Comorbidity of Anxiety and Conduct Problems in Children: Implications for Clinical Research and Practice

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Abstract Given the relative lack of research on the comorbidity of anxiety disorders (ADs) and conduct problems (oppositional defiant disorder, conduct disorder) in youth, we examine this comorbidity from both basic and applied perspectives. First, we review the concept of comorbidity and provide a framework for understanding issues pertaining to comorbidity. Second, we examine the comorbidity of ADs and conduct problems in both epidemiological and clinical studies. Third, we explore the artifactual and substantive reasons for the comorbidity of these disorders. Finally, we discuss the implications of comorbidity for assessment and treatment and provide recommendations for future directions in clinical research and practice.

Keywords Comorbidity · Anxiety · Conduct problems · Oppositional defiant disorder

Introduction

The co-occurrence of anxiety and conduct problems affects a substantial proportion of children and may cause significant impairment in functioning. Epidemiological findings indicate that 9.9% of children meet diagnostic criteria for an anxiety disorder (AD), whereas 11.3% of children meet criteria for conduct problems, defined for purposes of this review as oppositional defiant disorder (ODD) or conduct disorder (CD) (Costello et al. 2003). ADs are characterized by extreme distress and worry and may be generalized or result from specific triggers, including separation from an adult, social situations, or specific objects and situations (APA 2000). ODD is defined by a pattern of negativistic, hostile, and oppositional behaviors lasting at least 6 months, whereas CD is a pattern of behavior in which the basic rights of others or age-appropriate societal norms are violated (APA 2002). In these studies, the comorbidity of anxiety and conduct problems is three times more likely than what would be expected by chance (Angold et al. 1999). On the other hand, in clinic-referred samples, about 20% of children attending specialty AD clinics meet criteria for a disruptive behavioral disorder (Garland and Garland 2001; Kendall et al. 2001), whereas approximately 40% of youth with conduct problems meet criteria for an AD in clinics specializing in conduct problems (Greene et al. 2002).

The study of comorbid AD and conduct problems is of particular importance because there is evidence that comorbid AD may serve as a risk factor or a protective factor for youth with conduct problems. Currently, it is unclear under what circumstances comorbid AD serves as a risk factor or a buffer for global functioning, symptom severity, and treatment outcome in youth with conduct problems. On the one hand, Walker et al. (1991) found that AD serves as a protective factor for youth with conduct problems; furthermore, several longitudinal studies suggest that AD attenuates the severity and course of conduct problems (e.g., Mason et al. 2004; Walker et al. 1991; Pine et al. 2000). Other literature suggests that children with comorbid AD and conduct problems may display increased levels of symptomatology and impairment, higher levels of psychosocial adversity, and ongoing adjustment problems (Maser and Cloninger 1990). These children may also be at greater risk of developing more severe psychopathology than children with either diagnosis alone (e.g., Biederman...
et al. 1991; Kendall et al. 2001; Ollendick and King 1994). Furthermore, the presence of co-occurring AD and conduct problems might adversely affect treatment outcome. For example, compromised treatment outcomes may be indicated in youth with comorbid AD and conduct problems (Zoccolillo 1992). Furthermore, outcomes of comorbid anxious/aggressive children may worsen as the children transition into adolescence (Walker et al. 1991) or the protective effect of anxiety on conduct problems may disappear (Russo et al. 1993). For example, in a community sample of 879 boys, 10- to 13-year-olds were compared to 13- to 16-year-olds who exhibited high levels of anxiety and aggressive behaviors (Loeber et al. 1994). Persistent elevated levels of anxiety were significantly associated with increased involvement in behaviors that conflict with authority figures for the older adolescents but not the younger ones. In addition, the older adolescents with high levels of anxiety reported significant levels of involvement in multiple disruptive behaviors. Given the potential for adverse outcomes and the limited understanding to date regarding the contexts under which adverse outcomes might occur, understanding the co-occurrence of ADs and conduct problems in children is of considerable importance.

First, we review the concept of comorbidity and provide a framework for understanding issues pertaining to its developmental course and expression. Second, we examine the comorbidity of ADs and conduct problems in both epidemiological and clinical studies. Third, we explore the artifactual and substantive reasons for the comorbidity of these disorders. Finally, we discuss the implications of comorbidity for assessment and treatment and provide recommendations for future directions in clinical research and practice.

Comorbidity

Keiley et al. (2003) referred to comorbidity as the coexistence of two or more distinct disorders in the same individual at the same point in time (Achenbach 1991a; Caron and Rutter 1991). Generally, the term is used to describe coexisting disorders where pathology and etiology are well understood (Lilienfeld 2003). However, the etiology and pathology of specific psychological disorders are not well understood at this time; moreover, the etiologic pathways to the development of psychological disorders are complex and frequently overlap. Given this overlap, some argue that comorbidity between psychological disorders may simply be a problem with the classification system rather than a meaningful association between any two unique or “distinct” disorders (Angold et al. 1999). This does not imply, however, that comorbidity is not worthy of further investigation; rather, even from this perspective, the study of comorbidity might be helpful in validating the criteria of specific psychiatric disorders.

