years child offenders spend in prison are the most formative ones, in which typical adolescents finish their education, form relationships, start families, and gain employment.\textsuperscript{277}

In addition, research shows that juveniles in adult facilities are more likely to be victimized than those in juvenile facilities.\textsuperscript{278} One study found they are five times more likely to be sexually assaulted, twice as likely to be beaten by staff, and fifty percent more likely to be attacked with a weapon than are children in juvenile facilities.\textsuperscript{279} The fact that brains of juveniles are still developing suggests a lack of coping mechanisms necessary to deal with these types of problems.\textsuperscript{280}

In addition to physical abuse, juvenile offenders suffer from lack of intellectual development due to sparse educational opportunities in prison.\textsuperscript{281} Prisons are not required to provide educational programming for inmates older than eighteen, and federal funding for post-secondary education is available only for incarcerated youths under the age of twenty-five and within five years of release.\textsuperscript{282} Juveniles serving life without parole are disqualified because they are never within five years of release.\textsuperscript{283} Therefore, post-secondary education is available for youth offenders serving life without parole only if they or their families can afford to pay for it.\textsuperscript{284} Although many prisons offer educational and vocational programs, they often determine eligibility by weighing a number of factors including length of time remaining on an inmate's sentence.\textsuperscript{285} Because offenders sentenced to life without parole have the greatest amount of time remaining on their sentences, prisons often exclude them from programs to reserve resources for inmates returning to society.\textsuperscript{286}

As stated by the Supreme Court of Nevada in *Naovarath v. State*, "Denial of [opportunity for parole] means denial of hope; it means that good behavior and character improvement are immaterial."\textsuperscript{287} To adjudicate a child as forever irredeemable is to impose a hopelessness that is particularly severe for a juvenile.\textsuperscript{288} When the Court weighs the harshness of the penalty as part of the threshold comparison, it should consider the special status of juveniles and find that the harshness factor weighs in favor of disproportionality.\textsuperscript{289}

Another factor in the analysis of harshness of the penalty is the criminal record of the offender.\textsuperscript{290} For a first-time offender, this factor always weighs in favor of disproportionality.\textsuperscript{291} Even for a juvenile with a prior record of juvenile adjudications, the Court should give less weight to these adjudications than it would assign to an adult with a prior criminal record.\textsuperscript{292} Ultimately, the Court should find that the threshold comparison of the offense and the punishment of life without parole creates an inference of gross disproportionality when the offender is a juvenile and a first-time offender, especially when the juvenile did not participate in a murder or intend for a murder to occur.\textsuperscript{293}

**C. Jurisdictional Analyses**

When a Court finds an inference of gross disproportionality, it conducts the jurisdictional analyses described in *Solem* to validate its initial judgment that a sentence is grossly disproportionate to a crime.\textsuperscript{294} Specifically, the Court compares the challenged sentence to those imposed on other criminals in the same jurisdiction and those imposed for...
commission of the same crime in other jurisdictions. n295 The Court has not conducted these analyses since *Solem* in 1983 because the Court has not found any inferences of disproportionality. n296 The outcome of these analyses largely will depend on the current rate of sentencing in the state where the juvenile is convicted. n297

In certain cases, the Court should identify an inference of disproportionality and should confirm that inference through interjurisdictional and intrajurisdictional comparisons to find that juvenile life without parole fails the gross disproportionality test and violates the Constitution as applied to the specific offender. n298 The Court should do so when it reviews a sentence of life without parole imposed on a first-time juvenile offender who did not participate in a [*1114] murder or intend for a murder to occur in a jurisdiction that does not frequently impose the penalty. n299

VII. POLICY ARGUMENTS FOR ABOLITION OF JUVENILE LIFE WITHOUT PAROLE BY CONGRESS AND STATE LEGISLATURES

Even if the U.S. Supreme Court does not find juvenile life without parole to violate the Eighth Amendment, the U.S. Congress and state legislatures should pass laws to proscribe this punishment for federal and state crimes and to allow current child offenders serving this sentence to obtain review by courts for re-sentencing to include the possibility of parole. n300 Both Congress and state legislatures should abolish this sentence due to the psychological research demonstrating the reduced culpability of juveniles, the absence of a deterrent effect, and the increased harshness of the penalty. n301 Congress should abolish juvenile life without parole for federal crimes also to improve the standing of the United States in the international human rights community. n302 State legislatures should proscribe the punishment also due to the high costs of aging prison populations. n303 Additionally, both Congress and state legislatures should abolish the sentence due to the racial disparities in sentencing of juvenile life without parole. n304

A. *International Law*

The interpretive use of international law promotes a broad range of normative values, including enhancing the international stature of the United States, promoting its ability to influence the development of these norms, enhancing its ability to protect its interests abroad, and advancing the development of a well-functioning international judicial system. n305 International human rights law explicitly prohibits sentences of life without parole for those who commit their crimes before the [*1115] age of eighteen. n306 Almost every country besides the United States adheres to this prohibition. n307

In 1959, the U.N. General Assembly adopted the Declaration of the Rights of the Child, which recognized that children need special legal protections due to their immaturity. n308 Seventy-eight members of the U.N. General Assembly, including the United States, voted to adopt the Declaration. n309 Since then, the international community has protected further the rights of children and the United States has been left behind. n310

For example, the United States has failed to ratify the United Nations Convention on the Rights of the Child (the "CRC"), which went into force in 1990 and explicitly proscribes sentencing juveniles to life without parole. n311 Every country in the world ratified this resolution except the United States and Somalia. n312 If Congress expects and intends the United States to be a world leader on the issue of human rights, the Senate should consent to ratification of the CRC without reservation. n313

In 1992, the United States became a party to the International Covenant on Civil and Political Rights (the "ICCPR"), which was adopted by the U.N. General Assembly in 1966. n314 The ICCPR acknowledges the special needs of children in the criminal justice system by requiring the separation of child offenders from adults and the provision of treatment appropriate to the child's age. n315 It also emphasizes the importance of rehabilitation by requiring parties to focus on education rather than punishment when sentencing children for offenses. n316 When the United States ratified the ICCPR, however, it attached this limiting reservation:

That the policy and practice of the United States are generally in compliance with and supportive of the Covenant's provisions [*1116] regarding treatment of juveniles in the criminal justice system.
Nevertheless, the United States reserves the right, in exceptional circumstances, to treat juveniles as adults, notwithstanding paragraphs 2(b) and 3 of Article 10 and paragraph 4 of Article 14. n317

Given the frequency with which the United States prosecutes juveniles as adults and incarcerates them in adult prisons, it is failing to adhere to the terms of its reservation. n318 If the United States wants to continue to influence the development of international human rights norms, it should remove its reservation to the ICCPR and proscribe the sentence of juvenile life without parole for federal crimes. n319

B. Costs of Lifetime Imprisonment

Even if juvenile life without parole is not found to violate the Eighth Amendment, state legislatures should proscribe the punishment for one practical reason—it is expensive. n320 Because offenders serving life without parole necessarily age and die in prison, this sentence increases the size of the elderly inmate population. n321 Prisoners over age sixty are now the fastest-growing age segment; this population grew nearly fifty percent between 1999 and 2004. n322 The needs of elderly inmates are much greater than those of younger inmates: they have more chronic health problems, need expensive medication, and often require handicap-accessible housing. n323 Because elderly inmates require more medical care, it costs nearly three times as much to incarcerate them. n324 State legislatures should consider this cost when contemplating long sentences. n325

[*1117] C. Racial Disparities in Sentencing

Finally, Congress and the states should consider research studies showing that minority youths receive harsher treatment than similarly situated white youths at every stage of the criminal justice system. n326 Minority youths are more likely than white youths to be detained, formally charged, waived to adult court, and incarcerated. n327 In 1997, the most recent year for which data are available, minority youths made up about one-third of the juvenile population nationwide but two-thirds of the detained and committed population in secure juvenile facilities. n328 African-American youths are overrepresented more than any other minority group. n329

The overrepresentation of minority youths also exists in sentencing. n330 In 2005, Amnesty International found that black youth offenders constituted sixty percent of all youth offenders serving life without parole in the United States, whereas whites constituted only twenty-nine percent. n331 Data from individual states also show disparities in sentencing. n332 In Michigan, the American Civil Liberties Union (the "ACLU") reported that of 307 people serving life without parole in 2004, the majority (221) consists of minority youths and 211 of those are African Americans. n333 A Florida study found that, among like offenders, minority youths had a higher probability than white youths of receiving the harshest disposition available at each stage of processing. n334 This racial disparity in sentencing, combined with the other arguments against juvenile life without parole, should convince Congress and state legislatures to prohibit the sentence for juveniles. n335

[*1118] CONCLUSION

Sentencing juveniles to life without the possibility of parole is cruel and unusual punishment and violates the Eighth Amendment of the U.S. Constitution because adolescents are less culpable than adults due to their psychological and neurological deficiencies. The U.S. Supreme Court should create a categorical exemption for juveniles from life without parole by applying its independent judgment in the "evolving standards of decency" test. Juvenile life without parole violates the Eighth Amendment on its face because of the reduced culpability of children and because the sentence does not contribute to the purposes of lifelong imprisonment for adults. Even if application of this test does not result in abolition of the sentence, the Court should find that juvenile life without parole is grossly disproportionate as applied in certain cases, such as for a first-time offender for a crime of felony murder. Furthermore, even if the Court finds that sentencing juveniles to life without parole does not violate the Constitution, the U.S. Congress and state legislatures should pass laws to exempt juveniles from this type of punishment. Although children should be held accountable for their crimes, the U.S. criminal justice system should never make them disposable.
HILLARY J. MASSEY

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FOOTNOTES:

n1 Kim Taylor-Thompson, States of Mind/States of Development, 14 STAN. L. & POL'Y REV. 143, 143, 144 & n.10 (2003). Throughout this Note, all references to youths, children, adolescents, and juveniles refer to persons under the age of eighteen. The phrase "life without parole" refers to sentences of life without the possibility of parole. The phrase "juvenile life without parole" refers to sentences of life without parole imposed on persons younger than eighteen.

n2 Id. at 146-49.

n3 Id.

n4 Id. at 148-49.


n6 Id.


n8 See Cauffman & Steinberg, supra note 7, at 742-43; Sowell et al., Mapping Continued, supra note 7, at 8819; Steinberg & Scott, supra note 7, at 1013.

n9 543 U.S. 551, 578 (2005).

n10 Id.
n11 *Id.* at 575-78.

n12 HUMAN RIGHTS WATCH, *supra* note 5, at 104-07.

n13 *Id.* at 106. It is not clear whether any of these countries permits the possibility of parole. *Id.* Of the fourteen other countries that permit the sentence, only three currently have people serving life without parole for crimes committed as children--South Africa, Tanzania, and Israel. *Id.*


n16 *Id.* at 94.

n17 *See infra* notes 222--299 and accompanying text.

n18 *See Lockyer v. Andrade, 538 U.S. 63, 72 (2003)* (noting "[o]ur precedents in this area have not been a model of clarity").

n19 *See infra* notes 222-299 and accompanying text.

n20 *See infra* notes 27-61 and accompanying text.

n21 *See infra* notes 62-80 and accompanying text.

n22 *See infra* notes 81-108 and accompanying text.

n23 *See infra* notes 109--221 and accompanying text.

n24 *See infra* notes 222-255 and accompanying text.

n25 *See infra* notes 256-299 and accompanying text.

n26 *See infra* notes 300-335 and accompanying text.

n28 See Taylor-Thompson, supra note 1, at 145.

n29 Id. at 147.

n30 See id. at 148.

n31 See id.

n32 Id. at 145.

n33 See Taylor-Thompson, supra note 1, at 145. The government had this burden when a child criminal defendant advanced an infancy defense, in which the child asked the court to dismiss the charges because she lacked the capacity to distinguish between right and wrong. Id.

n34 See id. Although the practice was rare, some children between the ages of ten and twelve were executed. See id. at 145-46.


n36 See Scott & Grisso, supra note 35, at 141-43; Taylor-Thompson, supra note 1, at 146.


n38 Taylor-Thompson, supra note 1, at 147.

n39 Id. at 146.

n40 Id. at 147.

n41 See PATRICK GRIFFIN ET AL., U.S. DEPT OF JUSTICE, TRYING JUVENILES AS ADULTS IN CRIMINAL COURT: AN ANALYSIS OF STATE TRANSFER PROVISIONS 3 (1998), available at http://www.ncjrs.gov/pdffiles/172836.pdf. All states that authorize discretionary waivers require a waiver hearing. Id. Most waiver statutes specify transfer criteria that must be met before a court may consider waiver. Id.

n42 See HUMAN RIGHTS WATCH, supra note 5, at 14.

n43 See Taylor-Thompson, supra note 1, at 147. For example, juveniles did not have the right to an attorney
in juvenile court. *Id.*

n44 Scott & Grisso, *supra* note 35, at 145; Taylor-Thompson, *supra* note 1, at 147.

n45 *In re Gault*, 387 U.S. 1, 18-20 (1967). Under the rationale of the state as parens patriae, children had a right to custody rather than to liberty. *Id.* at 16-17. Therefore, when the state intervened for the parents of a delinquent child, it merely substituted the custody to which the child was entitled. *Id.* Because juvenile proceedings were civil rather than criminal, they were not subject to the due process requirements for deprivations of liberty. *See id.* at 17. Such individualized treatment often led to arbitrary results. *See id.* at 18-19.

n46 *Id.* at 33, 36-37, 55-56. The Court based its decision partly on concerns that juveniles were getting neither the promised rehabilitation nor the procedural rights guaranteed to adults. *Id.* at 18 n.23. The Court noted that "unbridled discretion, however benevolently motivated, is frequently a poor substitute for principle and procedure." *Id.* at 18.

n47 *Id.* at 33, 36-37, 55-56. The Court did not extend to juveniles the right to trial by jury, nor did it adopt a punitive approach. See Taylor-Thompson, *supra* note 1, at 147.


n49 *See* SNYDER, *supra* note 48, at 6.

n50 *See id.*


n52 *See* Scott & Grisso, *supra* note 35, at 149; Taylor-Thompson, *supra* note 1, at 148-49.

n53 *See* Scott & Grisso, *supra* note 35, at 149-50; Taylor-Thompson, *supra* note 1, at 149.

n54 *See* GRIFFIN ET AL., *supra* note 41, at 3-11. Twenty-eight states have statutes that remove certain offenses from the juvenile court's jurisdiction. *Id.* at 8. Fourteen states require mandatory waiver of juvenile court jurisdiction in cases that meet certain criteria. *Id.* at 4. Fifteen states have direct file statutes that define a category of cases in which the prosecutor determines whether to proceed initially in juvenile or criminal court. *Id.* at 7.

n56 See HUMAN RIGHTS WATCH, supra note 5, at 18.

n57 See id. at 25.

n58 See ZIMRING, supra note 55, at 105-06 (quoting analysts including John Dilulio of Princeton University, who coined the term “super-predators,” James Fox of Northeastern University, and the Council on Crime in America, all of whom warned of an impending crime wave in the first ten years of the twenty-first century due to population growth of teenagers).

n59 See SYNDICATE, supra note 48, at 6.

n60 See Taylor-Thompson, supra note 1, at 148--49.

n61 See HUMAN RIGHTS WATCH, supra note 5, at 116.


n63 See id. The eight states are Alaska, Kansas, Kentucky, Maine, New Mexico, New York, Oregon, and West Virginia. See ALASKA STAT. § 12.55.125 (2004); D.C. CODE § 22-2104 (2001 & Supp. 2006); KAN. STAT. ANN. § 21-4622 (2000 & Supp. 2005); KY. REV. STAT. ANN. § 640.040 (LexisNexis 1999); ME. REV. STAT. ANN. tit. 17A, § 1251 (2005); N.M. STAT. § 31-21-10 (2004); N.Y. PENAL LAW § 10.00 (1998 & Supp. 2004) (defining juvenile offender as fifteen or younger); id. § 70.05 (providing for indeterminate sentencing for juveniles who commit felonies including second degree murder); id. § 125.27 (removing juveniles from jurisdiction for first degree murder); OR. REV. STAT. § 161.620 (2005); W. VA. CODE § 62-12-13 (2005 & Supp. 2006).


n65 D.C. CODE § 22-2104; KAN. STAT. ANN. § 21-4622; KY. REV. STAT. ANN. § 640.040; N.Y. PENAL LAW § 10.00; id. § 70.05; id. § 125.27; OR. REV. STAT. § 161.620.


n68 See id. Although ninety-three percent of youths are sentenced to life without parole for homicide
offenses, the punishment is not reserved only for the most brutal murderers. See HUMAN RIGHTS WATCH, supra note 5, at 27. Rather, the Amnesty International self-report study of 172 youth offenders found that twenty-six percent were sentenced to life without parole for felony murder. Id. In a survey of 146 juvenile lifers in Michigan, nearly half reported that they were convicted of aiding and abetting or that they did not personally commit the murder. See LABELLE ET AL., supra note 67, at 4.


n71 See Hughes, supra note 70, at B2; Reinhard, supra note 70, at 1A.


n73 Id.

n74 See HUMAN RIGHTS WATCH, supra note 5, at 35.


n76 See HUMAN RIGHTS WATCH, supra note 5, at 35; LABELLE ET AL., supra note 67, at 4.

n77 See HUMAN RIGHTS WATCH, supra note 5, at 1.

n78 See id. at 37.

n79 See id. at 18 (presenting a table of minimum age for adult prosecution by state); id. at 35 (presenting a table of total number of youths serving life without parole by state); id. at 37 (discussing differences between states with mandatory sentences and those with discretionary sentences).

n80 See id. at 45.

n81 See, e.g., Cauffman & Steinberg, supra note 7, at 742-43; Sowell et al., Mapping Continued, supra note 7, at 8819; Steinberg & Scott, supra note 7, at 1013.