In an early paper, Meehl (2001) suggested the term “comorbidity” should be used to describe taxonomic conditions, whereas the term “covariation” should apply to dimensional conditions. Thus, the presence of an AD and conduct problems (ODD or CD) would be considered comorbidity, whereas the co-occurrence of high symptomatic levels of anxiety and high levels of aggression, for example, would be considered covariation. For purposes of this review, we examined the literature on the comorbidity of ADs and conduct problems in examining prevalence rates. However, in reviewing substantive causes of comorbidity, there were instances where the literature on the comorbidity of specific disorders was sparse and, in those instances, we included symptom-level, covariation investigations as well. In addition, our review is focused primarily on research using the Diagnostic and Statistical Manual, fourth edition (DSM-IV) and text revision (DSM-IV-TR) (American Psychiatric Association 1994, 2000).

The comorbidity of AD and conduct problems (ODD or CD) can be conceptualized as heterotypic comorbidity (Angold et al. 1999), since ADs and conduct problems are from differing diagnostic groups in the DSM-IV-TR (American Psychiatric Association 2000). When the comorbidity of two disorders is from the same diagnostic group (e.g., both ADs), such as generalized anxiety disorder (GAD) and separation anxiety disorder (SAD), homotypic comorbidity would be evident. This distinction may be useful, as heterotypic comorbid conditions may be more likely to have distinct etiologies and pathways to onset for each disorder compared to homotypic comorbid conditions. Other forms of heterotypic comorbidity have been addressed in previous reviews (e.g., Jarrett and Ollendick 2008; Wolff and Ollendick 2006). Specifically, Jarrett and Ollendick (2008) reviewed comorbid AD and ADHD, and Wolff and Ollendick (2006) reviewed comorbid conduct problems and depression. However, heterotypic comorbidity has not been systematically examined for AD and conduct problems. For youth with comorbid AD and conduct problems, different etiological features may account for anxiety disorders (e.g., anxious coping) and conduct problems (e.g., parental substance abuse). These multiple risk factors may translate into increased impairment and reduced treatment outcomes compared to youth with homotypic comorbid conditions (e.g., GAD and SAD).

Over the last 20 years, there has been an exponential increase in investigations pertaining to comorbidity (Angold et al. 1999). Given this increased interest, several challenges to the investigation into comorbidity are evident. For example, methodological issues in studying comorbidity are substantial and have frequently been
investigated (Jensen 2003; Lilienfeld 2003; Rutter 1997). Such methodological issues include referral biases in clinical samples, screening procedures in community samples, assessor biases, overlapping diagnostic criteria, artificial diagnostic subdivisions, and disorders based on dimensional ratings rather than based on categorical decisions.

In addition to methodological issues, substantive reasons accounting for comorbidity are equally important but have not been explored as fully. Rutter (1997) proposed several substantive indicators of comorbidity, including (1) comorbidity represents two manifestations of the same disorder, (2) comorbidity reflects two different stages of the same disorder, (3) comorbidity is the result of shared or related risk factors, and (4) comorbidity reflects two distinct disorders and one disorder is associated with an increased risk for the other disorder. Unfortunately, other substantive reasons for comorbidity, such as clinical characteristics, correlates, and outcomes, have only rarely been described in previous studies (Jensen 2003). In the absence of such studies, it is unclear whether comorbid forms of disorders have distinct etiologies, clinical characteristics, and outcomes. Thus, in this review, we will highlight these understudied features.

Epidemiological Studies

Several epidemiological investigations have explored the comorbidity of anxiety and conduct problems primarily through cross-sectional data. In a seminal meta-analytic review of 17 epidemiological studies, Angold et al. (1999a, b) examined the comorbidity of various disorders, including the comorbidity of AD with ODD/CD. Angold and colleagues reported the rate of CD/ODD in youth with ADs was about 10% and the rate of ADs in youth with ODD/CD was about 40%. Unfortunately, little research is available pertaining to longitudinal investigations. However, Angold et al. (1999a, b) reviewed two longitudinal investigations pertaining to comorbidity (Angold et al. 1999b; Costello et al. 1997). Both investigations followed children from 9 to 13 years of age for 3 years until they were 12–16 years of age. For the Angold et al. (1999a, b), the rate of CD/ODD in children with anxiety remained relatively constant over time, whereas the rate of anxiety in children with ODD/CD decreased over time. Conversely, in the Costello et al. (1997), the overall rate of comorbidity of both types of disorders increased over time. Additionally, Costello et al. (2003) completed a longitudinal investigation into comorbidity in a sample of children followed from ages 9–16 years. This investigation found that the comorbidity rates for each disorder remained about the same over time.

Angold et al. (1999a, b) argued that the comorbidity of anxiety and conduct problems may be epiphenomenal or better accounted for by associations with other disorders such as attention-deficit hyperactivity disorder (ADHD) or depressive disorders. Conversely, in a review of psychological disorders in preschoolers by Egger and Angold (2006), the authors suggest that comorbid depressive disorders in preschoolers with ADs and conduct problems are epiphenomenal, whereas the relationship between AD and conduct problems is substantive. Specifically, Egger and Angold (2006) concluded that ODD appeared to mediate the relationship between depression and anxiety, though it should be noted that these findings were cross-sectional ones and not based on longitudinal data. In other words, based on these findings, the relationship between AD and ODD is statistically significant and may explain the relationship between depressive disorders and ADs. Overall, then, there are discrepancies in the conclusions drawn by Angold and others across these and other studies. We address the issue of the “epiphenomenal” relationship between AD and conduct problems later in this review.

The Angold and colleagues investigations did not address the comorbidity of conduct problems with specific ADs, nor were specific forms of conduct problems parsed out (e.g., ODD versus CD). Fortunately, at least one study has examined specific rates for comorbidity for a specific form of conduct problem (ODD) and specific ADs (Simonoff et al. 1997). The study of comorbid ODD/AD may be of particular importance, given that ODD may be a precursor to CD, and therefore understanding the relationship between AD and ODD may have implications for the prevention of AD and CD over time. Simonoff and colleagues reported three-month prevalence data for 2,762 twins between ages 8 and 16 years. In this investigation, ODD was significantly related to overanxious disorder (precursor to GAD), when compared to other ADs. Additionally, when all ADs were combined, there was a statistically significant relationship between ADs and ODD, but not with ADHD.

More recently, Nock et al. (2007) examined the correlates of ODD in the National Comorbidity Survey Replication study. They found that 62.3% of those with lifetime ODD also met criteria for a lifetime disorder of AD. Moreover, early onset of ODD (before age 8) and the comorbidity of ODD with an AD predicted slow speed of recovery. Nock et al. (2007) also examined the lifetime rates of ODD with specific ADs. The most common comorbid conditions were social phobia (31.4%), specific phobia (24.7%), PTSD (19.7%), GAD (15.5%), SAD (12.5%), and panic disorder (10.9%).

In sum, there appears to be considerable variability in prevalence rates across epidemiological investigations. One generally consistent finding is that comorbidity of ADs and conduct problems occurs at a greater rate than would be expected by chance. While it is debatable, the
relationship between these two disorders may be substantive and not merely a result of the relationship with conduct problems or ADs with other disorders such as ADHD or the mood disorders. However, as noted, there is little research addressing the comorbidity of specific ADs and specific conduct problems and specific patterns of comorbidity over time.

Clinical Studies

Angold et al. (1999a, b) identify several limitations to interpreting comorbidity rates from clinical samples. Clinical samples may be biased in that the youth in such samples may have more severe symptoms, greater impairment, and greater family adversities than youth who do not present for treatment. Furthermore, individuals with comorbid conditions are twice as likely to seek treatment as individuals with one diagnosis alone (Costello et al. 1996). In spite of these potential biases, the importance of examining prevalence rates in clinical settings should not be understated, given the applicability of such findings to clinical practice.

To date, there are limited investigations into rates of clinic-referred children with comorbid ADs and conduct problems and those that have been conducted have been done in specialty clinics (Gadow and Nolan 2002; Garland and Garland 2001; Greene et al. 2002; Kendall et al. 2001). Garland and Garland (2001) explored the prevalence of oppositional features in 145 anxious children (aged 6–12) who were referred to an AD clinic. The authors used clinical diagnoses and a DSM-IV symptom inventory to assess for the presence of oppositional defiant symptoms in these anxious youth. Results indicated that 16 of the 145 anxious children (11%) were diagnosed with ODD. Moreover, 11 of the 16 ODD cases had 2 or more additional comorbid diagnoses. Specifically, 5 had an additional comorbid AD, 7 had a depressive disorder, and 10 had comorbid ADHD. Five of the 10 children with ADHD also had a comorbid depressive disorder.

Kendall et al. (2001) also examined comorbidity in 173 anxious children between the ages of 8–13 years referred to an anxiety disorder clinic. Similar to the aforementioned study, the rate of anxious youth in this sample who met criteria for ODD was 9.2%. In a subsequent paper, Verduin and Kendall (2003) examined the relationship between ODD and children with a primary diagnosis of GAD, SAD, and specific phobias. Among children with GAD, 10.1% met criteria for ODD. In children with social phobia, 12.0% met criteria for ODD and in children with specific phobias 5.0% met criteria for ODD. Overall, a greater rate of children with comorbid social phobia or GAD and ODD was detected when compared to specific phobia diagnoses, though additional data are needed to substantiate this finding.

There are few investigations into the comorbidity of ADs in clinic-referred children with conduct problems. In one of these studies, Greene and colleagues (2002) reported that approximately 40% of youth with ODD (n = 643, mean age = 10.6) and youth with ODD/CD (n = 262, mean age = 10.8) also met criteria for an AD. Unfortunately, these researchers did not report on the prevalence of specific ADs.