n82 See Steinberg & Scott, supra note 7, at 1011 (stating "adolescents are less culpable than are adults because adolescent criminal conduct is driven by transitory influences"). But see Alfred S. Regnery, Getting
Away with Murder: Why the Juvenile Justice System Needs an Overhaul, 34 POL’Y REV. 65, 65 (1985) ("These are criminals who happen to be young, not children who happen to commit crimes.").

n83 543 U.S. 551, 570 (2005).

n84 See id. at 569.


n87 See infra notes 88-108 and accompanying text.

n88 See Cauffman & Steinberg, supra note 7, at 742-43; Scott & Grisso, supra note 35, at 161; Steinberg & Scott, supra note 7, at 1011-12.

n89 See Scott & Grisso, supra note 35, at 157.

n90 See Steinberg & Scott, supra note 7, at 1012.

n91 See Leon Mann et al., Adolescent Decision-Making: The Development of Competence, 12 J. ADOLESCENCE 265, 275 (1989). One study found that adolescents are aware of the risks they take and that little growth in logical abilities related to decision making occurs past age sixteen. See Cauffman & Steinberg, supra note 7, at 743–44 (stating that research shows few significant differences). In contrast, one study indicated there may be significant differences in the extent to which those logical abilities are employed. See Scott & Grisso, supra note 35, at 160.

n92 See Cauffman & Steinberg, supra note 7, at 744.

n93 See Steinberg & Scott, supra note 7, at 1012; see also Cauffman & Steinberg, supra note 7, at 745 (identifying three psychosocial factors—responsibility, perspective, and temperance).

n94 See Cauffman & Steinberg, supra note 7, at 756.

n95 See id. at 756-57.

n96 See Scott & Grisso, supra note 35, at 162-63 (noting that adolescents are more likely to commit crimes with peers than are adults, and citing studies showing that adolescents differ from adults in their attitude toward, and perception of, risk); Claudia Wallis, What Makes Teens Tick, TIME, May 10, 2004, at 56-58 (noting that hormones released during adolescence attach to receptors in the brain that regulate mood and excitability and
thereby create an appetite in adolescents for thrill-seeking and risk-taking behavior).


n98 See Taylor-Thompson, supra note 1, at 153-54.


n101 See Elizabeth R. Sowell et al., In Vivo Evidence for Post-Adolescent Brain Maturation in Frontal and Striatal Regions, 2 NATURE NEUROSCIENCE 859, 861 (1999) [hereinafter Sowell et al., In Vivo]; Sowell et al., Mapping Continued, supra note 7, at 8819.

n102 See Jay N. Giedd et al., Brain Development During Childhood and Adolescence: A Longitudinal MRI Study, 2 NATURE NEUROSCIENCE 861, 861 (1999) (concluding that the volume of brain matter continues to increase and reorganize through age twenty); Sowell et al., In Vivo, supra note 101, at 861. These studies refute the conclusions of previous generations of psychologists who believed that human brain development finishes before age twelve. See Giedd et al., supra note 102, at 861; Sowell et al., In Vivo, supra note 101, at 861.

n103 See Mary Beckman, Neuroscience: Crime, Culpability, and the Adolescent Brain, 305 SCIENCE 596, 596 (2004); Giedd et al., supra note 102, at 861; Sowell et al., In Vivo, supra note 101, at 861.

n104 See Sowell et al., Mapping Continued, supra note 7, at 8821; Wallis, supra note 96, at 59-60 (attributing behavioral problems in adolescents to hormonal changes as well as the immaturity of the frontal lobe).

n105 See Wallis, supra note 96, at 59-60.

n106 See Beckman, supra note 103, at 599; Wallis, supra note 96, at 62 (noting that using the amygdala may explain why adolescents have difficulty reading emotional signals).

n107 See Beckman, supra note 103, at 599; Wallis, supra note 96, at 62.

n108 See 543 U.S. at 570; Steinberg & Scott, supra note 7, at 1011. Similarly, the Supreme Court held in


n110 See U.S. CONST. amend. VIII; Roper, 543 U.S. at 560.

n111 U.S. CONST. amend. VIII.

n112 See U.S. CONST. amend. XIV, § 2; Roper, 543 U.S. at 560.


n114 Roper, 543 U.S. at 560.


n116 See Roper, 543 U.S. at 561 (applying the "evolving standards" test to find that the juvenile death penalty is unconstitutional on its face); Harmelin, 501 U.S. at 1001 (applying the "gross disproportionality" test to find that life without parole as applied to the offender did not violate the Constitution).

n117 Roper, 543 U.S. at 561.

n118 Harmelin, 501 U.S. at 1001.


n120 See Ewing, 538 U.S. at 32; Harmelin, 501 U.S. at 965.

n121 501 U.S. at 966-93 (Scalia, J., writing in a Part joined only by Chief Justice Rehnquist).

n122 See id. at 996 (Scalia, J., plurality opinion).

n123 See Ewing, 538 U.S. at 32 (Thomas, J., concurring) (stating that "the Eighth Amendment contains no proportionality principle").

n124 Roper, 543 U.S. at 561-62 (quoting Trop v. Dulles, 356 U.S. 86, 100-01 (1958)).
n125 See id.

n126 See id. at 563; Atkins, 536 U.S. at 312.

n127 Thompson v. Oklahoma, 487 U.S. 815, 833 (1988). In Ewing v. California, decided in 2003, the Supreme Court identified four standard justifications that inform a state's sentencing scheme: rehabilitation, deterrence, incapacitation, and retribution. 538 U.S. at 25. Although the Constitution does not mandate adoption of any one penological theory, a legitimate punishment must further at least one of these goals. See id.; Harmelin, 501 U.S. at 999 (Kennedy, J., concurring).

n128 See Roper, 543 U.S. at 561.


n130 See Roper, 543 U.S. at 574 (holding that the juvenile death penalty is unconstitutional); Atkins, 536 U.S. at 321 (holding that the death penalty is unconstitutional when applied to mentally retarded offenders).

n131 487 U.S. at 838.

n132 Id. at 822-23.

n133 Id. at 832.

n134 536 U.S. at 321.

n135 Id. at 314-16.

n136 Id. at 321.

n137 543 U.S. at 568.

n138 Id.


n140 Roper, 543 U.S. at 568-71.
n141 Id. at 564-65.

n142 Id. at 564.

n143 Id.

n144 Id. at 565.

n145 Roper, 543 U.S. at 565-66.

n146 Id. at 566; see Stanford, 492 U.S. at 380.

n147 Roper, 543 U.S. at 565-66.

n148 Id. at 567-68.

n149 Id. at 568-72.

n150 Id. at 569.

n151 Id. (citing Johnson v. Texas, 509 U.S. 350, 367 (1993)).

n152 Roper, 543 U.S. at 569.

n153 Id. at 570.

n154 Id. at 571-72.

n155 Id. The Court concluded that retribution fails as a justification because imposing the law's most severe penalty on one whose culpability is diminished is inherently disproportional. Id. The Court rejected deterrence as a justification because it is unclear whether the death penalty has a significant deterrent effect on juveniles. Id.

n156 Id. at 574.

n157 Roper, 543 U.S. at 575.

n158 Id. at 578.

n159 Id. at 575.
n160 Id. at 577-78.

n161 Id. at 576.

n162 Roper, 543 U.S. at 576 (citing CRC, supra note 14, at art. 37).

n163 Id.

n164 Id. (citing ICCPR, supra note 14, at art. 6(5)).


n166 543 U.S. at 578.

n167 Id.

n168 See id. at 561.

n169 See id. at 568.

n170 See Harmelin, 501 U.S. at 1001 (Kennedy, J., concurring).

n171 See id. at 997.

n172 See id. at 1001; Solem, 463 U.S. at 288.

n173 Harmelin, 501 U.S. at 1001; Solem, 463 U.S. at 288.

n174 463 U.S. at 303.

n175 Id. at 281.

n176 Id. at 292. The gravity of the offense is determined in light of the harm inflicted by the offender on the victim and society, as well as the culpability of the offender. See id.

n177 See id. at 303.
n178 See Harmelin, 501 U.S. at 961-62 (Scalia, J., writing in a Part joined only by Chief Justice Rehnquist).

n179 Id. at 1009 (Kennedy, J., concurring).

n180 See id. at 996-97.

n181 Id. at 996. (Scalia, J., plurality opinion).

n182 Id. at 965 (Scalia, J., writing in a Part joined only by Chief Justice Rehnquist).

n183 501 U.S. at 997 (Kennedy, J., concurring).

n184 See Andrade v. Attorney Gen. of Cal., 270 F.3d 743, 754 (9th Cir. 2001); Henderson v. Norris, 258 F.3d 706, 709 (8th Cir. 2001); United States v. Jones, 213 F.3d 1253, 1261 (10th Cir. 2000); United States v. Bland, 961 F.2d 123, 128-29 (9th Cir. 1992).

n185 Harmelin, 501 U.S. at 1027 (White, J., dissenting).

n186 Id. at 1005 (Kennedy, J., concurring).

n187 Id.

n188 Id.

n189 Id. at 1004.

n190 Solem, 463 U.S. at 292.

n191 501 U.S. at 1002 (Kennedy, J., concurring). In Harmelin, the Court also held that mandatory sentences are not unconstitutional because the Constitution does not mandate any particular penological theory and because the Court is deferential to legislative policy. Id. at 995 (Scalia, J., plurality opinion). For another opinion upholding mandatory sentences, see Chapman v. United States, 500 U.S. 453, 467 (1991) (holding that a mandatory sentencing scheme for drug distribution offenses does not violate the Eighth Amendment).

n192 See Harmelin, 501 U.S. at 1002-04 (Kennedy, J., concurring).


n194 538 U.S. at 72.
n195 Id. at 77.

n196 538 U.S. at 30-31 (plurality opinion).

n197 Id.

n198 Id. at 30.

n199 Id. at 29-30.

n200 See HUMAN RIGHTS WATCH, supra note 5, at 86.

n201 See 501 U.S. at 1005 (Kennedy, J., concurring). In Harmelin, Chief Justice Rehnquist joined Justice Scalia in an opinion refusing to extend the proportionality principle to non-capital sentences. See id. at 994 (Scalia, J., writing in a Part joined only by Chief Justice Rehnquist). Justice O'Connor, on the other hand, joined the Justice Kennedy concurrence that established the gross disproportionality test. See id. at 996-97 (Kennedy, J., concurring). Therefore, the loss of these two Justices results in one fewer vote in favor and one fewer vote against a proportionality principle for non-capital cases. See id. at 994 (Scalia, J., writing in a Part joined only by Chief Justice Rehnquist); id. at 996-97 (Kennedy, J., concurring).

n202 See Roper, 543 U.S. at 551.

n203 See Rice v. Cooper, 148 F.3d 747, 752 (7th Cir. 1998); Harris v. Wright, 93 F.3d 581, 585 (9th Cir. 1996).

n204 148 F.3d at 752.

n205 93 F.3d at 585.

n206 Id. at 584-85.

n207 Id. at 585.

n208 Id.


n210 779 P.2d at 948-49, 949 n.6.
n211 Id. at 947.

n212 Id.

n213 Id. at 948.

n214 Id.

n215 See People v. Miller, 781 N.E.2d 300, 310 (Ill. 2002); Trowbridge v. State, 717 N.E.2d 138, 150 (Ind. 1999); Workman, 429 S.W.2d at 378.

n216 429 S.W.2d at 378.

n217 717 N.E.2d at 150-51.

n218 Id.

n219 Miller, 781 N.E.2d at 310.

n220 Id.

n221 Id. at 308-10 (citing ILL. CONST. art. I, § 11).


n223 See Roper, 543 U.S. at 561; Harmelin, 501 U.S. at 1001.

n224 See infra notes 226-255 and accompanying text.


n226 See Roper, 543 U.S. at 564.

n227 See HUMAN RIGHTS WATCH, supra note 5, at 36.

n228 See id. at 25.
n229 See Roper, 543 U.S. at 565-66.

n230 See HUMAN RIGHTS WATCH, supra note 5, at 31. This decrease in rate of sentencing might be explained partly, however, by the decrease in juvenile arrests since the 1990s. See SNYDER, supra note 48, at 6.

n231 See Roper, 543 U.S. at 564-67.


n233 See id.


n235 See Roper, 543 U.S. at 570; Steinberg & Scott, supra note 7, at 1011; supra notes 81-108 and accompanying text.

n236 See Roper, 543 U.S. at 570.

n237 See id. at 571-72.


n239 Id.; Harmelin, 501 U.S. at 999 (Kennedy, J., concurring).

n240 543 U.S. at 571.


n242 See Roper, 543 U.S. at 571; Naovarath, 779 P.2d at 948.

n243 See Ewing, 538 U.S. at 25-27 (noting that life sentences further the goals of retribution, deterrence, and incapacitation).

n244 See Naovarath, 779 P.2d at 948; Scott & Grisso, supra note 35, at 164 (noting that adolescents place more value on short-term consequences and are less sensitive to future outcomes). Similarly, the Roper Court noted the absence of evidence that the death penalty has a deterrent effect on juveniles. 543 U.S. at 571.

n245 See Naovarath, 779 P.2d at 948.

n246 See id.
n247 See Thompson, 487 U.S. at 833.

n248 See Roper, 543 U.S. at 578.

n249 Id. at 575.

n250 HUMAN RIGHTS WATCH, supra note 5, at 106.

n251 Id.

n252 Id. at 105-06.

n253 See Roper, 543 U.S. at 577 (noting the particular relevance of the United Kingdom to the United States); Hussain v. United Kingdom, 22 Eur. Ct. H.R. 1, 27 (1996) (abolishing life without parole for juveniles in the United Kingdom).

n254 See HUMAN RIGHTS WATCH, supra note 5, at 1, 106.

n255 See Roper, 543 U.S. at 561; Thompson, 487 U.S. at 833.


n258 Harmelin, 501 U.S. at 1005 (Kennedy, J., concurring).

n259 Id. at 1004.

n260 Id. at 1005; Solem v. Helm, 463 U.S. 277, 292 (1983).

n261 See Harmelin, 501 U.S. at 1001 (Kennedy, J., concurring).

n262 See id. at 1004.

n263 463 U.S. at 292, 296-97.


n265 See id.
n266 Harris v. Wright, 93 F.3d 581, 585 (9th Cir. 1996).

n267 See id.

n268 See id.

n269 See Roper, 543 U.S. at 569-70; Steinberg & Scott, supra note 7, at 1014; supra notes 81-108 and accompanying text.

n270 See Harmelin, 501 U.S. at 1004 (Kennedy, J., concurring).

n271 See HUMAN RIGHTS WATCH, supra note 5, at 27-28.

n272 JOSHUA DRESSLER, UNDERSTANDING CRIMINAL LAW § 31.06 (3d ed. 2001).

n273 See HUMAN RIGHTS WATCH, supra note 5, at 27-28; LABELLE ET AL., supra note 67, at 4.

n274 See HUMAN RIGHTS WATCH, supra note 5, at 27-28; LABELLE ET AL., supra note 67, at 4.


n276 See LABELLE ET AL., supra note 67, at 18.

n277 See id. (quoting one child offender serving life without parole who said, “I don't even know what I'm missing, only that I'm missing everything ... I recognize that I'm not mentally capable to endure this for another 50+ years”).

n278 See id.; see also Martin Forst et al., Youth in Prisons and State Training Schools, 40 Juv. & FAM. CT. J. 1, 9 (1989).

n279 See Forst, supra note 278, at 9.

n280 See Roper, 543 U.S. at 569-70.

n281 See HUMAN RIGHTS WATCH, supra note 5, at 67-72.

n283 See id.

n284 See HUMAN RIGHTS WATCH, supra note 5, at 69.

n285 See id. at 70-71.

n286 See id.


n288 See id. at 947.

n289 See Roper, 543 U.S. at 570.

n290 See Harmelin, 501 U.S. at 1005 (Kennedy, J., concurring).

n291 See id. The Amnesty International report surveyed 281 youth offenders and found that fifty-nine percent received a life without parole sentence for their first offense. See HUMAN RIGHTS WATCH, supra note 5, at 28.

n292 See Roper, 543 U.S. at 570.

n293 See Harmelin, 501 U.S. at 1005 (Kennedy, J., concurring).

n294 See id.

n295 Solem, 463 U.S. at 292.


n297 See Solem, 463 U.S. at 292.

n298 See Harmelin, 501 U.S. at 1005 (Kennedy, J., concurring).

n299 See id.

n300 See infra notes 301-335 and accompanying text.

n301 See supra notes 81-108, 244, 275-293 and accompanying text.
n302 See infra notes 308-319 and accompanying text.


n304 See infra notes 326-335 and accompanying text.

n305 Ingrid Brunk Wuerth, Authorizations for the Use of Force, International Law, and the Charming Betsy Canon, 46 B.C. L. REV. 293, 303 (2005). Critics of the use of international law argue that it is counter-majoritarian and antidemocratic. Id. at 304.

n306 HUMAN RIGHTS WATCH, supra note 5, at 94.

n307 Id.


n309 See HUMAN RIGHTS WATCH, supra note 5, at 94.

n310 Id.


n312 Roper, 543 U.S. at 576; LABELLE ET AL., supra note 67, at 21.

n313 See CRC, supra note 14, at art. 37(a); HUMAN RIGHTS WATCH, supra note 5, at 7.

n314 See generally ICCPR, supra note 14; RIGHTS REPORT, supra note 165.

n315 ICCPR, supra note 14, at art. 10(3).

n316 ICCPR, supra note 14, at art. 14(4).

n317 RIGHTS REPORT, supra note 165, at 651-52.

n318 See HUMAN RIGHTS WATCH, supra note 5, at 97-98.
n319 See id.

n320 See LABELLE ET AL., supra note 67, at 22 (estimating that it costs the state of Michigan more than one million dollars to incarcerate a juvenile lifer for fifty years); Wilson & Vito, supra note 303, at 25.

n321 See Wilson & Vito, supra note 303, at 25.

n322 See Vanessa Blum, Gray Area, LEGAL TIMES, Mar. 29, 2004, at 1.

n323 See Wilson & Vito, supra note 303, at 25.

n324 See Blum, supra note 322, at 1; Tammerlin Drummond, Cellblock Seniors: They Have Grown Old and Frail in Prison. Must They Still Be Locked Up?, TIME, June 21, 1999, at 60.

n325 See HUMAN RIGHTS WATCH, supra note 5, at 7-9.


n327 Id. at 2-3.


n330 See LABELLE ET AL., supra note 67, at 6.

n331 HUMAN RIGHTS WATCH, supra note 5, at 39. A shortcoming of this study is that it fails to control for type of conviction and extent of criminal history. Id. Therefore, it cannot be used to determine whether minority children are sentenced to higher rates than white children from similar backgrounds. Id.

n332 Id.

n333 LABELLE ET AL., supra note 67, at 6.

n334 HUMAN RIGHTS WATCH, supra note 5, at 40.
n335 See id. at 39-40.
Neurobiology and the Law: A Role in Juvenile Justice?