Overall, these findings suggest that the rates of comorbid conduct problem diagnoses in individuals with ADs are generally congruent across studies. Additionally, the rates of ADs in youth with conduct problems may be higher than the rates of conduct problems in youth with AD, though this conclusion is based on limited research. Additionally, the rate of comorbidity in clinical studies is greater than what would be expected by chance.

Methodological Reasons for the Comorbidity of Anxiety and Conduct Problems

As mentioned previously, artifactual or methodological reasons for the comorbidity of AD and conduct problems must be taken into account when interpreting rates of comorbidity. Several authors (Angold et al. 1999a; Jensen 2003; Lilienfeld 2003; Rutter 1997) have proposed potential methodological sources of comorbidity, including (1) referral bias, (2) information collection strategies, (3) use of multiple informants, (4) diagnostic criteria overlap, and (5) use of categorical versus dimensional ratings.

The first potential methodological problem is referral bias. Referral biases include Berksonian and clinical selection biases (Lilienfeld 2003). Berksonian bias refers to the observation that persons with two disorders are more likely to seek treatment for either of the disorders than those with only one of the disorders in clinical settings. Similarly, clinical selection bias suggests that having more than one disorder or a more severe disorder leads to a greater chance of seeking treatment due to greater impairment. On the other hand, a recent meta-analysis of epidemiological studies concluded that referral biases was not a major cause of comorbidity (Angold et al. 1999a); thus, it is not entirely clear what, if any, role referral bias and other methodological explanations may play in the comorbidity of ADs and conduct problems in clinical samples.

Another potential methodological bias may be information collection strategies. For example, Angold et al. (1999a, b) note when clinicians diagnose psychopathology without use of structured or semi-structured diagnostic procedures, their assessment may be subject to information collection and decision-making biases, which in turn may account for elevated rates of comorbidity. However, the
use of such interviews does not necessarily obviate interviewer expectancies, as Angold et al. (1999a, b) indicate. Interviewees may have developed biased interviewing techniques due to training in certain domains (e.g., training as a child anxiety specialist but working in a delinquency setting), which may lead to overdiagnosis of certain disorders along with diagnoses of other less “substantiated” disorders.

Informant discrepancy issues are another important methodological consideration contributing to comorbidity. To date, researchers have examined the various methods of combining child and parent reports of psychopathology in order to accurately arrive at comorbid disorders (Jensen 2003; Youngstrom et al. 2003). Youngstrom et al. (2003) noted that comorbid diagnoses of internalizing and externalizing disorders could be inflated, given the prevalence may range from 5 to 75% depending on the decision rules used across informants. That is, by using three data combination strategies (e.g., conjunctive, compensatory, and disjunctive), the same data and diagnostic thresholds yielded large variability in the percentage of 189 clinic-referred youth diagnosed with comorbid conditions. For example, conjunctive combination strategies, where multiple data sources provide convergent information, yielded lower rates of comorbidity than disjunctive data combination approaches, where only one data source is needed to confirm a diagnosis. Compensatory models, on the other hand, aggregate information from multiple sources; thus, diagnostic rates fall within the range of the other two combination strategies. In addition, higher comorbidity rates were obtained in this investigation via diagnostic interviews and parent reports versus youth or teacher reports. However, Jensen et al. (1995) reported that the mean number of diagnoses did not significantly differ using parent, child, and combined reports of psychopathology in a study of children in military families.

Additionally, the potential for overlap of symptoms between various disorders may be an important methodological consideration in assessing the comorbidity of any disorders including the ADs and conduct problems. For example, some of the symptom criteria of SAD (i.e., refusal to separate from a major attachment figure, not wanting to sleep in one’s own bed) may overlap with conduct problems (i.e., refusal to do as one is told, being argumentative). Of note, however, there is limited criterion overlap between internalizing and externalizing disorders; thus, this issue may not pose as serious a problem for the study of AD and conduct problems in children as suggested by some. In as much as ADs and conduct problems are comorbid with one another at times and do not share many overlapping symptoms, it is probable that symptom overlap alone does not account for the comorbidity between these disorders (Angold et al. 1999a, b). For example, some of the key features of ODD include hostile and defiant behavior (e.g., argues with adults, deliberately annoys other people, blames other for his/her mistakes, angry and resentful, spiteful or vindictive), whereas ADs are characterized by excessive fearfulness or stress that may manifest in physiological symptoms such as sweating or nausea and/or behavioral symptoms such as avoidance (APA 2002).

Lastly, the issue of dimensional versus categorical approaches to describe child psychopathology may be important. Some investigations measure the categorical presence or absence of AD and conduct problems in children, whereas others use dimensional ratings of anxiety and aggression or oppositionality to gauge prevalence, clinical profiles, and treatment outcomes. Given dimensional ratings of psychopathology tend to follow a normal distribution, many participants may endorse some symptoms of pathology within this range. If cut-off scores to define pathology are not used consistently across investigations, those studies using lower cut-off scores may “overpathologize” a sample. Additionally, dimensional measures of internalizing and externalizing symptoms are often correlated with one another; thus, these correlations may artificially present as comorbidity without use of stringent cut-off scores or diagnostic categories (Angold et al. 1999a; Garnefski and Diekstra 1997; McConaughy and Achenbach 1994).

### Substantive Reasons for the Comorbidity of Anxiety and Conduct Problems

Cantwell (1995) outlined eight domains by which to examine the discriminant validity of psychiatric disorders and subtypes of specific disorders. These domains include (1) clinical phenomenology, (2) demographic correlates, (3) psychosocial correlates, (4) family environment factors, (5) family genetic factors, (6) biological factors, (7) response to treatment, and (8) clinical outcomes. These factors and others (e.g., cognitive factors, neuropsychological factors) may be important in understanding the comorbidity between AD and ODD (for a recent review, see Bubier and Drabick 2009). For purposes of this review, we will focus on several inter-related substantive factors, which are as follows: clinical phenomenology, demographic factors, psychosocial factors, family environment, temporal relations, and pathology/treatment outcome. As such these factors may help us discriminate when comorbid AD and conduct problems serve as risk factors or protective factors.

#### Clinical Phenomenology

The clinical phenomenology of both AD and conduct problems has been well substantiated in the literature.
Measures of anxiety and fears typically correspond to symptoms of anxiety in youth, whereas measures of oppositional, aggressive, and delinquent behavior tend to characterize symptoms of oppositionality in youth (Achenbach 1991b; March et al. 1997; Ollendick 1983). Broadband measures of internalizing symptoms typically map onto childhood AD but may not distinguish ADs from other internalizing conditions, such as the depressive disorders (Achenbach 1991b; Seligman et al. 2004). Similarly, the measures of externalizing symptoms relate to ODD and CD but may not differentiate these disorders from each other or from other externalizing disorders such as ADHD (Achenbach 1991b). The relationship between externalizing symptoms and conduct problems and internalizing symptoms and ADs are generally consistent across informants.

It is important to examine whether the clinical profile of comorbid AD and conduct problems captures the features of both disorders or whether the comorbid profile is clinically distinct from features typically associated with either disorder alone. To date, there is limited research pertaining to the phenomenology of comorbid AD and conduct problems. One phenomenological investigation examined AD and externalizing disorders in children in relation to children with a pure AD, comorbid ADs (e.g., GAD and SAD), and comorbid AD and depressive disorders (Franco et al. 2006). Results indicated that the comorbid AD and externalizing group had significantly higher ratings of child-reported anxiety and fears and parent-reported internalizing symptoms than the AD only group, but not higher ratings than the other comorbid groups. Moreover, ratings of parent-reported externalizing symptoms were significantly higher in the AD and externalizing disorders group when compared to the other groups. One limitation to this investigation was it included ADHD, CD, and ODD in its category of “externalizing disorders.” Thus, the true clinical phenomenology of a child with AD and conduct problems (i.e., ODD or CD) cannot be determined from this investigation.

Kendall et al. (2001) reported pre-treatment measures of anxiety, depressive symptoms, internalizing, and externalizing symptoms in AD youth in the context of a broader treatment outcome study. The findings were grouped by children with a single AD, more than one AD, and comorbid AD and externalizing disorders. While Kendall and colleagues did not report statistical tests of group differences at pre-treatment (they were statistically compared with post-treatment data only), some general trends are evident via visual inspection of the data. For example, child reports of anxiety were generally congruent across groups, whereas child reports of depressive symptoms appeared higher in the multiple AD group and the comorbid AD and externalizing disorder group when compared to the AD only group. Both parent and teacher reports of internalizing symptoms appeared congruent across groups. Not surprisingly, parent reported that externalizing symptoms appeared higher in the AD/externalizing group when compared to the other groups. While interpretation of these data is limited in the absence of statistical tests of group differences, it appears depressive symptoms and externalizing symptoms are more common in the comorbid AD/externalizing group when compared to groups with other comorbid internalizing disorders and to those with a single anxiety diagnosis.

Overall, the phenomenological data are limited as the aforementioned examinations do not use a pure comorbid AD and conduct problems category, but rather an AD/externalizing disorders category when making comparisons across single diagnoses or other comorbid groups. Specific research on the phenomenology of youth with comorbid AD and conduct problems is needed.

Demographic Factors

Little is known about the demographic correlates in youth with comorbid AD and conduct problems when compared to other groups. The overall prevalence rate of conduct problems appears to increase from childhood to adolescence (though two pathways with an early and late onset have been identified), whereas AD appears to fluctuate with age, though it may be most common in adolescence (Loeb and Keenan 1994). Additionally, each AD may have a different prevalence rate as a function of age. Certain ADs (e.g., SAD, GAD, specific phobia) may appear as early as preschool, and their prevalence decreases with age. In addition, conduct problems are generally more common in boys and anxiety is generally more common in girls (Ollendick and Seligman 2006).