Staci A. Gruber & Deborah A. Yurgelun-Todd*

Human behavior is determined by a complex interaction between biology and experience. In childhood, it is clear that specific biological milestones need to be reached for key behaviors to emerge. As we move into adolescence, it is more difficult to recognize the relationship between biological underpinnings and behavior. Just how old do you have to be to make a good decision? Determining the point at which someone is able to fully understand the consequences of his actions and be held accountable for such is critical to making and enforcing laws. A closer look at the neurobiology of adolescence and the processes involved in brain development underscore the importance of considering a number of factors when evaluating whether juveniles may be “held accountable” for all of their actions. While parental guidance, education and peer values undoubtedly play important roles in adolescent behavior, the integrity of the brain, particularly the prefrontal cortical region is of special importance. Data from recent investigations provide evidence that brain maturation continues well past where we once thought adolescence ends. Accordingly, the developmental factors which influence decision-making in adolescents may result in choices which are suggestive of cortical immaturity, poor judgment and impulsivity. It is reasonable then, to assume that all significant factors, including chronological age, nature and severity of the crime, previous history, and neurobiologic stage of development should be considered when dealing with juvenile offenders.

I. INTRODUCTION

Human behavior is determined by a complex interaction between biology and experience. In childhood, it is clear that specific biological milestones need to be reached for key behaviors to emerge. For example, walking requires muscle development, neural coordination and practice. As we move into adolescence it is more difficult to recognize the relationship between biological underpinnings and the increased functionality associated with mature behavior. The concept of childhood and adolescence is predominantly a cultural and social phenomenon, and, as a result, clear beginning and end points are not easily referenced by physical milestones. The exact definition of a child varies, but it is often referenced as “someone who is a young human” or a person who is between birth

* Dr. Gruber is the Associate Director and Dr. Yurgelun-Todd is the Director of the Cognitive Neuroimaging and Neuropsychology Laboratory of McLean Hospital, Harvard Medical School. Comments or questions may be directed to Dr. Gruber at gruber@mclean.harvard.edu.
and puberty. Accordingly, adolescence is often defined as a transitional stage of
development between childhood and full adulthood, representing the period of
time during which a person may physically be considered an adult but may not in
fact be emotionally at full maturity. Of course, the definition of maturity is also
culturally defined, and not based on any specific neurobiologic evidence. The ages
that are considered to be part of adolescence vary by culture; even within the
United States there is dispute regarding absolute age ranges. However,
organizations like the Center for Disease Control (CDC) define adolescence as
anyone between the ages of ten and twenty-four years of age (Virginia Department
of Health—Office of Family Health Services, 2005).

Just how old do you have to be to make a good decision? Unfortunately,
despite an increasing amount of research on the development of the human brain,
the answer is still unclear. Since so many of our cultural and sociological
practices, like getting a driver’s license, buying alcohol, enlisting in the military,
voting in elections, getting a marriage license, or even getting into a movie are
based on chronological age, determining when an individual might arrive at the
“age of reason” is critically important. Further, determining the point at which
someone is able to fully understand the consequences of and be held accountable
for his actions is critical to making and enforcing laws. A closer look at the
neurobiology of adolescence and the processes involved in brain development
underscores the importance of considering a number of factors when evaluating
whether juveniles may be held accountable for all of their actions. While parental
guidance, education, and peer values undoubtedly play important roles in
adolescent behavior, the integrity of the brain, particularly the prefrontal cortical
region is of special importance. The prefrontal cortex in the portion of the brain
located behind the eyebrows is the forward most portion of the brain. Divided into
the dorsolateral, orbitofrontal and mesial prefrontal areas, this brain region has
been implicated in planning complex cognitive behaviors, personality expression
and moderating correct social behavior.

II. THE PREFRONTAL CORTEX

The cerebral hemispheres of primates can be divided into a frontal and
posterior portion at the level of the central sulcus. The posterior portion subserves
perception, sensation, and perceptual memory functions and the frontal portion
governs action and motor memory functions. It appears that increasingly complex
actions or functions are organized in a hierarchical manner within the frontal lobe,
and that the most complex and novel action domains depend upon the integrity of
the prefrontal cortex (PFC). The PFC has a pivotal role in the development and
execution of novel thoughts and behaviors which are thought to be represented by
neural networks as “abstract schema” or mental representations. For example the
mental representations of “insight,” “judgment,” “winning,” and “goals” are all
supported by this brain region. The simpler action components of these schema
are felt to be represented by neural networks in frontal and subcortical regions
which constitute lower levels of the motor hierarchy. During execution of an action plan, the flow of neural activity is generally from the prefrontal to the premotor and ultimately the motor cortex. However, these areas are interconnected in a reciprocal manner, both with each other and other deeper brain areas. In this way, both serial (sequential or linear) and parallel (simultaneous processing by multiple regions) processing occur at the same time.

The frontal cortex has been shown to play a major role in the performance of executive functions including short term or working memory, motor set and planning, attention, inhibitory control and decision making (Lezak, 2004; Goldberg, 2001; Luria, 1966). These functions are subserved by reciprocal connections between the prefrontal cortex and posterior cortical regions as well as subcortical regions. Working memory involves the capacity to keep new sensory or motor information, or a newly activated memory “on line” for a short period of time so that the information present can be processed and acted upon. This process is mediated primarily by the dorsolateral prefrontal region. The capacity to maintain information “on line” is thought to result from the repetitive activation of specific neuronal networks via reverberating circuits or connections with shared access to the information.

Attention or motor set and planning are mediated by the medial prefrontal cortex. These functions require the selection of a particular motor act to be performed from an existing repertoire of motor acts in motor memory and the preparation of various related sensory and motor systems for the performance of this act. Inhibition is mediated primarily by the orbitomedial prefrontal cortex and acts to suppress extraneous sensory or motor stimuli or memories that might interfere with performance of the task at hand. The process of decision-making requires inhibitory function as well as attention and planning, and is mediated by a complex interaction of the frontal systems described. Each of these functions, most notably the ability to make decisions, has an important impact on juvenile behavior. For example, the choice of whether or not to engage in illegal or risky behavior requires an individual to have some facility and cognitive appreciation of the functions described above. Of particular importance is the fact that each of these functions draws upon diffuse neural networks linking multiple cortical and subcortical areas which must reach an appropriate maturational level for an individual to utilize good judgment and make good decisions.

Previous studies have shown that the capacity to perform well on simple tests that utilize both working memory and inhibitory capacity progresses steadily in infant monkeys throughout the first four months of life, and in human infants from the seventh to the twelfth month of life (Piaget, 1954; Jacobsen, 1935; Diamond & Goldman-Rakic, 1989; Diamond, 1996). This is the age range at which object constancy develops; it has been suggested that object constancy is simply one facet of working memory capacity in the infant (Diamond, 1991). This term refers to the fact that when children develop object constancy, they look for objects in the last place it was seen, instead of its original position. Adolescent or adult monkeys with lesions of the dorsolateral prefrontal cortex do not exhibit object constancy,
but monkeys with lesions of the parietal cortex or hippocampus do not have difficulty with these tasks (Diamond & Goldman-Rakic, 1989). Although great maturational strides occur in the prefrontal cortex of human infants during the first year of life, there is now considerable evidence that the prefrontal cortex is not fully mature until much later. In fact, in an investigation by Sowell and colleagues utilized structural magnetic resonance imaging techniques (MRI) to examine brain maturation in a group of adolescents (twelve to sixteen years old) and young adults (twenty-three to thirty years old), the authors report both a temporal and spatial progression of post adolescent maturation into the frontal lobes, underscoring that frontal lobe development continues into at least the third decade of life (Sowell et al., 1999).

In humans, the basic cytoarchitecture, or arrangement of cells in the tissue of the prefrontal cortex, is in place by the seventh intrauterine month and essentially complete by birth (Conel, 1939; Larroche & Amiel, 1966; Mrzljak et al., 1990). While the basic cellular structure may be in place for the prefrontal cortex early in life, maturation of neurons and the establishment and refinement of cell contacts continues for many years. For example, the differentiation of cell types within the hippocampus believed to mediate associative memory processes continues until puberty (Mrzljak et al., 1990). This example demonstrates that key anatomical aspects of the memory process are not developed until puberty. Furthermore, the PFC and other association areas are the last regions to begin myelination during the perinatal stage and the last regions to complete it (Yakovlev & Lecours, 1967; Sowell et al., 1999). Therefore, while the basic cellular structure may be in place for the prefrontal cortex early in life, the connectivity and efficiency of these connections has been shown to continue developing throughout adolescence and early adulthood (Huttenlocher & Dabholkar, 1997).

Given the neurobiologic findings described above, it is not surprising that adolescence is a critical period for brain development, characterized by significant decreases in cortical gray matter and increases in white matter (Giedd et al., 1996; Giedd et al., 1999; Jernigan et al., 1991; Pfefferbaum et al., 1994; Yurgelun-Todd et al., 2002). White matter is distinguished in that it is composed of nerve fibers often covered with myelin. This is as opposed to gray matter, which is composed primarily of nerve cell bodies. Generally, white matter can be understood as the parts of the brain responsible for information transmission, whereas gray matter is responsible for information processing. Giedd and colleagues reported that the increase in white matter occurs linearly during development, whereas gray matter increases during preadolescence, peaking in the frontal cortex around age twelve, but then decreases during post adolescence (Giedd et al., 1999). Likewise, Sowell and colleagues reported that the largest maturational changes observed between twelve to sixteen and twenty-three to thirty years occurred in dorsal, medial, and lateral regions of the frontal lobes, as compared to parietal and occipital lobes (Sowell et al., 1999). Indeed, it has been well established that reductions in gray matter presumably reflect, in part, increased myelination, which may be associated with age-related improvements in cognitive processing (Yurgelun-Todd et al.,
Diffusion Tensor Imaging (DTI) is a non-invasive technique that is used to characterize structural properties of matter or tissues from measurements of water diffusion. A recent DTI study has demonstrated that anisotropy, a measure reflecting myelin-related restriction of water diffusion across axons (threadlike process of a neuron), in frontal white matter was significantly lower in children than in adults, suggesting less myelination in children (Klingberg et al., 1999).

While it is clear that development is associated with progressive increases in the ratio of cerebral white-to-gray-matter volume, the precise ways in which these changes relate to cognitive development has been a critical area of investigation. Given previous evidence that gray matter tends to decline during adolescence, while white matter continues to increase well into adulthood (Pfefferbaum et al., 1994), Yurgelun-Todd and colleagues examined whether greater volume of white matter would be associated with better performances on a battery of standard neurocognitive tests (Yurgelun-Todd et al., 2002; see Table 1). The authors examined the relationship between cerebral tissue volume and cognitive performance in healthy adolescents using morphometric magnetic resonance imaging (MRI), and found that the proportional volumes of white matter, gray matter, and cerebrospinal fluid were significantly associated with variability in cognitive performances on several cognitive factors. Overall, greater volume of white matter and concomitantly reduced gray matter volume was associated with more efficient and rapid processing of information and generally stronger verbal skills in our sample of adolescents. The significant correlations between white matter volume and processing speed are consistent with evidence suggesting that increased myelination of axons produces faster conduction velocity of neural signals (Waxman & Foster, 1980) and more efficient processing of information (Bartres-Faz et al., 2001), and further suggest that some of the increased cognitive abilities characteristic of adult maturation may be associated with developmental increases in relative white matter volume.
Table 1. Correlations Between Regional Tissue Volume and Cognitive Factors

<table>
<thead>
<tr>
<th>Cognitive Factor</th>
<th>Processing</th>
<th>Verbal</th>
<th>Mental Flexibility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age</td>
<td>Speed/Efficiency</td>
<td>Ability</td>
</tr>
<tr>
<td>Tissue Volume(^1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Sample (n = 30)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>--</td>
<td>.20</td>
<td>.56**</td>
</tr>
<tr>
<td>Gray Matter</td>
<td>-.11</td>
<td>-.50**</td>
<td>-.32</td>
</tr>
<tr>
<td>White Matter</td>
<td>.14</td>
<td>.52**</td>
<td>.36*</td>
</tr>
<tr>
<td>Cerebrospinal fluid</td>
<td>.36*</td>
<td>-.15</td>
<td>-.42*</td>
</tr>
<tr>
<td>Total Brain Volume</td>
<td>.16</td>
<td>.25</td>
<td>.19</td>
</tr>
<tr>
<td>Gray Matter Asymmetry</td>
<td>-.07</td>
<td>-.38*</td>
<td>-.03</td>
</tr>
<tr>
<td>White Matter Asymmetry</td>
<td>.05</td>
<td>.05</td>
<td>.07</td>
</tr>
<tr>
<td>Males (n = 10)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>--</td>
<td>.40</td>
<td>.61</td>
</tr>
<tr>
<td>Gray Matter</td>
<td>-.40</td>
<td>-.96**</td>
<td>-.58</td>
</tr>
<tr>
<td>White Matter</td>
<td>.39</td>
<td>.96**</td>
<td>.63*</td>
</tr>
<tr>
<td>Cerebrospinal fluid</td>
<td>-.60</td>
<td>-.25</td>
<td>-.89**</td>
</tr>
<tr>
<td>Total Brain Volume</td>
<td>.42</td>
<td>.71*</td>
<td>.39</td>
</tr>
<tr>
<td>Gray Matter Asymmetry</td>
<td>.33</td>
<td>-.73*</td>
<td>.42</td>
</tr>
<tr>
<td>White Matter Asymmetry</td>
<td>-.68</td>
<td>-.05</td>
<td>.08</td>
</tr>
<tr>
<td>Females (n = 20)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>--</td>
<td>.11</td>
<td>.56**</td>
</tr>
<tr>
<td>Gray Matter</td>
<td>.15</td>
<td>.07</td>
<td>.05</td>
</tr>
<tr>
<td>White Matter</td>
<td>-.13</td>
<td>-.06</td>
<td>-.05</td>
</tr>
<tr>
<td>Cerebrospinal fluid</td>
<td>-.22</td>
<td>-.11</td>
<td>-.08</td>
</tr>
<tr>
<td>Total Brain Volume</td>
<td>.01</td>
<td>.08</td>
<td>.13</td>
</tr>
<tr>
<td>Gray Matter Asymmetry</td>
<td>-.11</td>
<td>-.31</td>
<td>-.08</td>
</tr>
<tr>
<td>White Matter Asymmetry</td>
<td>.17</td>
<td>.05</td>
<td>.03</td>
</tr>
</tbody>
</table>

Note: \(^1\) Tissue volumes are corrected for total intracranial volume, \(*p < .05, \ **)p < .01

Findings from Yurgelun-Todd and others suggest that these tissue volume changes are associated with measurable performances on cognitive tasks, and that reduced cerebral tissue volume, as evidenced by greater proportions of cerebrospinal fluid, is also associated with poorer cognitive performance, particularly for tasks measuring verbal abilities (Yurgelun-Todd et al., 2003; Yurgelun-Todd et al., 2002). Further, it appears that changes in white matter volume and concomitant decreased gray matter volume during adolescence are associated with stronger performances on cognitive tasks assessing the speed of information processing and general verbal abilities. These findings complement...
other recent neurobiologic studies suggesting that the development of cognitive abilities appears to be related to structural and physiologic brain changes that occur during childhood and adolescence (Gomez-Perez et al., 2003; Sowell et al., 2001; Yurgelun-Todd et al., 2003; Yurgelun-Todd et al., 2002).

While structural studies have helped document brain changes occurring during adolescence, the relationship between structural brain change and resultant behavior has not always been clear. Recently, there has been an increase in the awareness of impulsive and often dangerous behavior in juveniles, a fact which has underscored the need for understanding the healthy development of emotional processing in adolescents. In contrast to the considerable literature on childhood and adolescent emotional development, relatively limited research exists on the neurobiological changes that occur during the transition between childhood and early adulthood. Fortunately, many of the developmental questions that were previously impossible to answer through traditional psychological studies can now be addressed through the use of newly developed brain imaging technology such as functional magnetic resonance imaging (fMRI). While a number of imaging techniques based on methods using x-rays or other ionizing radiation have been developed and used for studying the brain in subjects with neurological disorders, these methods are not well suited for children and adolescents. In contrast, magnetic resonance scanning is non-invasive and is free of ionizing radiation, allowing subjects to complete multiple experiments or several repetitions of the same experiment without risk. With this technology, it is now possible to obtain detailed brain images that reveal the specific areas and circuits within the brain which are involved in mental processes (Yurgelun-Todd & Renshaw, 2000).