A meta-analysis by Loeb and Keenan (1994) reveals that the odds for comorbid AD and conduct problems shift from positive to negative between the ages of 11 and 19 years of age. That is, the likelihood of comorbid AD and conduct problems is more probable in early adolescence and less probable in later adolescence. However, these findings are limited in that they have not been substantiated or been the subject of more recent investigations. Additionally, Loeb and Keenan (1994) used differing diagnostic criteria (e.g., DSM-III and DSM-III-R vs. DSM-IV), informants, and instruments in their meta-analysis. As noted earlier, other studies report the likelihood of comorbid AD and conduct problems in adolescence to be over three times greater than what would be expected by chance alone (Angold et al. 1999a, b). Note that in order to calculate the expected rates of the conditions co-occurring, the prevalence rate of each individual disorder would be multiplied. In the Angold and colleagues review, the actual rate of comorbidity exceeds this estimated rate by over three times.
In a clinical investigation, Kendall et al. (2001) reported that boys appeared to have higher levels of co-occurring AD and externalizing disorders than girls, although there were no differences in age or race across the groups. Marmorstein (2007) examined comorbidity in several community samples of youth aged 9–17 years and found the strength of association between ADs and ODD/CD tended to be stronger for boys than for girls (for social phobia) and the association for ODD alone tended to be stronger for boys than for girls (for SAD). Furthermore, there appeared to be a stronger relationship between ADS and conduct problems for younger youth (for overanxious disorder, the precursor to GAD).

Loeber et al. (2000) suggest that gender and age are crucial parameters in developing comorbid conditions with conduct problems. The authors propose a “gender paradox” for comorbid conditions, in that the gender with the lowest prevalence of a disorder appears to be more at risk for increased impairment and additional comorbidities. Loeber et al. (2000) concluded that these risks of developing ADs or depressive disorders are increased in girls with conduct problems. However, it should be noted that the risk of girls developing other disorders as a result of conduct problems was not limited to ADs but also included mood disorders and substance abuse. In addition, the Dunedin Longitudinal Study suggests that disruptive behavior disorders in girls predicted emotional disorders several years later (Angold et al. 1999a, b). Moreover, Robins (1986) reported that internalizing disorders were common in girls with CD (64–73%) and occurred twice as frequently as they occurred in girls without CD (see also Zoccolillo 1992). Given the limited data, the sociodemographic characteristics in children with DSM-IV disorders are less determined from social withdrawal.

Further, it may be important to distinguish between social anxiety and social withdrawal in terms of psychosocial correlates of children with comorbid AD and conduct problems (Loeber et al. 2000). There is some evidence to suggest social anxiety may serve as a protective factor against developing conduct problems and related behaviors, whereas social withdrawal may be a risk factor in predicting conduct problems (Kerr et al. 1997; Ollendick and Hirshfeld-Becker 2002). Social anxiety, for example, may indicate more sensitivity to social punishment and social rewards, which may reduce conduct problems. On the other hand, behaviors symptomatic of conduct problems, such as ODD (e.g., frequently annoying others), may be related to peer rejection and ultimately social withdrawal. Thus, a thorough clinical assessment using a semi-structured interview, self-reports, and behavioral observations may be a useful approach to delineate anxiety in social situations from social withdrawal.

Overall, comorbid child AD and externalizing disorders may be related to poor social outcomes. It is difficult to determine a specific understanding of the role of psychosocial factors and development of comorbid AD and conduct problems at this time. However, there is evidence that suggests comorbid AD and externalizing disorders are associated with greater impairment in social functioning.

Psychosocial Factors

It is also important to examine the psychosocial correlates in children with co-occurring ADs and conduct problems. Unfortunately, however, there are limited data addressing this issue. However, Franco et al. (2006) found that children with comorbid ADs and externalizing disorders were less likely to be involved in extracurricular activities when compared to children with an AD alone. However, the comorbid AD/externalizing group could not be differentiated from the comorbid AD group or the comorbid anxiety/depressed group in these analyses. Furthermore, AD/externalizing children had significantly worse peer relationships than children with a single AD. However, these results also indicated that children with co-occurring ADs and depressive disorders also had significantly worse peer relationships than children with AD alone. Social factors may also predict psychopathology outcomes in youth. For example, Keiley et al. (2003) found that child unadaptability in social situations was not only related to internalizing disorders but also to low levels of externalizing symptoms. Peer rejection appears to be specifically associated with externalizing disorders, whereas peer neglect is tied to internalizing disorders. Thus, it is possible unadaptability and peer rejection may stem from a shared causal agent, such as high levels of introversion or high levels of constraint (Lilienfeld 2003; Tellegen 1982). Another possibility is both unadaptability and peer rejection are outcomes associated with a comorbid profile.

Family Environment

Our review will focus on three facets of family environment in relation to comorbid AD and conduct problems: parental psychopathology, parenting styles, and general family risk factors. It is important to note that these studies have typically measured anxiety and oppositional behaviors dimensionally and that studies of family environmental variables in children with DSM-IV disorders are less common.

Parental Psychopathology

Franco et al. (2006) found that parents of children with comorbid AD and externalizing disorders were significantly
more likely to endorse psychopathology in themselves than parents of children with AD alone. Angold et al. (1999a, b) reviewed a series of papers linking maternal depression to both ADs and disruptive behavior problems in their children (Beidel and Turner 1997; Hammen 1992; Last et al. 1987). Children of depressed parents or mixed anxious/depressed parents may have a much wider range of psychiatric disorders, such as AD and ODD (Beidel and Turner 1997). Maternal anxiety, but not paternal anxiety, also appears to predict child anxiety in a high-risk sample of 816 adolescents (McClure et al. 2001). Female children of anxious parents are more likely to have parent-reported behavior problems (Silverman et al. 1988).

**Parenting Style**

Perceived parental rearing behaviors (e.g., rejection, anxious rearing) may be related to the expression of both anxious and oppositional traits in children (Roelofs et al. 2006). Roelofs et al. (2006) examined the relationship between negative family factors (e.g., insecure attachment, adverse parent rearing) and internalizing symptoms (anxiety and depression) and externalizing symptoms (aggression) in 237 children aged 9–12 years. Results indicated that maternal and paternal rejection was significantly related to anxiety, depression, and aggression in both boys and girls. Emotional warmth was negatively related to anxiety in boys (for father) and aggression in boys (for mother). Overprotection was related to anxiety for both boys and girls, depression for girls (for mother), and depression for boys (for father). Maternal anxious rearing was related to anxiety, depression, and aggression for girls. Paternal anxious rearing was related to anxiety for both boys and girls, depression for boys, and aggression for boys. Overall, perceived rearing behaviors were significantly related to both internalizing and externalizing symptoms in children. Additionally, the perception of negative rearing behaviors in fathers may have a greater impact on symptoms in boys, whereas the perception of negative rearing behaviors in mothers may have a greater effect on girls.

Yahav (2006) examined the relationship between externalizing symptoms (aggression and delinquent behavior) and internalizing symptoms (depression, anxiety, somatic, or regressive behavior) and perceived parenting behavior in a sample of 159 children aged 10–17 years. The results suggest that both internalizing and externalizing symptoms are more strongly associated with negative perceptions of maternal and paternal rejection, favoritism, and overprotection, when compared to siblings and unrelated controls, though these results were particularly strong for externalizing children. Contrary to the findings by Roelofs et al. (2006), child/parent gender did not impact the results.

**General Family Environment**

In further support of the importance of family factors, there have been several studies that have linked aggression, anxiety, and family conflict (Jouriles et al. 1987). For example, there has been evidence to suggest parent–child aggression is correlated with anxiety withdrawal in children (Jouriles et al. 1987; Lansford et al. 2002). Further data on the inter-relationship between family conflict, anxiety, and aggression have been documented in a prospective longitudinal study of 585 youth followed from kindergarten through the eleventh grade (Lansford et al. 2002). Results of this study indicated that youth who experienced parental maltreatment early in life were at increased risk for elevated rates of aggressive and anxious symptomatology in adolescence. These findings were consistent even when other factors related to child maltreatment were controlled. Additionally, cross-cultural research indicates that the use of physical discipline has been linked to both anxious and aggressive behavior in children (Lansford et al. 2005). The nature of the relationship between these variables, however, remains unclear. Finally, a recent investigation by Drabick et al. (2008) concluded that higher levels of family conflict were present in 243 clinic-referred boys (aged 6–10) with co-occurring anxiety symptoms and ODD symptoms when compared to groups with either condition alone. However, it is unclear how these results would be impacted by the inclusion of adolescents and girls.

**Temporal Relations**

There may be several temporal pathways to concurrent comorbidity: (1) shared and unique risk factors precede the development of both disorders; (2) AD precedes the development of conduct problems; and (3) ODD precedes the development of ADs. It should be clear that it is not necessary that one disorder “causes” the other disorder in the studies of temporal relations. While the risk of developing a comorbid condition is greater than developing a single psychiatric condition, the presence of one disorder and the risk for another imply correlation, not causation.

The first pathway suggests that shared or correlated risk factors may lead to the concurrent development of both AD and conduct problems (Caron and Rutter 1991). Even if the two disorders have differing risk factors, the risk factors themselves may be correlated with one another or with a third set of variables. Fergusson et al. (1996) also support the premise of overlapping/intercorrelated risk factors among comorbid conditions. For example, children who are anxious and have conduct problems may have a shared risk factor (e.g., parent psychopathology) that may precede
the development of high levels of both anxiety and conduct problems.

The second pathway suggests that AD precedes the development of conduct problems. In fact, the concept of “neurotic psychopathy” or “neurotic delinquency” (Karpman 1941; Lykken 1995) posits that chronic antisocial behavior stems from anxiety, guilt, and overcontrol of impulsive behaviors. However, more recent empirical support is lacking for such a position.

On the other hand, there is both theoretical and empirical evidence for the third pathway that conduct problems may precede the development of AD. For example, Frick et al. (1999) have shown that antisocial behavior frequently tends to precede the development of recurrent state anxiety. It should be noted that, however, individuals with externalizing behaviors often experience an array of adverse outcomes across interpersonal, academic, and occupational domains. In individuals who experience recurrent impairments across these domains, it may be problematic to distinguish between repeated episodes of state anxiety and trait anxiety, the latter of which is commonly observed in most children with an AD (Lilienfeld 2003).