A number of fMRI studies have examined whether the functional neuroanatomy underlying executive processing differs between children and adults; however, results of studies examining age-related differences in prefrontal brain activation have been inconsistent. Several investigations have reported similar patterns of prefrontal brain activity in children and adults on tasks of working memory (Nelson et al., 2000; Casey et al., 1995), response inhibition (Casey et al., 1997; Luna et al., 2001), and verbal fluency (Gaillard et al., 2000). A number of studies have underscored differences between these age groups on similar tasks of executive function, with children failing to utilize the same prefrontal brain areas as adult subjects (Thomas et al., 1999; Rubia et al., 2000; Bunge et al., 2002; Schlaggar et al., 2002). A number of methodological differences between studies may have contributed to these conflicting findings, including task performance mismatch between age groups and the absence of an adult comparison group in some investigations (Casey et al., 1995; Nelson et al., 2000). Notably, the only study that segregated performance from age-related prefrontal brain activation, (Schlaggar et al., 2002), found that adults but not children significantly activated the dorsal prefrontal cortex on a single-word processing task. While other age-group differences in prefrontal activation were also found, they were related to accuracy of task performance independent of age. The results of this study underline the importance of separating age-group
differences in brain activation into those attributable to maturation versus those secondary to accuracy of performance (Schlaggar et al., 2002).

Studies that have quantified the magnitude of prefrontal activation during tests of executive function have reported linear increases from childhood through young adulthood in the superior (Klingberg et al., 1999), middle (Rubia et al., 2000; Adleman et al., 2002), and inferior (Rubia et al., 2000) portions of prefrontal cortex. Klingberg and colleagues reported that the positive correlation between increasing age and magnitude of activation persists after controlling for performance accuracy (Klingberg et al., 1999). In contrast, one study reports a trend in the opposite direction with children tending to activate the right inferior frontal gyrus, an area located in the inferior portion of the frontal lobe (just behind the bridge of the nose), more powerfully than adults during word generation (Gaillard et al., 2000). Furthermore, an event-related fMRI study characterized age-differences in brain activation between children (ages eight to twelve) and adults on measures of cognitive control and showed that children were more susceptible to interference and less able to inhibit inappropriate responses than adults (Bunge et al., 2002). In addition, children exhibited immature prefrontal activation depending on the type of cognitive control required. Taken together, these studies suggest that cerebral maturation may be related to improved cognitive functioning. Although, little is known regarding the changes in cognitive functioning that occur prior to the onset of puberty versus those that occur within the few years following puberty, but prior to adulthood.

In a study designed to evaluate maturational changes associated with emotional response, Killgore and colleagues utilized fMRI techniques to test the hypothesis that adolescent development is associated with increased modulation of limbic system responsiveness by prefrontal inhibitory mechanisms (Hariri et al., 2000; Rubia et al., 2000; Killgore et al., 2001). Adolescent and adult subjects were presented with a fearful face perception task. The results demonstrated that in adult subjects, a significant increase in dorsolateral prefrontal cortex (DLPFC) activation during the viewing of fearful faces was detected, whereas the adolescent subjects showed no increase in prefrontal activation during the task. Of particular interest, we found that the adults showed lower activation within the amygdala relative to the adolescents, suggesting that adult maturation of the DLPFC was associated with reduced amygdala activity. Furthermore, within the adolescent sample, chronological age was significantly correlated with greater normalized signal intensity within the DLPFC ($r = .58, p = .02$), suggesting that prefrontal activity increases with adolescent maturation.

In a more recent investigation, the finding of increased frontal activation during conscious affective face processing has been replicated in a new group of subjects using a new data analytic approach (see Figures 1 and 2). Using a software package that reconstructs brain imaging data from each subject into a group map in 3-dimensional space, brain activation can be examined in association with age-related changes. During the perception of fearful facial affect, a significant positive relationship between age and right dorsolateral prefrontal
cortical activity is noted (see Figure 1). During the perception of happy facial affect, a significant positive relationship between age and activation within the anterior cingulate, an area of the brain tucked into the crease between the two hemispheres of the brain, is demonstrated (see Figure 2). The anterior cingulate has been linked to multiple processes, including decision making, evaluation of outcome, and inhibition. Results from this study suggest that during adolescent development, the amount of “work” carried out by frontal regions increases with age (Killgore & Yurgelun-Todd, 2005).

Figure 1. (A) Illustrates increased activation in the right dorsolateral prefrontal cortex during the perception of fearful affect. (B) Scatterplot demonstrates the significant age-correlated activation seen in the right dorsolateral prefrontal cortex during the perception of fearful affect.

Figure 2. (A) Increased activation in the anterior cingulate during the perception of happy affect. (B) Scatterplot demonstrates the significant age-correlated activation in the anterior cingulate cortex during the perception of happy affect.

Difficulty with executive cognitive functioning and behavioral self-regulation, including difficulties with planning, attention, foresight, abstract reasoning, judgment, self-monitoring, and motor control, have been found to be present in adolescents. This is of particular importance, as neurobiological studies, including research measuring cerebral metabolic changes and rates of glucose utilization during cortical development, indicate that the cerebral cortex undergoes a dynamic course of metabolic maturation that persists at least until the age of eighteen.
Moreover, studies comparing adult and adolescent cortical function indicate that adolescents process information differently, often enlisting different brain regions than do adults (Baird et al., 1999; Van der Stelt et al., 1998; Meyer-Lindenberg, 1996; Killgore et al., 2001; Killgore & Yurgelun-Todd, 2005). An adolescent’s level of cortical development may therefore be directly related to her or his ability to perform well in situations requiring executive cognitive skills. Younger, less cortically mature adolescents may be more at risk for engaging in impulsive behavior than their older peers for two reasons. First, their developing brains are more susceptible to the neurological effects of external influences such as peer pressure. Second, they may make poor decisions because they are cognitively less able to select behavioral strategies associated with self-regulation, judgment, and planning that would reduce the effects of environmental risk factors for engaging in such behaviors.

III. JUVENILES AND DECISION-MAKING

The process of decision-making is surprisingly complex as it relies heavily on an interconnected neural system. In fact, individuals must be able to complete multiple processes for even the most seemingly simple decisions. This includes the perception of the stimuli as well as the situation, “holding” the set of response options online, assessing the implication of each option, and finally, the selection of the best option for the given situation (Braver & Bongiolatti, 2002). The higher order or executive components which are involved in this process include selective attention and short-term storage of information, inhibition of response to irrelevant information, initiation of response to relevant information, self-monitoring of performance, and changing internal and external contingencies in order to move towards the ultimate goal. These executive functions have been attributed to functions mediated by the frontal cortex (Daffner et al., 2000; Miller et al., 2000; Gruber et al., 2002; Gruber et al., 2004). Anomalous functioning or incomplete development of the prefrontal cortex has been documented to impair an individual’s ability to monitor and inhibit behavior, and make effective decisions, and may therefore lead to inappropriate, impulsive behavior (Band et al., 2000; Killgore & Yurgelun-Todd, 2005; Rubia et al., 2000). Further, the documentable differences in processing affective and cognitive stimuli reported between adolescents and adults underscores the likelihood that both social and emotional influences, as well as processing abilities, affect juvenile behavior and their ability to make decisions. It follows, therefore, that if a juvenile’s frontal cortex is not fully mature, he or she may make bad decisions reflective of an inability to adequately consider options and appreciate consequences.

The juvenile justice system was initially designed to reform American policies regarding youthful offenders. Early changes to the justice system were made under a conviction that society had a responsibility to recover the lives of its young offenders before they became absorbed in criminal activity (Schetky & Benedek, 2002). The juvenile justice system initially exercised its authority within
a *parens patriae* role. The current system, which now separates juvenile and adult criminal offenders, is based on two premises. First, adolescents as a group are less able to make good decisions based on mature levels of judgment, and as a result are less responsible for their actions, and second, are more likely to be receptive and responsive to treatment, thereby rendering them more likely to benefit from rehabilitation (Scott & Grisso, 1997). Despite the recognition that adolescents may differ from adults in their capacity to make good decisions and be successfully rehabilitated, many states have *lowered* the age limit for criminal prosecution with some having no lower age limit at all (Griffin, 2003). Nevertheless, the preponderance of the biological evidence indicates that profiles of adolescent functioning differ from those of adults.

Consider our current legal system. If a patient with bipolar disorder in the midst of a manic episode was arrested for driving erratically, narrowly missing pedestrians, and shouting insults out of the window of his car, the first point a defense attorney would make to a judge is that the client has a neurobiologic condition that renders him unable to modulate his behavior appropriately. A discussion of treatment, past and present might follow, as would some consideration of the client’s behavioral history, and potential contributory factors to the incident. While the patient’s behavior may not be deemed socially acceptable, it is difficult to imagine that some consideration of the underlying disorder would not be raised. Neuroscientific methods enable us to examine specific behavior or conditions in a way that was previously impossible. It is now understood that many psychiatric disorders, once thought or assumed to be the result of environmental or social factors, are in fact the result of differences in brain structure or function. Consider the same behavior exhibited by the bipolar patient being attributed to a seemingly healthy sixteen-year-old male. It is likely that an important consideration, namely the neurobiologic circumstances that have impacted the episode, has been forgotten. After all, this is a healthy adolescent boy, ostensibly free from any biologically based condition.

Based on neurobiological data alone, it is clear that children and adolescents are different both structurally and functionally from adults. In addition to documentable alterations which change during the trajectory of normal development, data from recent investigations provide evidence that brain maturation continues well past adolescence. Accordingly, the developmental factors which influence decision-making in adolescents may result in choices which are suggestive of cortical immaturity, poor judgment, and impulsivity. Is it fair then, for our society to consider adolescent offenders in the same way as adult offenders, or are they somehow less responsible given the ongoing “condition” of development?

The United States Supreme Court recently held in *Roper v. Simmons*, that it was unconstitutional to execute an offender for a crime committed when he was under the age of eighteen, primarily because of evidence from neurobiologic and neuropsychological investigations demonstrating the developmental immaturity of these offenders as a group. This ruling underscores the importance of viewing
adolescent offenders as fundamentally different from adult offenders. Further, given the variability inherent to the developmental process, the ruling also lends support to the consideration of additional mitigating circumstances. Factors including cognitive function, psychiatric status, and drug and alcohol use have all been linked to the ability to make decisions, even in healthy adult subjects. These areas must therefore be considered when evaluating the juvenile offender.

What advice can we offer attorneys and policy makers about children and adolescents who commit criminal acts, especially those marked by “impulsivity” or an unwillingness or inability to actively inhibit inappropriate behavior? Careful consideration of individual circumstances, including psychiatric status, substance use/abuse history, physical and emotional trauma, genetic predisposition for psychiatric or developmental disorders, and other factors must be clearly documented and entered into the client’s case file. A defense attorney representing a juvenile accused of committing a crime might take the following steps to help elucidate the state of mind and “baseline” levels of functioning in his client:

1. Obtain a comprehensive neuropsychological evaluation, which should include both objective and projective (which requires subjective interpretation and takes into consideration psychological intent and motivation) testing. One example of objective psychological testing is an examiner asking a subject to repeat a series of numbers in a particular order; an example of a projective test question would be an examiner asking the subject what a particular image or story makes them think of. These results should be summarized in a report. Individual test results may then be examined in relation to school records, with a special focus on potential areas of dysfunction which are longstanding, and areas of behavior which appear to have deteriorated over time.

2. Obtain all medical, psychological or psychiatric and academic records. Review the records for evidence of previous physical or emotional injury/trauma. Document evidence of difficulty in school which may inform the current situation. For example, if a juvenile offender has a history of poor school performance and poor attention, this may affect his/her ability to attend to current “risky” situations and evaluate circumstances.

3. If indicated on the basis of neuropsychological and medical evaluations, request a clinical MRI scan to evaluate overall brain integrity at the time of the incident. This scan should be read and interpreted by a clinical neuroradiologist to determine whether any evidence for organicity (i.e., organic brain syndrome, major structural abnormality), generalized atrophy or any other abnormality is present.

Chronological age does not dictate an individual’s level of social, emotional, or even physical maturity. Each of us has encountered young adults who are “mature” and seem much older than their stated age, and adults in their late thirties
or early forties who still act as if they are twelve. Since there is no clear method for determining “maturity” or “emotional adulthood,” in our society, we are forced to consider other markers rather than simple chronological age. Recent neurobiologic investigations have begun to clarify some of the reasons why adolescents are not able to plan carefully, utilize good judgment, and practice behavioral inhibition when faced with difficult situations that often require a near immediate decision. Multiple factors, including neurobiology, social, economic, and psychological influences, all contribute to the complicated issue of juvenile behavior and culpability. Regardless of whether an individual supports the death penalty, it is reasonable to assume that all significant factors, including chronological age, nature and severity of the crime, previous history, and neurobiologic stage of development should be considered when dealing with juvenile offenders. Studies of adolescents which examine the relationship between structural and functional brain changes and the ability to make decisions are needed so that we may more carefully document maturational changes.
References


Peer Influence on Risk Taking, Risk Preference, and Risky Decision Making in Adolescence and Adulthood: An Experimental Study

Margo Gardner and Laurence Steinberg
Temple University

In this study, 306 individuals in 3 age groups—adolescents (13–16), youths (18–22), and adults (24 and older)—completed 2 questionnaire measures assessing risk preference and risky decision making, and 1 behavioral task measuring risk taking. Participants in each age group were randomly assigned to complete the measures either alone or with 2 same-aged peers. Analyses indicated that (a) risk taking and risky decision making decreased with age; (b) participants took more risks, focused more on the benefits than the costs of risky behavior, and made riskier decisions when in peer groups than alone; and (c) peer effects on risk taking and risky decision making were stronger among adolescents and youths than adults. These findings support the idea that adolescents are more inclined toward risky behavior and risky decision making than are adults and that peer influence plays an important role in explaining risky behavior during adolescence.

Keywords: adolescents, risk taking, peer influence, risk preference, decision making

It is well documented that adolescents are more likely than adults to engage in risky behavior. For example, adolescents are more likely than adults to drive recklessly, to drive while intoxicated, to use varied illicit substances, to have unprotected sex, and to engage in both minor and more serious antisocial behavior (Arnett, 1992). However, despite clinical and anecdotal evidence of heightened real-world risk taking during adolescence, laboratory studies of age differences in risk preference, risk perception, and risky decision making have not yielded consistent evidence that adolescents are actually less risk averse than are their elders. In fact, it is often asserted that, by midadolescence, teens’ capacities for understanding and reasoning in risky decision-making situations roughly approximate those of adults (Fischhoff, 1992; Furby & Beyth-Marom, 1992). This assertion has been used to argue both for protecting adolescents’ rights to make autonomous decisions about their reproductive health and for holding adolescents to adult standards of criminal blameworthiness (see Steinberg & Scott, 2003, for a discussion).

However, as several writers have recently argued, extant studies suggesting equivalent orientations toward risk among adolescents and adults are only modestly useful in understanding how adolescents compare with adults in real-world decision making. These authors suggest that typical laboratory studies of risky decision making fail to consider the emotional and social contexts in which risk taking actually occurs (Cauffman & Steinberg, 2000; Scott, Reppucci, & Woolard, 1995; Steinberg, 2004; Steinberg & Cauffman, 1996). In such studies, individual adolescents are presented with hypothetical dilemmas under conditions of low emotional arousal and are then asked to make and explain their decisions. In the real world, however, adolescents’ decisions are not hypothetical; they are generally made under conditions of emotional arousal (whether negative or positive), and they are usually made in peer groups. Whether the risky decision making of adolescents is truly comparable to that of adults under real-world conditions remains an open and unstudied question.

A number of explanations have been advanced to account for differences between adolescents and adults in real-world, as opposed to laboratory-based, risk taking. Some have argued that age differences in psychosocial capacities such as impulse control or sensation seeking play an important role (see Steinberg & Cauffman, 1996). Consistent with this, Cauffman and Steinberg (2000) reported that once differences in psychosocial maturity between adolescents and adults are accounted for, age differences in risky decision making disappear. An alternative and entirely compatible account of age differences in risky behavior emphasizes the role of peers and, more specifically, peer influence. That is, adolescents may engage in more risky behavior than do adults because they are more susceptible to the influence of their similarly risk-prone peers. Support for this latter explanation comes, in part, from the criminology literature. There is a small but compelling body of evidence to suggest that when adolescents commit crimes—acts that are inherently risky—they generally do so with their peers (Erickson & Jensen, 1977; Zimring, 1998). For example, adolescents are usually accompanied by one or more persons when committing crimes that range in seriousness from vandalism and drug use (Erickson & Jensen, 1977) to rape and homicide (Zim-
ring, 1998). This is not, however, true of adults; when adults commit crimes, they typically do so alone (Zimring, 1998).

Although adolescent risk taking often occurs in groups, it is not known whether the greater prevalence of group risk taking observed among adolescents stems from the fact that adolescents spend more time in peer groups than adults do (Brown, 2004) or from the heightened levels of susceptibility to peer influence that have been shown to characterize adolescence (Steinberg & Silverberg, 1986). In other words, it is not clear whether adolescents simply have more opportunities to engage in group risk taking than do adults or whether, when faced with behavioral decisions in a peer group context, adolescents are more easily swayed toward risky choices.

To our knowledge, only one study has attempted to determine whether there are developmental differences in the effects of actual peer presence on orientation toward risk. In a comparison of adolescents and college students, Hensley (1977) sought to determine whether the tendency for individuals to take more risks in adolescence and college students, Hensley (1977) used a hypothetical decision-making questionnaire to measure risk acceptance and found that the magnitude of the risky shift was greater among adolescents than it was among college students. However, the study sample was very small (22 college students and 18 adolescents), and these results have not, to our knowledge, been replicated with performance (as opposed to hypothetical) measures of risk taking.

There are other findings that indirectly support the notion that adolescents may be more easily swayed toward risky behavior than adults. Compared with adults, adolescents have limited abilities in areas of psychosocial functioning, such as self-reliance, which likely interfere with the ability to act independently of the influence of others (Cauffman, 1996; Cauffman & Steinberg, 2000; Steinberg & Cauffman, 1996). Not surprisingly, several studies have found a curvilinear relation between age and peer conformity on responses to hypothetical dilemmas about antisocial decision making, with conformity increasing throughout childhood and into midadolescence and decreasing thereafter (Berndt, 1979; Brown, Clasen, & Eicher, 1986; Steinberg & Silverberg, 1986). Although researchers have not examined the developmental pattern of resistance to peer influence beyond late adolescence, there is some evidence that peer influence remains an important predictor of participation in risky behavior even during young adulthood (Andrews, Tildesley, Hopps, & Li, 2002; Horvath & Zuckerman, 1993). Thus, when confronted with risky decisions in the context of a peer group, adolescents, and perhaps even young adults, may be less able than older adults to resist the influence of their risk-prone age mates.

Further support for the idea of heightened peer effects on risky behavior during adolescence comes from additional findings on the risky-shift. Although a number of researchers have found that risk-taking tendencies are greater when individuals are in groups than when alone (e.g., Blascovich & Ginsburg, 1974; Blascovich, Ginsburg, & Howe, 1975; Blascovich, Veach, & Ginsburg, 1973; Kogan & Wallach, 1967; Lamm, 1967; Lamm, Trommsdorff, & Rost-Schauende, 1972; Pruitt & Teger, 1969; Vidmar, 1970; Wallach & Kogan, 1965; Y. Jaffe, & Fishbach, 1975), several investigations have found the reverse to be true. Indeed, in some cases, individuals demonstrate a conservative shift and are actually more risk averse when in groups than when alone (e.g., Cohen & Ruis, 1974; Pilkonis & Zanna, 1973; Zaleska, 1974). Accordingly, social psychologists have advanced an alternative theoretical framework for understanding group risk taking. Whereas proponents of the risky shift theory assert that the presence of others should always lead to increased risk taking, advocates for the recent group polarization theory suggest that the direction of group effects on risk taking depends on the risk-taking tendencies of the group members (Hogg, Turner, & Davidson, 1990). According to this theory, relatively conservative individuals should become even more conservative when grouped together, whereas individuals who are inclined to take risks should make even more risky choices (Hogg et al., 1990). Given this theoretical framework, adolescents’ generally greater inclination toward risky behavior as individuals, in combination with their greater susceptibility to peer influence should, in theory, result in a larger effect of peer presence on risky behavior among adolescents than among adults.1 The goal of the present study is therefore to examine whether adolescents, relative to adults, are more likely to take risks when their peers are present.

The Present Study

In the present study, we examined the differential effects of the presence of peers on risk taking, risk preference, and risky decision making among adolescents (M age = 14), youths (M age = 19), and adults (M age = 37). Our three primary hypotheses were as follows:

Hypothesis 1. Risk taking, risk preference, and risky decision making will decrease with age.

Hypothesis 2. On average, individuals will demonstrate more risk taking, greater risk preference, and more risky decision making when in the company of their peers than when alone.

Hypothesis 3. The difference between levels of risk taking, risk preference, and risky decision making with and without the presence of peers will decrease with age. That is, group effects on risk orientation will be greater among adolescents than among youths, and greater among youths than among adults.

Method

Sample

Our sample included 106 adolescents (54 girls and 52 boys), ages 13 to 16 (M age = 14.01, SD = 1.02), 105 youths (53 women and 52 men), ages 18 to 22 (M age = 18.78, SD = 1.07), and 95 adults (48 women and 47 men), ages 24 and older (M age = 37.24, SD = 12.37). All participants

1 In keeping with group polarization theory, we are not suggesting that all adolescents should demonstrate shifts toward increased risk taking when in the presence of peers. It is conceivable that some adolescents, when placed in a group with risk-averse peers, might shift toward decreased risk taking. However, we expect that, given generally greater propensities for risk taking among adolescents, adolescents should, on average, be more likely than adults to demonstrate group-induced shifts toward greater risk taking.
were recruited from areas in and around a major urban center. The adolescents were recruited from middle schools, day camps, and community centers; the youths were recruited from undergraduate introductory psychology courses at a large urban university; and the adults were recruited through fliers posted on urban university and community college campuses, advertisements distributed to community organizations, and word of mouth.

The adolescent sample was composed of 50.9% girls and 49.1% boys; the youth sample was composed of 50.5% women and 49.5% men; and the adult sample was composed of 50.5% women and 49.5% men. These three groups did not differ significantly with respect to gender composition, $\chi^2(2) = .005, p = .997$. The three age groups were also very similar in terms of their ethnic composition. The majority of the participants were either White (48.7%) or African American (38.2%). Given the very small percentage of participants from other ethnic groups (the sample included only 1% Native Americans, 7.2% Asian Americans, 3.9% Latinos, and 0.7% others), the three age groups were compared only with respect to the percentages of White versus non-White participants. The adolescent sample included 44.8% White participants and 55.2% non-White participants; the youth sample included 53.3% White participants and 46.7% non-White participants; and the adult sample included 48.4% White participants and 51.6% non-White participants. These three groups did not differ significantly with respect to ethnic composition, $\chi^2(2) = 1.554, p = .460$. Finally, on a participant-report parent education rating scale (a proxy for socioeconomic status) where 1 = less than high school diploma, 2 = high school diploma/GED, 3 = some college/vocational school, 4 = college graduate, and 5 = graduate or professional school, all three age groups reported a mean level of parent education within the range of some college or vocational training. Thus, the three age groups did not differ substantially with respect to gender, ethnicity, or socioeconomic status (as indexed by parent education).

Recruitment and Procedure

Slightly different recruitment procedures were used for the adolescents versus the college students and adults. Each college undergraduate and adult participant was asked to invite to the session 2 people of his or her gender that he or she knew. These groups of 3 were then randomly assigned to a group condition (in which all 3 participants completed the battery of measures at the same time, in the same room, and communicated with each other while completing the tasks and measures) or to a sole participant condition (in which each of the 3 participants completed the battery of measures alone while the other 2 participants waited outside the room where the session took place).

Requirements concerning the need for parental consent among the adolescent participants necessitated a slight modification in this procedure. We found it difficult to get predetermined groups of 3 adolescents to appear for scheduled appointments together and to arrive with all 3 signed parent consent forms in hand. Thus, after first obtaining parental consent from large numbers of adolescents at different recruitment sites, we randomly assigned half of these adolescents within each recruitment site to the group condition (in which they completed the measures with two other teenagers of the same gender from their recruitment site) and half to the sole participant condition (in which they completed the measures alone). Thus, while the adolescent triads in the group condition were always composed of individuals who knew and were familiar with each other (i.e., individuals within each triad were from the same camp, classroom, or community-center summer or afterschool program), they were not necessarily composed of individuals who had selected one another as partners for the experiment. Although the adolescent and two older groups differed in this respect, in the real world, adolescents often find themselves in groups with other teenagers whom they know but have not necessarily selected as companions (i.e., in classrooms, on sports teams, in extracurricular activities, etc.). Moreover, to the extent that friends have been shown to exert more pressure on each other than acquaintances (e.g., McPhee, 1996), the way in which adolescents were recruited resulted in a more conservative test of the hypothesis that, relative to adults, risk orientation among adolescents is more influenced by peer pressure.

Among the adults, 54 participants (27 men and 27 women) were assigned to the group condition, and 41 participants (20 men and 21 women) were assigned to the sole participant condition. Among the youths, 54 participants (27 men and 27 women) were assigned to the group condition, and 51 (25 men and 26 women) were assigned to the sole participant condition. Among the adolescents, 54 participants (27 boys and 27 girls) were assigned to the group condition, and 52 (25 boys and 27 girls) were assigned to the sole participant condition.

All participant triads were composed of individuals of the same gender. However, the ethnic composition of the triads was not constricted in this manner. Among the adults, 37.5% of the triads consisted of all White participants, 43.8% consisted of all non-White participants, and 18.8% of the triads consisted of White and non-White individuals. Among the youths, 45.9% of the triads consisted of all White participants, 37.8% consisted of all non-White participants, and 16.2% consisted of White and non-White participants. Among the adolescents, 19.4% of the triads consisted of all White participants, 25% consisted of all non-White participants, and 55.6% consisted of White and non-White participants.

All participants completed three measures of risk orientation that were part of a battery of measures administered for a larger study of psychosocial development. The entire battery of measures took approximately 1 hr to complete. Each adolescent and adult participant was compensated $20, and each undergraduate participant was given the choice between either a $20 payment or research credit in an introductory psychology course.

Measures

Risk taking. Risk taking was assessed with a video game called “Chicken” (Sheldrick, 2004). Chicken is played on a laptop computer and requires participants to make decisions about whether to stop a car that is moving across the screen once a traffic light turns from green to yellow. The appearance of the yellow light signals the impending appearance of a red traffic light, as well as a potential crash if the car is still moving when the red light appears. Chicken was selected because it measures risk taking in the moment rather than the more deliberative form of risk taking assessed in many studies, in which participants have unlimited time to consider and evaluate all potential decisions and outcomes. Additionally, Chicken requires participants to make actual decisions in a risky situation, rather than simply requiring participants to report what they would do in a hypothetical risky situation.

The game is played from a third-person, side-view perspective (see Figure 1) and consists of 15 trials. In each trial, participants watch an animated car move across the screen for a predetermined amount of time until a yellow traffic light appeared. Before the first trial, players were informed that at some unknown point after the yellow light appeared, the traffic light would turn red and a wall would pop up in front of the car. Players were told that the object of the game was to allow the car to move as far as possible without crashing into the wall. Players controlled whether the car was moving or stopped but not the speed of the car. Participants accumulated more points the further the car moved without crashing but

2 One person was dropped from one of the adult sole participant triads. At the age of 79, we believed this individual to be developmentally dissimilar from the rest of the adult sample.

3 One person was missing from three of the young adult triads assigned to the sole participant condition. In the first two cases, the 3rd member of the group left before it was his or her turn to complete the session. In the third case, data for the 3rd member of the peer group were excluded because it was later determined that the participant had already completed the study several months prior.
lost any points that had been accumulated on that trial if the car crashed. If a player stopped the car before it crashed, the player had the option of restarting the car and allowing it to move further, or leaving the car where it was and accepting the amount of points accumulated. Thus, when the yellow light appeared, players had to decide how much further to allow the car to move, balancing their desire to accumulate points against the possibility of crashing the car into the wall. The latency between the beginning of the trial and the appearance of the yellow light, and between the appearance of the yellow light and the appearance of the wall varied across trials, such that the participants did not know whether the wall would appear suddenly or after some delay. The objectives of the game and the potential positive and negative outcomes (earning points vs. crashing and failing to accumulate points, respectively) were explained to participants during a demonstration. In order to ensure that all participants were equally familiar with the potential consequences of driving through a yellow traffic light, the demonstration round included a depiction of the animated car both driving safely through the yellow light without crashing, as well as driving through the yellow traffic light and crashing into the pop up wall.

The computer recorded the amount of time that the car was in motion between the onset of the yellow light and the car’s final stop, as well as the number of car restarts per round. Mean scores for the number of car restarts per round, and the percentage of time the car was in motion were calculated for each participant. Longer moving times and more restarts indicated greater risk taking. Scores on these two indices of risk taking were highly correlated ($r = .61, p < .01$) and were therefore standardized and averaged in order to compute a composite indicator of risk taking on the Chicken game.

Participants in the sole participant condition completed the task as described. Participants in the group condition took turns playing the game, but all of them completed 15 trials in a row, as did participants in the sole participant condition. In the group condition, while one participant was playing the game, the other two were told that they could call out advice about whether to allow the car to keep moving or to stop it. The player was instructed that he or she could choose whether to follow the advice of his or her peers.

Risk preference. A shortened, modified version of the Benthin Risk Perception Measure (BRPM; Benthin, Slovic, & Severson, 1993) was used to assess risk preference. This measure assesses both risk perception (the extent to which one perceives a given activity as carrying the potential for adverse consequences) and risk preference (whether one believes the benefits inherent in an activity outweigh the costs, or vice versa). Only data from the scale reflecting cost–benefit consideration are used in the present analyses. We chose not to include data from the risk perception scale because prior studies have failed to find age differences in performance on this scale (Steinberg, 2004). Similarly, evidence from the research of Beyth-Marom and colleagues (Beyth-Marom, Austin, Fischhoff, Palmgren, & Jacobs-Quadrel, 1993) suggests that adolescents and adults are relatively equal in terms of their awareness of the potential for adverse consequences in risky situations. However, as argued by Furby and Beyth-Marom (1992), adolescents and adults may differ in terms of the relative weights or values that they attach to the potential costs and benefits of risky activities. Studies of the relation between risk taking and cost versus benefit consideration suggest that those who give lesser consideration to costs and greater consideration to benefits are more likely to engage in risky behavior (e.g., Fromme, Stroot, & Kaplan, 1993; Goldberg & Fischhoff, 2000; Horvath & Zuckerman, 1993; Lavery, Siegel, Cousins, & Rubovits, 1999; McBride, Weatherby, Inciardi, & Gillespie, 1999; Singer, Dai, Weeks, & Malave, 1998; Thornton, Gibbons, & Gerrard, 2002). Thus, differential consideration or weighting of potential costs versus benefits among adolescents and adults may partially account for observed age differences in risky behavior.

In completing the Risk Preference Scale, participants were presented with five hypothetical scenarios involving risky behavior. These scenarios included having sex without a condom, riding in a car driven by someone...
who has been drinking, trying a new drug that one does not know anything about, breaking into a store at night and stealing something that one really wants, and driving over 90 mph on the highway at night. They were then asked to rate on a 4-point scale ranging from 1 (risks are much greater than benefits) to 4 (benefits are much greater than risks) how the risks compared with the benefits of the activity. A mean risk—benefit consideration score was then calculated for each participant by averaging responses across the five scenarios (α = .68).

Individuals in the sole participant condition read the scenarios from index cards and indicated their choices on a response card displaying the 4-point scale. Group condition participants followed the same procedure but were told that they could discuss each question. However, they were instructed that they need not reach a consensus and that each could make a final decision at any time. Each participant had his or her own set of response cards and had an unobstructed view of the others’ response cards. The administrator recorded individuals’ responses.

Risky decision making. Risky decision making was assessed via the Youth Decision-Making Questionnaire (YDMQ; Ford, Wentzel, Wood, Stevens, & Siesfeld, 1990). Participants were presented with five hypothetical dilemmas, each involving a risky decision. The dilemmas included decisions about allowing friends to bring drugs into one’s home, stealing a car, cheating on an exam, shoplifting, and skipping work without an excuse, all of which adolescents, college undergraduates, and adults potentially could have done. Decisions about each dilemma were made within the context of three different scenarios. In the first scenario, participants were informed that no matter what their decision, no negative consequences would result. The second scenario—introduced by Cauffman and Steinberg (2000)—stated that negative consequences might result if the risky course of action were taken. The final scenario stated that negative consequences would definitely occur if the risky course of action were taken.

Only responses from the second decision-making scenario (i.e., negative consequences might result) were included in the analyses for the present study, as this was the only scenario that involved some degree of uncertainty or risk. For each dilemma, participants were asked to decide what they would do “if they were really in that situation” on a 4-point scale that ranged from 1 (definitely making the risky decision) to 4 (definitely not making the risky decision). Scores were reverse coded, such that higher scores indicated higher risk-taking tendencies. A mean risky decision-making score was calculated for each participant by averaging the scores across the five dilemmas (α = .65).

The YDMQ was presented on a laptop computer. Individuals in the sole participant condition were asked to indicate their desired choices on cards displaying the 4-point response scale. Participants in the group condition followed the same procedure but were told that they could discuss each situation. They were also informed that they did not need to reach a consensus and that they could each make a final decision at any time. Each group condition participant had his or her own set of response cards, and each had an unobstructed view of the others’ cards. The administrator recorded participants’ responses. Means, standard deviations, and intercorrelations among the study variables are presented in Table 1.

Results

Data Analyses

Because participants were recruited in groups of 3, scores for participants within each triad could not be treated as independent.4 In order to accommodate the nested structure of the data, all analyses were performed with the linear mixed model (LMM) procedure in the Statistical Package for Social Sciences 11.5 (SPSS; SPSS, Inc., 2005). Unlike the general linear model (GLM) procedure, which assumes that all observations are independent of one another, the LMM procedure allows for correlated variability among observations. Because the LMM procedure does not permit the simultaneous analysis of multiple dependent variables, separate LMM analyses were performed for each of the three dependent variables (Chicken, BRPM, YDMQ). Prior to entering the independent and dependent variables for each analysis, the structure of the data—individuals nested within triads—was specified. Then, for each analysis, chronological age was entered as a continuous independent variable, and condition (group vs. sole participant) was entered as a fixed factor. Additionally, gender and ethnicity (White vs. non-White) were entered as fixed variables in order to determine whether these variables moderated age, condition, or Age × Condition effects.

Age differences in risk taking, risk preference, and risky decision making. The effect of chronological age on risk taking and risky decision making was significant, F(1, 284) = 18.79, p < .0001, $r_{effect size} = .249$, and, F(1, 288) = 24.599, p < .0001, $r_{effect size} = .281$, respectively. During the risk-taking game, younger individuals allowed the car to move forward for longer periods of time after the appearance of the yellow light and were more likely to restart the car after stopping it. Similarly, younger individuals were more likely than older participants to select the risky course of action on the risky decision-making questionnaire. The effect of chronological age on risk preference was not significant, however, F(1, 288) = .563, p = .465.

Effect of peer presence on risk taking, risk preference, and risky decision making. We found significant effects of peer presence on all three measures of risk orientation. Specifically, compared with those who completed the measures by themselves, participants who completed the same measures with peers present took more risks during the risk-taking game, F(1, 284) = 15.05, p < .0001.

Table 1

<table>
<thead>
<tr>
<th>Variable</th>
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<th>M</th>
<th>SD</th>
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<tbody>
<tr>
<td>1. Chronicageological</td>
<td>-.243**</td>
<td>-.279**</td>
<td>-.091</td>
<td>22.77</td>
<td>11.98</td>
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<tr>
<td>2. Risk taking (Chicken)</td>
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<td>0.00</td>
<td>0.90</td>
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<tr>
<td>3. Risky decision making (YDMQ)</td>
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<td></td>
<td>.331**</td>
<td>2.01</td>
<td>0.56</td>
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<tr>
<td>4. Risk preference (BRPM)</td>
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<td>1.50</td>
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</tbody>
</table>

Note. YDMQ = Youth Decision-Making Questionnaire; BRPM = Benthin Risk Perception Measure. *p < .05. **p < .01.

4 The adolescent sole participants were not recruited in groups of 3. However, in order to structure the data from the three age groups as similarly as possible, triads of adolescent sole participants were created for purposes of data analyses. The adolescent sole participant sample was subdivided by data collection site and then further subdivided by gender, such that a female from a particular community center could only be grouped with another female from that same community center, or a male from a particular middle school could only be grouped with another male from that same middle school. This was done under the assumption that adolescents of the same gender from the same site would most likely know one another, thus making the triads of adolescent sole participants as similar to those of undergraduate and adult sole participant triads as possible.
.0001, r_{effect size} = .224; gave greater weight to the benefits rather than the costs of risky activities, F(1, 288) = 3.662, p = .057, r_{effect size} = .112; and were more likely to select risky courses of action in the risky decision-making situations, F(1, 288) = 6.308, p < .05, r_{effect size} = .146.

**Differential effects of peer presence on risk taking, risk preference, and risky decision making as a function of age.** The effects of peer presence varied as a function of age on the risk-taking measure, F(1, 284) = 4.801, p < .05, r_{effect size} = .129, and the risky decision-making measure, F(1, 288) = 4.943, p < .05, r_{effect size} = .130, but not on the Risk Preference Scale, F(1, 293) = .284, p = .594. As Figure 2 indicates, for example, the magnitude of the group effect on risk taking was greater among younger rather than older participants (see Table 2 for means and standard deviations). The pattern of results was similar with respect to risky decision making.

**The Effects of Gender and Ethnicity**

The effects of gender and ethnicity on risk orientation were not focal issues in the present study. Thus, no hypotheses on the effects of these variables were generated. Nonetheless, gender and ethnicity were included in the model in order to determine whether the age, condition, or Age \times Condition interaction effects differed across males and females, or between White and non-White individuals.

We found few significant gender effects. There were no differences between males and females on risk taking or risky decision making, nor were there any significant two-way interaction effects involving gender on measures of these constructs. Additionally, we failed to find significant Age \times Condition \times Gender interactions on any measure of risk orientation. Nevertheless, we did find main effects of gender and gender differences in age and condition effects on the measure of risk preference. First, males gave significantly greater weight to the benefits of risky decisions than did females, F(1, 288) = 19.961, p < .0001, r_{effect size} = .255. Second, we found that males weighted the benefits of risky activities more heavily when in a group than when alone, but that cost–benefit consideration did not differ substantially between the group and sole participant conditions among females, F(1, 288) = 6.058, p < .05, r_{effect size} = .144. Finally, we found that among younger individuals, males weighted the benefits of risky decisions more heavily than did females but that among older individuals males and females gave comparable weights to the benefits of risky decisions, F(1, 288) = 11.089, p < .01, r_{effect size} = .193.

In contrast to these limited gender differences, a number of significant ethnicity effects were identified. First, we found significant differences between White and non-White participants on the measures of risk taking, F(1, 284) = 11.67, p < .01, r_{effect size} = .199, and risky decision making, F(1, 288) = 6.645, p < .01, r_{effect size} = .150. However, the direction of these effects differed. Although non-White participants engaged in greater risk taking than did White participants, White participants made more risky decisions than did non-White participants.

Second, the effects of age on risk taking, risky decision making, and risk preference differed across White and non-White individ-

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Figure 2. Age \times Condition interaction on Chicken game, where higher scores indicate more risk taking.
Adolescent Sole -.164 .612 22 -.035 .722 29 -.097 .669 52
Group .140 .886 25 .907 1.300 29 .552 1.182 54
Youth Sole -.258 .729 24 -.091 .666 27 -.170 .694 51
Group .139 .848 30 .289 .893 20 .199 .860 50
Adult Sole -.367 .387 22 -.316 .620 19 -.343 .502 41
Group -.080 .566 24 -.335 1.167 30 -.221 .949 54

Risk preference (BRPM)

Adolescent Sole 1.422 .564 24 1.074 .448 27 1.451 .447 51
Group 2.142 .335 22 1.862 .571 29 1.977 .551 52
Youth Sole 2.506 .477 32 2.282 .358 22 2.428 .455 50
Group 2.142 .564 24 2.074 .448 27 2.106 .502 51
Adult Sole 1.655 .339 22 1.962 .738 19 1.781 .581 41
Group 1.625 .397 24 1.720 .497 30 1.678 .453 54

Note. Chicken means are based on standardized scores. YDMQ = Youth Decision-Making Questionnaire; BRPM = Benthin Risk Perception Measure.
Between adolescence and adulthood there is a significant decline in both risk taking and risky decision making. In addition, our findings suggest that, in some situations, individuals may take more risks, evaluate risky behavior more positively, and make more risky decisions when they are with their peers than when they are by themselves. Most importantly, the effects of peer presence on both risk taking and risky decision making vary as a function of age. That is, although the sample as a whole took more risks and made more risky decisions in groups than when alone, this effect was more pronounced during middle and late adolescence than during adulthood. Thus, relative to adults, adolescents are more susceptible to the influence of their peers in risky situations.

The methodological strengths of this study provide good reason to feel confident about the internal validity of the findings. First, as an experiment that uses random assignment, we were able to control individuals’ exposure to peers. Second, whereas the only previous developmental comparison of peer effects on risk taking (Hensley, 1977) relied on a hypothetical decision-making questionnaire and used risk acceptance as a proxy for risk taking, the battery of measures in the present study included not only hypothetical decision-making questionnaires but also a behavioral measure of risk taking that required participants to make actual decisions about how much risk to take in a situation that closely mirrors one faced in everyday life—whether to “run” a yellow light and continue through an intersection. Third, the use of friends, or at least familiar individuals (in the case of the adolescents), helped to create a more ecologically valid social context than those of many studies of group behavior (e.g., Vidmar, 1970; Wallach & Kogan, 1965; Yinon et al., 1975). Everyday group decision-making situations generally involve friends or acquaintances, and laboratory studies that do not use such groups may not capture the dynamics of real-life group decision making.

It is also necessary to recognize several of the study’s limitations. First, although the driving game Chicken is a closer approximation to real-life risk-taking situations than are the typical decision-making questionnaires used in most research of this sort, no laboratory task can adequately simulate real life. No matter how realistic the task, it is difficult to determine whether participants’ performance in the laboratory is an accurate representation of their real-world behavior.

Second, different recruitment procedures were used for the adolescents versus the youths and adults. The youths and adults came to the sessions in groups of 3 friends, but the adolescents were assigned to groups of 3 (although all groups of 3 were made up of individuals who were from the same classroom, camp, or community-center program, and who were familiar with one another). Thus, it is conceivable that the older individuals knew one another better than did the adolescents. However, we believe that differences in familiarity among the age groups were minimal and that any effects of peer familiarity of behavior resulted in a more conservative test of our central hypothesis (i.e., that, relative to adults, adolescents should be more easily swayed toward risky behavior by their friends). Although some contradictory findings do exist (e.g., Leary et al., 1994), there is evidence to suggest that the effects of peer familiarity on behavior may either be negligible,

![Figure 3. Age × Condition × Ethnicity Interaction on Chicken game, where higher scores indicate more risk taking. W = White participants; NW = non-White participants.](image-url)
or may be stronger when in the company of friends versus acquaintances or strangers. For example, in a study of impression management among young adults, Bohra and Pandey (1984) found very few differences in the attempts of participants to manage the impressions of friends versus strangers. Moreover, in the few cases in which differences were found (e.g., use of other enhancement strategies), interactions with friends were generally more likely to elicit the use of impression management strategies than were interactions with strangers. Similarly, Gardner and Martinko (1988) found that participants in a study of school principals were more likely to use impression management strategies (e.g., other enhancement, apologies) when interacting with more familiar, as opposed to less familiar, individuals. Finally, in a study that examined the relation between familiarity and willingness to exert peer pressure (both antisocial and prosocial) among adolescents, McPhee (1996) found that participants were more likely to exert pressure on friends than on acquaintances. Thus, if differences among the age groups in triad familiarity affected our results in any measurable way, we believe that the adolescent participants, who completed the battery of measures with acquaintances (as opposed to self-selected friends), should have demonstrated group induced shifts toward risk taking that were no greater than those observed among the adults. But, overall, this was not the case.

Finally, it is conceivable that members of the three age groups differed in their prior experience with the subject matter of the risk-orientation measures. Thus, age differences in performance on the risky decision-making and risk-taking measures might be construed as an artifact of differences between the age groups in prior experience. However, any differences in experience with the content of the risky decision-making questionnaire were likely limited to the individual dilemmas. Thus, although a given dilemma might have been relatively more familiar to a particular age group, overall, the items were balanced in such a way that no one age group should have been more familiar with all five dilemmas than any other age group. With respect to the risk-taking measure, Chicken, it is likely that the youths and adults had more first-hand experience with driving than the adolescents. However, Chicken is a video game played from a third-person perspective not a driving simulation experienced from a first-person perspective. Although adolescents may have limited experience with driving, they have ample experience with video and computer games. Additionally, by adolescence, individuals have spent a great deal of time riding in cars and are surely familiar with the potential consequences of failing to follow traffic signals. Nonetheless, in order to ensure equal familiarity with the potential consequences of running a yellow light, all participants observed a demonstration round prior to playing the game in which they watched the animated car crash after running a yellow light. Thus, we believe that differences in first-hand driving experience had minimal impact on performance.

It is also important to note the few instances in which our hypotheses were not supported. Specifically, we failed to find significant age main effects or two-way Age × Condition interaction effects on the risk preference measure. In conceptualizing the study, we assumed that those who gave greater weight to the benefits versus the costs of risky decisions should be more likely to take risks. As noted earlier, there are a number of studies that have found strong correlations between cost–benefit consideration and risk taking (e.g., Goldberg & Fischhoff, 2000; Horvath & Zuckerman, 1993; Thorton, Gibbons, & Gerrard, 2002). However, the samples in these studies were composed primarily of adults, and there is some evidence to suggest that measures of risk preference may not predict risk taking in the same way among adolescents as among adults. Indeed, despite findings that adolescents are more likely than are adults to engage in risky behavior, several studies suggest that adolescents are relatively similar to adults in their ability to recognize the risks and benefits of their actions. For example, Beyth-Marom et al. (1993) found few differences between adolescents and adults in the spontaneous mention of the costs and benefits associated with several risky actions. This has prompted some to argue that age differences in risky behavior may be better accounted for by differences in psychosocial functioning than by differences in more cognitive aspects of risk orientation, such as risk preference (Cauffman, 1996; Cauffman & Steinberg, 2000; Steinberg & Cauffman, 1996). In this respect, our failure to find age-related differences in individuals’ cost–benefit appraisals is not entirely surprising.

We did find some interesting gender differences in risk preference, however. Specifically, males, particularly at younger ages, were more likely than were females to weigh the benefits of risky activities over the costs. Additionally, peer effects on benefit versus cost consideration were greater among males than among females. Although we did not explicitly predict these gender differences, our findings are consistent with several previous studies. For instance, Parsons, Halkitis, Bimb, and Borkowski (2000) found that, among young adults, males reported more benefits and fewer risks when asked about the consequences of risky behaviors. Additionally, Brown et al. (1986) found that, at least among adolescents, males are more susceptible to peer influence than are females in antisocial or risky situations. Nonetheless, it is interesting that these gender-related differences in risk–benefit consideration did not translate into gender differences on the more direct measures of risk taking or risky decision making.

We also found differences in risk orientation as a function of ethnicity. First, we found differences between White and non-White participants in risk taking, risk preference, and risky decision making—particularly among adolescents (ethnic differences in risk orientation among adults were small to negligible). However, the direction of these ethnic group differences varied across measures. Whereas non-White adolescents demonstrated greater risk taking and risk preference than did White adolescents, White adolescents demonstrated greater risky decision making than did non-White adolescents. This is not entirely surprising given that prior studies have identified differences in the direction of ethnicity effects for different risk behaviors. For example, there is evidence to suggest that minority adolescents (particularly African Americans) are more likely than are White adolescents to engage in risky sexual behavior (e.g., Koniak-Griffin & Brecht, 1995; Neumark-Sztainer et al., 1996; Santelli, Lowry, Brener, & Robin, 2000) and to participate in delinquent activities (e.g., Blum et al., 2000; Hawkins, Laub, & Lauritsen, 1998; Piquero & Buka, 2002). However, there is also evidence to suggest that White adolescents may take more risks than may non-White adolescents when substance use is the behavior of interest. Specifically, a number of studies and have found that White adolescents engage in more alcohol and tobacco use than adolescents from many non-White ethnic groups (Best et al., 2001; Blum et al., 2000; Brannock, Schandler, & Oncley, 1990; Douglas & Collins, 1997). Accordingly, researchers studying adolescent risk taking must exercise caution in
asserting that ethnic group differences on particular risk measures reflect more general patterns of ethnic group differences in risk taking overall.

Second, we found that peer effects on risk orientation varied across ethnic groups. Specifically, we found that the effects of peer presence on risk preference were greater among non-White than among White participants. Though effect size estimates were not entirely consistent, inspection of mean scores suggests that the same pattern of ethnic group differences may also exist for risk taking. However, if it is, in fact, the case that non-White, relative to White, individuals are more susceptible to peer influence in risky situations, this ethnic group difference appears to be largely limited to adolescence. Although peer effects on risk taking and risk preference were greater among non-White than among White adolescents, non-White adults demonstrated levels of resistance to peer influence that were equal to or greater than those demonstrated by White adults. Though few studies have examined ethnic group differences in the development of resistance to peer influence, there is tentative evidence to support the finding that, relative to White adolescents, non-White adolescents may be more susceptible to the influence of others when in risky situations. For instance, Zimmerman, Sprecher, Langer, & Holloway (1995) found that African American and Hispanic adolescent females were slightly less confident in their ability to refuse unwanted sex than White adolescent females. However, to our knowledge, no prior research has directly examined the possibility that ethnic group differences in susceptibility to peer influence in risky situations may diminish as individuals move into adulthood. Thus, further research is necessary in order to both replicate and explain this finding.

In conclusion, it appears that differences in rates of group risk taking among adolescents versus adults are not simply the product of differences in the amount of time teenagers and adults spend with peers but are instead the result of age differences in individuals’ orientation toward risky behavior when in the presence of friends. Moreover, our results suggest that the psychosocial capacities that undergird the ability to resist peer pressure may continue to develop throughout late adolescence and into early adulthood. Thus, interventions aimed at reducing risky behavior among adolescents and young adults—particularly those from ethnic minority groups—ought to focus some attention on increasing individuals’ resistance to peer influence. For reasons not yet understood, the presence of peers makes adolescents and youth, but not adults, more likely to take risks and more likely to make risky decisions.

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Adolescent Brains Show Reduced Reward Anticipation

Adolescents show less activity than adults in brain regions that motivate behavior to obtain rewards, according to results from the first magnetic resonance imaging (MRI) study to examine real-time adolescent response to incentives. The study also shows that adolescents and adults exhibit similar brain responses to having obtained rewards. Researchers in the Laboratory of Clinical Studies of the National Institute on Alcohol Abuse and Alcoholism (NIAAA), one of the National Institutes of Health, conducted the study, which appears in the February 25 issue of the Journal of Neuroscience (Volume 24, Number 7).

"Understanding adolescent motivation is critical for understanding why so many young people drink alcohol and engage in associated behaviors such as drinking and driving and sexual risk-taking. That understanding also will be critical for shaping prevention messages that deter such behaviors," said Ting-Kai Li, M.D., Director, National Institute on Alcohol Abuse and Alcoholism. "With today's report, researchers in NIAAA's Laboratory of Clinical Studies provide an important part of the picture."

In the MRI study, James Bjork, Ph.D., and others in the laboratory of Daniel Hommer, M.D., scanned the brains of twelve adolescents aged 12 to 17 years and twelve young adults aged 22 to 28 years. While being scanned, the subjects participated in a game-like scenario risking monetary gain or loss. The participants responded to targets on a screen by pressing a button to win or avoid losing 20 cents, $1, or $5.

For both age groups, the researchers found that the anticipation of potential gain activated portions of the ventral striatum, right insula, dorsal thalamus, and dorsal midbrain, with the magnitude of ventral striatum activation sensitive to gain amount. In adolescents, however, the researchers found lower activation of the right ventral striatum centered in the nucleus accumbens, a region at the base of the brain shown by earlier research (see Alcohol Researchers Localize Brain Region That Anticipates Reward August 3, 2001 at News Releases - http://www.niaaa.nih.gov/) to be crucial for motivating behavior toward the prospect of rewards.

"Our observations help to resolve a longstanding debate among researchers about whether adolescents experience enhanced reward from risky behaviors — or seek out alcohol and other stimuli because they require enhanced stimulation. They also may help to explain why so many young people have difficulty achieving long-term goals," according to James Bjork, Ph.D., first author on the study.
When the researchers examined brain activity following gain outcomes, they saw that in both adolescents and young adults monetary gain similarly activated a region of the mesial frontal cortex. "These results suggest that adolescents selectively show reduced recruitment of motivational but not consummatory components of reward-directed behavior," state the authors.

For interviews with Drs. Bjork and Hommer, please telephone the NIAAA Press Office: 301/443-0595 and 301/443-3860. The article "Incentive-Elicited Brain Activation in Adolescents: Similarities and Differences from Young Adults" is available after 12:00 AM February 25 at http://www.jneurosci.org/. MRI scans also may be accessed at "MRIs Show Adolescent-Adult Differences in Reward Anticipation" at Graphics Gallery - http://www.niaaa.nih.gov/.

The National Institute on Alcohol Abuse and Alcoholism, a component of the National Institutes of Health, U.S. Department of Health and Human Services, conducts and supports approximately 90 percent of U.S. research on the causes, consequences, prevention, and treatment of alcohol abuse, alcoholism, and alcohol problems and disseminates research findings to science, practitioner, policy making, and general audiences. Additional alcohol research information and publications are available at http://www.niaaa.nih.gov/.
LESS GUILTY BY REASON OF ADOLESCENCE

Developmental Immaturity, Diminished Responsibility, and the Juvenile Death Penalty

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Laurence Steinberg
Temple University

Elizabeth S. Scott
University of Virginia School of Law
The authors use a developmental perspective to examine questions about the criminal culpability of juveniles and the juvenile death penalty. Under principles of criminal law, culpability is mitigated when the actor’s decision-making capacity is diminished, when the criminal act was coerced, or when the act was out of character. The authors argue that juveniles should not be held to the same standards of criminal responsibility as adults, because adolescents’ decision-making capacity is diminished, they are less able to resist coercive influence, and their character is still undergoing change. The uniqueness of immaturity as a mitigating condition argues for a commitment to a legal environment under which most youths are dealt with in a separate justice system and none are eligible for capital punishment.

Since 1990, only a handful of countries in the world—Congo, Iran, Yemen, Saudi Arabia, Pakistan, Nigeria, and the United States—have executed individuals whose crimes were committed when they were juveniles (Brady, 2002; de la Vega, 2002). Twenty-two states in the United States allow the execution of individuals under the age of 18, and in most of these states, adolescent offenders as young as 16 can be sentenced to death (Streib, 2003). The United States Supreme Court has held that the death penalty is unconstitutional for youths who are under 18 at the time of their offense (Thompson v. Oklahoma, 1998) but has declined to categorically prohibit capital punishment for 16- and 17-year-olds (Stanford v. Kentucky, 1989).

Several events have occurred recently that, considered together, suggest that it is time to reassess the constitutional status of the juvenile death penalty. First, in Atkins v. Virginia (2002), the Supreme Court ruled that the execution of mentally retarded offenders violates the U.S. Constitution; some of the reasons offered by the Court for the ban may also apply to the capital punishment of juveniles. Second, following the Atkins decision, three Supreme Court justices took the unusual step of urging reconsideration of the constitutional status of the juvenile death penalty, suggesting considerable dissatisfaction at the highest level with current doctrine (Lané, 2002). Finally, after the apprehension of the Washington-area serial snipers, one of whom, Lee Malvo, was 17 years old, prosecutors vied for the right to try the case in their jurisdiction. It was widely speculated that Attorney General Ashcroft selected Virginia as the venue, in large part, because that jurisdiction permits the execution of juveniles, whereas Maryland, where the majority of the killings took place, does not (Lichtblau, 2002). Thus, this highly publicized case has focused national attention on the debate over the juvenile death penalty.

The juvenile death penalty is a critically important issue in juvenile crime policy, but it is not our sole focus in this article. We are interested in the broader question of whether juveniles should be punished to the same extent as adults who have committed comparable crimes. Capital punishment is the extreme case, but in practical effect, it is not the most important one in an era in which youth crime policy has become increasingly punitive. The question of whether juveniles should be punished like adults is important to discussions about sentencing guidelines, the transfer of juvenile offenders into the adult criminal justice system, and the incarceration of juveniles in adult facilities (Fagan & Zimring, 2000). High-profile murder cases, like those involving Lee Malvo or Lionel Tate, the Florida 16-year-old who was sentenced to life in prison for killing a playmate during a wrestling match, generate public attention to these matters (e.g., Browning, 2001), but questions about the appropriate punishment of juvenile offenders arise in many less visible cases, including those involving nonviolent crimes such as drug selling (Cluay, 2001).

In this article, we draw on research and theory about adolescent development to examine questions about the criminal culpability of juveniles. Recent shifts in juvenile justice policy and practice toward the harsher treatment of youthful offenders are grounded in concerns about public protection and the belief that there is no good reason to exercise leniency with young offenders. This view rejects the conventional wisdom behind traditional juvenile justice.
policy and challenges those who support reduced punishment for juveniles to justify a separate, more lenient justice regime for young offenders. We accept this challenge, and we argue that emerging knowledge about cognitive, psycho-social, and neurobiological development in adolescence supports the conclusion that juveniles should not be held to the same standards of criminal responsibility as adults. Under standard, well-accepted principles of criminal law, the developmental immaturity of juveniles mitigates their criminal culpability and, accordingly, should moderate the severity of their punishment.

Excuse and Mitigation in the Criminal Law

The starting point for our argument is the core principle of penal proportionality—the foundation of any legitimate system of state punishment (Bonnie, Coughlin, & Jeffries, 1997). Proportionality holds that fair criminal punishment is measured not only by the amount of harm caused or threatened by the actor but also by his or her blameworthiness. Thus, the question we address is whether, and in what ways, the immaturity of adolescent offenders is relevant to their blameworthiness and, in turn, to appropriate punishment for their criminal acts. Answering this question requires a careful examination of the developmental capacities and processes that are relevant to adolescent criminal choices, as well as the conditions and circumstances that reduce culpability in the criminal law (Scott & Steinberg, 2003).

As a preliminary matter, it is important to distinguish between excuse and mitigation, two constructs that are distinct within the law but that are often blurred in laypersons' discussions of crime and punishment (Hart, 1968). In legal parlance, excuse refers to the complete exculpation of a criminal defendant; he or she bears no responsibility for the crime and should receive no punishment. Not surprisingly, defenses that excuse actors altogether from criminal liability are very narrowly drawn. For example, crimes committed under extreme duress may be excused—one who acts with a gun to one's head, for instance—whereas crimes committed under less stressful conditions would not (Robinson, 1997; Wassil, 1977). Unlike excuse, which calls for a binary judgment—guilty or not guilty—mitigation places the culpability of a guilty actor somewhere on a continuum of a criminal culpability and, by extension, a continuum of punishment. Thus, mitigation is a consideration when a harmful act is sufficiently blameworthy to meet the minimum threshold of criminal responsibility, but the actor's capacities are sufficiently compromised, or the circumstances of the crime sufficiently coercive, to warrant less punishment than the typical offender would receive. For example, mental illness that distorts an individual's decision making, but that is not severe enough to support an insanity defense, can reduce the grade of an offense or result in a less punitive disposition (Bonnie et al., 1997).

The public debate about the criminal punishment of juveniles is often heated and ill-informed, in part because the focus is typically on excuse when it should be on mitigation. It is often assumed, in other words, that the only alternative to adult punishment of juveniles is no punishment at all—or a slap on the hand. Instead, we argue that the developmental immaturity of adolescence mitigates culpability and justifies more lenient punishment, but that it is not, generally, a basis for excuse—except in the case of very young, preadolescent offenders. That is, a juvenile offender, owing to his or her developmental immaturity, should be viewed as less culpable than a comparable adult offender, but not as an actor who is without any responsibility for the crime. The public understandably wants to make sure that juvenile offenders are held responsible for their crimes, so that other would-be offenders receive a strong message about the costs of crime and so that the community is protected from those who might offend again (Bennett, Dilallo, & Walters, 1996). A policy based on mitigation can achieve these goals; at the same time, however, such a policy recognizes that youths are less culpable than adults and punishes them less harshly.

Criminal law doctrine takes account of excuse and mitigation in many ways calculating the seriousness of offenses and the amount of punishment that is appropriate. For example, defenses such as duress, insanity, and self-defense recognize that actors can cause the harm of the offense but be less culpable than the typical offender—or, in extreme cases, not culpable at all (Robinson, 1997). Also, under the law of homicide, punishment for causing the death of another varies dramatically depending on the blameworthiness of the actor (Michael & Wochler, 1937). The actor who kills intentionally is deemed less culpable when he or she does so without premeditation and deliberation. One who kills in response to provocation or under extreme emotional disturbance is guilty only of manslaughter, not murder. And a person who causes a victim's death through negligence is punished less severely than one who...
actually intends to kill (Bonnie et al., 1997). Finally, miti-
gation plays a key role in sentencing. In most states, 
sentencing guidelines include a list of mitigating factors to 
be considered in the determination of the amount of pun-
ishment the convicted offender should receive. These mitig-
ing factors include traits of the offender and circum-
cstances surrounding the offense that may reduce culpability 
(Florida Annotated Statutes, 2001).

In general, factors that reduce criminal culpability can 
be grouped roughly into three categories. The first category 
includes exogenous impairments or deficiencies in the 
actor’s decision-making capacity that affect his or her 
choice to engage in criminal activity. The incapacity—or 
diminished capacity—may be due to mental (fitness or 
menta) retardation, extreme emotional distress, or suscep-
tibility to influence or domination (Kadish, 1987).

Under the second category, culpability is reduced when 
the external circumstances faced by the actor are so 
compelling that an ordinary (or “reasonable”) person might 
have succumbed to the pressure in the same way as did the 
defendant (Morse, 1994). The extraordinary circumstances 
could involve duress, provocation, threatened injury, or 
extreme need. A person who commits a crime in response 
to these circumstances typically receives less punishment than 
one who commits a comparable crime under less 
compelling conditions.

The third category of mitigation includes evidence that 
the criminal act was out of character for the actor and that, 
unlike the typical criminal act, his or her crime was not 
the product of bad character. For example, a reduced 
sentence might result if the crime was a first offense; if the 
actor expressed genuine remorse or tried to mitigate the 
harm; if the actor had a history of steady employment, 
fulfillment of family obligations, and good citizenship; or,

more generally, if the criminal act was aberrant in light of 
the defendant’s established character traits and respect for 
the law’s values (United States Sentencing Commission, 1998).

Developmental Immaturity and Mitigation

Each of the categories of mitigation described in the pre-
vious section is important to an assessment of the culpa-
bleness of adolescents who have engaged in crime, and 
each sheds light on differences between normative adoles-
cents and adults. First, and most obviously, adolescents’ 
levels of cognitive and psychosocial development are likely 
to shape their choices, including their criminal choices, in 
ways that distinguish them from adults and that may un-
dermine competent decision making. Second, because ad-
olescents’ decision-making capacities are immature and 
their autonomy constrained, they are more vulnerable than 
are adults to the influence of coercive circumstances that 
mitigate culpability for all persons, such as provocation, 
duress, or threat. Finally, because adolescents are still in 
the process of forming their personal identity, their crimi-
nal behavior is less likely than that of an adult to reflect bad 
character. Thus, for each of the sources of mitigation in 
criminal law, typical adolescents are less culpable than are 
adults because adolescent criminal conduct is driven by 
transitory influences that are constitutive of this develop-
mental stage.

Deficiencies in Decision-Making Capacity

It is well established that reasoning capabilities increase 
through childhood into adolescence and that preadolescents 
and younger teens differ substantially from adults in their 
cognitive abilities (Keating, 1990). These basic improve-
ments in reasoning are complemented by increases in spe-
cific and general knowledge gained through education and 
experience and by improvements in basic information-
processing skills, such as attention, short- and long-term memory, and organization (Siegel, 1997).

Although few psychologists would challenge the as-
sertion that most adults have better reasoning skills than 
preadolescent children, it is often asserted that, by mid-
adolescence, teens’ capacities for understanding and rea-
soning in making decisions roughly approximate those of 
adults (Fischhoff, 1992; Farbey & Beyth-Marom, 1992).

Indeed, advocates for adolescent self-determination made 
this argument in support of adolescent abortion rights (American Psychological Association, 1990; Melton, 1993). However, as we and our colleagues have argued in 
several recent articles, there is good reason to question 
whether age differences in decision making disappear by 
mid-adolescence, particularly as capacities may be mani-
fested in the real-world settings in which choices about 
criminal activity are made (Scott, Reppucci, & Woolard, 1995; Steinberg & Cauffman, 1996). Laboratory studies 
that are the basis of the assertion that adolescents’ reason-
ing ability is equivalent to that of adults are only modestly 
useful in understanding how youths compare with adults in

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making choices that have salience to their lives or that are presented in stressful, unstructured settings in which decision makers must rely on personal experience, knowledge, and intuition (Cauffman & Steinberg, 2000; Scott et al., 1995; Steinberg, 2003; Steinberg & Cauffman, 1996). In typical laboratory studies of decision making, individual adolescents are presented with hypothetical dilemmas under conditions of low emotional arousal and then asked to make and explain their decisions. In the real world, and especially in situations in which crimes are committed, however, adolescents' decisions are not hypothetical, they are grave, and the consequences of their actions are real (whether negative or positive), and they usually are made in groups. In our view, it is an open and unstudied question whether, under real-world conditions, the decision making of mid-adolescents is truly comparable with that of adults.

More important, even when teenagers' cognitive capacities come close to those of adults, adolescent judgment and their actual decisions may differ from that of adults as a result of psychosocial immaturity. Among the psychosocial factors that are most relevant to understanding differences in judgment and decision making are (a) susceptibility to peer influence, (b) attitudes toward and perception of risk, (c) future orientation, and (d) the capacity for self-management. Whereas cognitive capacities underlie the process of decision making, psychosocial immaturity can affect decision-making outcomes, because the psychosocial factors influence adolescent values and preferences in ways that drive the cost-benefit calculus in the making of choices. In other words, to the extent that adolescents are less psychosocially mature than adults, they are likely to be deficient in their decision-making capacity, even if their cognitive processes are mature (Cauffman & Steinberg, 2000; Scott et al., 1995; Steinberg & Cauffman, 1996).

There is considerable evidence that the four dimensions of psychosocial maturity described in the previous paragraph continue to develop during the adolescent years. First, substantial research supports the conventional wisdom that, even in middle adolescence, teenagers are more responsive to peer influence than are adults. Studies in which adolescents are presented with hypothetical dilemmas in which they are asked to choose between an antisocial course of action suggested by their peers and a prosocial one of their own choosing indicate that susceptibility to peer influence increases between childhood and early adolescence as adolescents begin to individuate from parental control, peaks around age 14, and declines slowly during the high school years (Berndt, 1979; Steinberg & Silverberg, 1986). Peer influence affects adolescent judgment both directly and indirectly. In some contexts, adolescents make choices in response to direct peer pressure to act in certain ways. More indirectly, adolescents' desire for peer approval—and fear of rejection—affect their choices, even without direct coercion. Peer also provide models for behavior that adolescents believe will assist them in accomplishing their own ends (Moffitt, 1993).

Second, it is well established that over an extended period between childhood and young adulthood, individuals become more future-oriented. Studies in which individuals are asked to envision themselves or their circumstances in the future find that adults project out their visions over a significantly longer time frame than do adolescents (Greene, 1986; Nunnih, 1991). In addition, in studies in which individuals are queried about their perceptions of the short-term and longer term pros and cons of various sorts of risk taking (e.g., the risk of having unprotected sex, Gardner & Herman, 1990) or asked to give advice to others about risky decisions (e.g., whether to have cosmetic surgery; Halpern-Felsher & Cauffman, 2001), adolescents tend to discount the future more than adults do and to place more weight on the immediate consequences of decisions—both risks and benefits—in making choices. There are at least two plausible explanations for this age difference in future orientation. First, owing to cognitive limitations in their ability to think in hypothetical terms, adolescents simply may be less able than adults to think about events that have not yet occurred (i.e., events that may occur sometime in the future). Second, the weaker future orientation of adolescents may reflect their more limited life experience. For adolescents, a consequence 5 years in the future may seem very remote in relation to how long they have been alive; teens may simply attach more weight to short-term consequences because they seem more salient to their lives (Gardner, 1993).

Third, adolescents differ from adults in their assessment of and attitude toward risk. In general, adolescents use a risk-reward calculus that places relatively less weight on risk, in relation to reward, than that used by adults. When asked to advise peers on making a potentially risky decision, for example (e.g., whether to participate in a study of an experimental drug), adults spontaneously mentioned more potential risks than did adolescents (Halpern-Felsher & Cauffman, 2001). In addition, experimental studies that use gambling tasks show that compared with those of adults, adolescents' decisions are more driven by rewards and less by risks (see Furby & Bryth-Maron, 1992). A number of explanations for this age difference have been offered. First, youths' relatively weaker risk aversion may be related to their more limited time perspective, because taking risks is less costly for those with a smaller stake in the future (Gardner & Herman, 1990). Second, adolescents may have different values and goals than do adults, leading them to calculate risks and rewards differently (Furby & Bryth-Maron, 1992). For example, the danger of some types of risk taking (e.g., driving well over the speed limit) could seem a reward for an adolescent but a cost to an adult. In addition, considerable evidence indicates that people generally make riskier decisions in groups than they do alone (Visokor, 1971); there is evidence both that adolescents spend more time in groups than do adults and, as noted earlier, that adolescents are relative more susceptible to the influence of others.

Fourth, although more research is needed, the widely held stereotype that adolescents are more impulsive than adults finds some support in research on developmental changes in impulsivity and self-regulation over the course of adolescence. As assessed on standardized self-report personality measures, impulsivity increases between middle
adolescence and early adulthood and declines thereafter, and gains in self-management skills take place during early, middle, and late adolescence (Greenberger, 1982; Steinberg & Cauffman, 1996). Studies using the Experience Sampling Method, in which individuals are paged several times each day and asked to report on their emotions and activities, indicate that adolescents have more rapid and more extreme mood swings (both positive and negative) than adults, which may lead them to act more impulsively (Larson, Csikszentmihalyi, & Grieff, 1980). Taken together, these findings indicate that adolescents may have more difficulty regulating their moods, impulses, and behaviors than do adults.

Most of the developmental research on cognitive and psychosocial functioning in adolescence measures behaviors, self-perceptions, or attitudes, but mounting evidence suggests that at least some of the differences between adults and adolescents have neurophysiological and neuropsychological underpinnings. What is most interesting is that studies of brain development during adolescence, and of differences in patterns of brain activation between adolescents and adults, indicate that the most important developments during adolescence occur in regions that are implicated in processes of long-term planning, the regulation of emotion, impulse control, and the evaluation of risk and reward (Spear, 2000). For example, changes in the limbic system around puberty may stimulate adolescents to seek higher levels of novelty and to take more risks and may contribute to increased emotionality and vulnerability to stress (Dahl, 2001). At the same time, patterns of development in the prefrontal cortex, which is active during the performance of complicated tasks involving long-term planning and judgment and decision making, suggest that these higher order cognitive capacities may be immature well into late adolescence (Giedd et al., 1999; Sowell, Thompson, Holmes, Jernigan, & Toga, 1999).

At this point, the controversy between neurobiological and psychological evidence of age differences in decision-making capacity is indirect and suggestive. However, the results of studies using paper-and-pencil measures of future orientation, impulsivity, and susceptibility to peer pressure point in the same direction as the neurobiological evidence, namely, that brain systems implicated in planning, judgment, impulse control, and decision making continue to mature into late adolescence. Thus, it is good reason to believe that adolescents, as compared with adults, are more susceptible to less future oriented, less risk averse, and less able to manage their impulses and behaviors, and that these differences likely have a neurobiological basis. The important conclusion for our purposes is that juveniles may have diminished decision-making capacity compared with adults because of differences in psychosocial capacities that are likely biological in origin.

It is easy to see how psychosocial immaturity can contribute to youth's choices to get involved in crime (Considers the following scenario (adapted from Scott & Grissi, 1997). An adolescent is hanging out with his friends, when one member of the peer group, on spur of the moment, suggests that they rob a passer-by to get money to buy beer. The adolescent does not really go through a deliberative decision-making process but "chooses" to go along, despite having mixed feelings, because he assumes that his standing in the group will suffer if he declines to participate—a negative consequence to which he attaches considerable weight. Although a more mature person might think of options to extricate himself from the situation, the adolescent may not, because he lacks experience in similar circumstances, because the choice is made so quickly, or because he has difficulty projecting the course of events into the future. In any event, this "adventure" of the hold-up and the possibility of getting some money from it are appealing. These immediate and concrete rewards, along with the reward of peer approval, weigh more heavily in his decision than the abstract and temporarily remote possibility of apprehension by the police. The last thing the adolescent considers is the long-term costs associated with conviction of a serious crime.

The available evidence supports the conclusion that, like offenders who are mentally retarded and mentally ill, adolescents are less culpable than typical adults because of diminished decision-making capacity. To some extent, juvenile offenders have acknowledged this. In Thompson v. Oklisona (1998), for example, the Supreme Court pointed to the immature judgment of youth in prohibiting the execution of juveniles whose offenses occurred before their 16th birthday. Justice Stevens concluded that to impose the death penalty on youths below this age violates the principle of proportionality.

The Supreme Court decision in Thompson does not speak explicitly in the language of adolescent development or support its arguments with scientific research on adolescents' capacities. Nonetheless, the Court's pronouncement can best be understood as a recognition that psychosocial immaturity compromises adolescents' decision making in ways that mitigate criminal blameworthiness. The Court's recent rejection in Atkins v. Virginia (2002) of imposing the death penalty on mentally retarded offenders points more explicitly to the mitigating character of attributes that characterize adolescent decision making as well as those of retarded persons.

Because of their impairments, [mentally retarded offenders] have diminished capacities to understand and process information, to communicate, to abstract from mistakes and learn from experience, to engage in logical reasoning, to control impulses, and to understand the reactions of others. There is, abundant evidence that they often act on impulse rather than pursuant to a premeditated plan, and that in group settings, they are followers
Many factors that influence youthful decision making and distinguish adolescents from typical adults are similar to those that compromise the criminal choices of actors who are mentally retarded. Moreover, like offenders who are mentally retarded, there is good reason to believe that the deficiencies of adolescent judgment are organic in nature—although, among adolescents, poor judgment is shaped by transitory developmental factors and, unlike mentally retarded persons, most adolescents will mature out of their tendency to make unwise choices that are driven by the psychosocial influences. Nonetheless, during adolescence, immature judgment is likely no more subject to the volitional control of the youth than is the poor judgment of adults who are mentally retarded.

**Heightened Vulnerability to Coercive Circumstances**

The psychosocial immaturity of adolescents contributes to their diminished capacity (the first category of mitigation), but it is important to another source of mitigation as well. As we noted earlier, criminal culpability can be reduced on the basis of circumstances that impose extraordinary pressures on the actor. The criminal law does not require exceptional fortitude or bravery of citizens and, in general, recognizes mitigation where an ordinary (or in legal parlance, “reasonable”) person might have responded in the same way as the defendant under similar circumstances. In evaluating the behavior of an adolescent in responding to extenuating circumstances, however, the correct basis for evaluation is not comparison of the actor’s behavior with that of an “ordinary” adult but rather with that of an “ordinary” adolescent (In re William G., 1967; Scott & Steinberg, 2003).

Because of their developmental immaturity, normative (i.e., “ordinary”) adolescents may respond adversely to external pressures that adults are able to resist. If adolescents are more susceptible to hypothetical peer pressure than are adults (just as they are more susceptible to the threats of adver
tency than would an adult in the same situation. Similarly, if adolescents are more impulsive than adults, it may take less of a threat to provoke an aggressive response from a juvenile. And, because adolescents are less likely than adults to think through the future consequences of their actions, the same level of distress may have a more disruptive impact on juveniles’ decision making than on that of adults. In general, legal judgments about mitigation should consider the extent to which developmentally normal adolescents are more susceptible to external pressures than are adults. Adolescents’ claim to mitigation on this ground is particularly compelling in that, as legal minors, they lack the freedom that adults have to extricate themselves from a criminogenic setting (Fagan, 2000).

Although plausible inferences can be drawn about how developmental influences may affect adolescents’ responses to external pressures, we do not have sufficient research comparing the behavior of adolescents and adults at varying levels of duress, provocation, or coercion. Some social psychological research has examined contextual influences on decision making—for example, the literature on the risky shift, which shows that individuals take more risks in groups than when alone (Voskvor, 1971)—but this research has not examined whether the impact of different contextual factors varies as a function of the decision maker’s age. Further, as we noted earlier, studies comparing the decision making of adolescents with that of adults have intentionally minimized the influence of contextual factors that could affect the decision-making process differently for individuals of different ages. Recent evidence on age differences in the processing of emotionally arousing information supports the hypothesis that adolescents may tend to respond to threats more viscerally and emotionally than adults (Baird, Grunert, & Fein, 1999), but far more research on this topic is needed.

**Uniformed Character as Mitigation**

In addition to the mitigating effects of adolescents’ diminished decision-making capacity and greater vulnerability to external pressures, youthful culpability is also mitigated by the relatively uniformed nature of their characters. As we have noted, the criminal law implicitly assumes that harmful conduct reflects the actor’s bad character and treats evidence that this assumption is inaccurate as mitigating of culpability (Duff, 1993; Voskvor, 1986). For most adolescents, the assumption is inaccurate, and thus their crimes are less culpable than those of typical criminals.

The emergence of personal identity is an important developmental task of adolescence and one in which the aspects of psychosocial development discussed earlier play a key role. As documented in many empirical tests of Erikson’s (1968) theory of the adolescent identity crisis, the process of identity formation includes considerable exploration and experimentation over the course of adolescence (Steinberg, 2000a). Although the identity crisis may occur in middle adolescence, the resolution of this crisis, with the coherent integration of the various retained elements of identity into a developed self, does not occur until late adolescence or early adulthood (Waterman, 1982). Often this experimentation involves risky, illegal, or dangerous activities like alcohol use, drug use, unsafe sex, and antisocial behavior. For most teens, these behaviors are fleeting; they cease with maturity as individual identity becomes settled. Only a relatively small proportion of adolescents who experiment in risky or illegal activities develop entrenched patterns of problem behavior that persist into adulthood (Farrington, 1986; Moffitt, 1993). Thus, making predictions about the development of relatively more permanent and enduring traits on the basis of patterns of risky behavior observed in adolescence is an uncertain business. At least until late adolescence, individuals’ values, attitudes, beliefs, and plans are likely to be tentative and exploratory expressions rather than enduring represen-
tations of personhood. Thus, research on identity development in adolescence supports the view that much youth crime stems from normative experimentation with risky behavior and not from deep-seated moral deficiency reflect- tive of "bad" character. One reason the typical delinquent youth does not grow up to be an adult criminal is that the developmental values and preferences that drive his or her criminal choices as a teenager change in predict- able ways as the youth matures.

Distinctions between youthful criminal behavior that is attributable to characteristics that adolescents out- grow and conduct that is attributable to relatively more permanent elements of personality is captured in Moffitt's (1993) work on the developmental trajectories of antisocial behavior. In her view, adolescent offenders fall into one of two broad categories: adolescence-limited offenders, whose antisocial behavior begins and ends during adoles- cence, and a much smaller group of life-course persistent offenders, whose antisocial behavior begins in childhood and continues through adolescence and into adulthood. According to Moffitt, the criminal activity of both groups during adolescence is similar, but the underlying causes of their behavior are very different. Life-course-persistent of- fenders show longstanding patterns of antisocial behavior that appear to be rooted, at least in part, in relatively stable psychological attributes that are present early in develop- ment and that are attributable to deficient socialization or neurobiological anomalies. Adolescence-limited offending, in contrast, is the product of forces that are inherent fea- tures of adolescence as a developmental period, including peer pressure, experimentation with risk, and demonstra- tions of bravado aimed at enhancing one's status in the social hierarchy of the peer group. By definition, the causes of adolescence-limited offending weaken as individuals mature into adulthood.

In view of what we know about identity development, it seems likely that the criminal conduct of most young wrongdoers is quite different from that of typical adult criminals. Most adults who engage in criminal conduct act on subjectively defined preferences and values, and their choices can fairly be charged to deficient moral character. This cannot be said of typical juvenile actors, whose be- haviors are more likely to be shaped by developmental forces that are constitutive of adolescence. To be sure, some adolescents may be in the early stages of developing a criminal identity and reprehensible moral character traits, but most are not. Indeed, studies of criminal careers indi- cate that the vast majority of adolescents who engage in criminal or delinquent behavior desist from crime as they mature into adulthood (Farrington, 1986). Thus the crimi- nal choices of typical young offenders derive from those of adults not only because the choice, qua choice, is deficient as the product of immature judgment, but also because the adolescent's criminal act does not express the actor's bad character.

The notion that individuals are less blameworthy when their crimes are out of character is significant in assessing the culpability of typical young offenders. In one sense, young wrongdoers are not like adults whose acts are

less culpable on this ground. A claim that an adult's crimi- nal act was out of character requires a demonstration that his or her established character is good. The criminal choice of the typical adolescent cannot be evaluated in this manner because the adolescent's personal identity is in flux and his or her character has not yet stabilized. However, like the adult offender whose crime is mitigated because it is out of character, adolescent offenders lack an important component of culpability—the connection between a bad act and a bad character.

The fact that antisocial activity in adolescence is not usually indicative of bad character also raises important questions about the construct validity of juvenile psychop- athy, a "diagnosis" that has recently received considerable attention (Dades, Sheen, Cruise, & Cauffman, 2001; Fein & Burke, 1998; Seagrave & Griso, 2002; Steinberg, 2002b). Labeling an individual as a psychopath—perhaps the quintessential case of "bad character"—implies that the individual's antisocial behavior is due to fixed aspects of his or her personality. But, as we have suggested, this assumption is difficult to defend as applied to individuals whose identity development is still under way. (Indeed, it is for this very reason that the diagnosis of antisocial person- ality disorder is not made prior to the age of 18, American Psychiatric Association, 1994). Although the notion that some juvenile offenders are actual or "fledgling" psycho- paths has become increasingly popular in legal and psy- chological circles, no data exist on the stability or contin- uity of psychopathy between adolescence and adulthood. In the absence of evidence that juveniles who, on the surface, resemble adult psychopaths (e.g., juveniles who are cal- lous, manipulative, and antisocial) actually become adult psychopaths, it would seem unwise to use this label when describing an adolescent.

Our analysis also clarifies why the crime of the adult actor with "adolescent" traits warrants a different response than does that of the typical young offender. Although most impulsive young risk takers who focus on immediate con- sequences will mature into adults with different values, some adult criminals have traits that are similar to their younger counterparts. In the case of the adult, however, the predispositions, values, and preferences that motivate him or her most likely are characterological and are unlikely to change predictably with the passage of time. Adolescent traits that contribute to criminal conduct are not characterological in adolescence, but they are not typical of adulthood. In an adult, these traits are often part of the personal identity of an individual who is not respectful of the values of the criminal law and who deserves full punishment when he or she violates its prohibitions.

Developmental Immaturity, Diminished Culpability, and the Juvenile Crime Policy

The adolescent who commits a crime typically is not so deficient in his or her decision-making capacity that the adolescent cannot understand the immediate harmful con- sequences of his or her choice or its wrongfulness, as might

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be true of a mentally disordered person or a child. Yet, in ways that we have described, the developmental factors that drive adolescent decision making may predictably contribute to choices reflective of immature judgment and unformed character. Thus, youthful criminal choices may share much in common with those of adults whose criminal behavior is treated as less blameworthy than that of the typical offender, because their criminal behavior is out of character, their decision-making capacities are impaired by emotional disturbance, mental illness, or retardation, or their criminal choices were influenced by unusually coercive circumstances.

If, in fact, adolescent offenders are generally less culpable than their adult counterparts, how should the legal system recognize their diminished responsibility? An important policy choice is whether immaturity should be considered on an individualized basis, as is typical of most mitigating conditions, or as the basis for treating young law violators as a separate category of offenders (Scott & Steinberg, 2003).

We believe that the uniqueness of immaturity as a mitigating condition argues for the adoption of, or renewed commitment to, a categorical approach, under which most youths are dealt with in a separate justice system, in which rehabilitation is a central aim, and none are eligible for the ultimate punishment of death. Other mitigators—emotional disturbance and coercive external circumstances, for example—affect criminal choices with endless variety and have idiosyncratic effects on behavior; thus, individualized consideration of mitigation is appropriate where these phenomena are involved. In contrast, the capacities and processes associated with adolescence are characteristic of individuals in a relatively defined group, whose development follows a roughly systematic course to maturity, and whose criminal choices are affected in predictable ways. Although individual variations exist within the age cohort of adolescence, of course, coherent boundaries can delineate a minimum age for adult adjudication, as well as a period of years beyond this when a strong presumption of reduced culpability operates to keep most youths in a separate system. The age boundary is justified if the presumption of immaturity can be applied confidently to most individuals in the group, as we believe is the case for juveniles. Moreover, a categorical approach to the separation of juveniles and adults offers substantial practical efficiencies over one in which immaturity must be assessed on a case-by-case basis.

A developmentally informed boundary restricting the dispositions that can be imposed on juveniles who have entered the criminal justice system represents a precommitment to taking into account the mitigating character of youth in assigning blame. Without such a commitment, immaturity may be ignored when the exigencies of a particular case engender a punitive response, as in the case of the accused sniper Lee Malvo. Indeed, absent such a commitment, immaturity is likely to count as mitigating only when the juvenile otherwise presents a sympathetic case or when other, irrelevant factors, such as a childish physical appearance, lead others to view the offender as relatively less blameworthy. This is a critical concern, given the evidence that racial and ethnic biases influence attitudes about the punishment of young offenders and that decision makers are more likely to discount the mitigating impact of immaturity when judging the behavior of minority youths (Bridges & Steen, 1999; Graham, 2002). A structural boundary that hinders adult adjudication of young offenders and that prohibits the use of the death penalty altogether for juveniles is justified as a counterweight to its pernicious influence.

Maintaining a categorical distinction between juvenile and adult offenders does not mean that all youths are less mature than adults in their decision-making capacity or that all juveniles are unfounded in their identity development. Some individuals exhibit mature judgment at an early age (most are not offenders, however), and among others, anti-social tendencies that begin in childhood continue in a stable pattern of criminal conduct that defines their adult character. Adult punishment of psychologically mature youths might be fair if these individuals could be identified with some degree of certainty. But we currently lack the diagnostic tools to evaluate psychosocial immaturity reliably on an individualized basis or to distinguish young career criminals from ordinary adolescents who will replicate their reckless experimentation as adults. As a consequence, litigating maturity on a case-by-case basis is likely to be an error-prone undertaking. This risk of error is problematic as a general matter, but it is unacceptable when the stakes are life and death. In our view, this risk of error argues against ever imposing the death penalty on young offenders.

A policy that treats immaturity as a mitigating condition is viable only to the extent that public protection is not seriously compromised, and public safety concerns dictate that the small group of young recidivists who inflict large amounts of social harm must be incapacitated as adults. That is not to say that we should "throw away the key" when we incapacitate these youths, however. Given the uncertainty of predicting adult character during adolescence, efforts should be made to protect against the iatrogenic effects of incarceration in prison and to invest in the future postincarceration lives of even serious chronic offenders (Scott & Grisso, 1997).

Ongoing research on the links between brain maturation and psychological development in adolescence has begun to shed light on why adolescents are not as planful, thoughtful, or self-controlled as adults, and, more importantly, it clarifies that these "deficiencies" may be physiological as well as psychological in nature. Nevertheless, we are a long way from comprehensive scientific understanding in this area, and research findings are unlikely to ever be sufficiently precise to draw a chronological age boundary between those who have adult decision-making capacity and those who do not. Some of the relevant abilities (e.g., logical reasoning) may reach adultlike levels in middle adolescence, whereas others (e.g., the ability to resist peer influence or think through the future consequences of one's actions) may not become fully mature until young adulthood.
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