In addition, Keiley et al. (2003) suggest that externalizing problems may precede depression, anxiety, and other internalizing symptoms, perhaps due to the mediating influence of peer rejection. Moreover, Angold et al. (1999) review findings from the Dunedin Longitudinal Study, which suggests disruptive behavior disorders in girls predicted internalizing disorders several years later (McGee et al. 1996). Zoccolillo (1992) also supports a similar temporal pattern given that more severe conduct problems increase the likelihood of additional disorders; persistent CD in adulthood only predicts adult anxiety/affective disturbances, and CD is associated with earlier onset of affective disturbances. Thus, the development of anxiety in children with conduct problems has been supported in theory and in research. This pathway to comorbid AD and conduct problems may be more pronounced in girls, though additional evidence is needed.

Pathology and Treatment Outcome

Severity of pathology and treatment outcome in relation to youth with comorbid AD and conduct problems is mixed. There is some evidence that anxiety may serve to bolster outcomes and facilitate treatment outcome, particularly in the treatment of conduct-related problems, though there is also evidence that children with comorbid ADs and conduct problems experience adverse clinical profiles/treatment outcomes (Russo and Beidel 1994; Walker et al. 1991). Others argue that comorbidity has little impact on pathology or treatment outcome.

Comorbidity as a Protective Factor

Youth with disruptive behavior disorders may experience improved treatment outcome in the presence of an AD. Recent evidence from Costin and Chambers (2007) examined comorbidity in relation to the effectiveness of parent training in 94 youth with ODD between 5 and 13 years of age. Study participants were divided into three groups: ODD alone, ODD and ADHD, and ODD, ADHD, and an AD or depressive disorder. Overall, comorbidity predicted improved treatment response. Interestingly, rates of improvement were greater for those in the comorbid groups compared to those in the ODD alone group, though these findings were not different between the comorbid externalizing group (ODD and ADHD) and the comorbid internalizing/externalizing group (ODD, ADHD, and AD/depressive disorder). Costin and Chambers suggest that improvement may be greater in the comorbid group because comorbidity may be a proxy for general severity rather than an indication of multiple disorders. In other words, the treatment approach may work equally well for those with or without comorbid conditions because the treatment reduces general psychopathology.

Comorbidity as a Risk Factor

Other findings support reduced treatment outcomes in comorbid anxiety and ODD, at least in adolescent samples (Zoccolillo 1992). Outcomes of comorbid AD–aggressive children may worsen as the children transition into adolescence (Walker et al. 1991) or the protective effect of AD on conduct-related symptoms dissipates (Russo et al. 1993). For example, in an epidemiological investigation into 11-year-old youths, those who were comorbid with ODD/CD and AD were rated as more aggressive and more hyperactive by parents and teachers than those youths with ODD/CD alone (Anderson et al. 1987).

Whereas the role of ADs in the treatment outcome of disruptive behavior problems is mixed, the presence of conduct problems may adversely impact the treatment of AD. Ferguson (2002) measured the impact of externalizing behaviors in the treatment of phobia disorders in a sample of 71 children (aged 6–17). For the 12 children in this sample with significant levels of parent-reported externalizing problems, the treatment effect (measured by diagnostic interview and child report and parent report) was reduced across all treatment conditions (e.g., contingency management, self-control, and educational control). However, this sample was very small and the age range was very large, so it is difficult to ascertain true patterns of treatment outcomes, especially as they relate to age.
Rapee (2003) also examined the influence of comorbidity on treatment outcome of childhood AD. He posited that there is little influence on treatment outcome for children with AD alone versus children with comorbid disorders in general, citing an investigation (Kendall et al. 2001) that found no differences when comparing the treatment outcome of a group intervention for youth with AD alone and youth with AD and comorbid conditions. Overall, the number and type of comorbidities with ADs do not appear to predict treatment outcome, according to investigations by Kendall et al. (1997, 2001, 2004) and Ollendick et al. (2010). However, the differences between comorbid AD/ODD children versus children with AD only were not specifically reported in these studies.

Similarly, Berman et al. (2000) found no differences in a follow-up study of 106 anxious youth between the ages of 6 and 17 years in terms of treatment outcome between a group of AD youth and a group of youth with comorbid AD and an externalizing disorders. On the other hand, differences were found for youth who had a comorbid depressive disorder when compared to the group with AD only; comorbid depression appeared to adversely impact treatment outcome.

Beauchaine et al. (2005) examined psychological treatment (parent training (PT), child training (CT), teacher training (TT)) for 514 ODD/CD youth between the ages of 3 and 8 years. They found that comorbid anxiety/depression moderated treatment outcome for youth in mother report models. Specifically, interventions including PT were the most effective for children who scored below the median on the CBCL anxious/depressed subscale, whereas all intervention combinations were equally effective for children with elevated anxious/depressed scores. On the other hand, latent growth curve modeling predicting slopes of externalizing behavior via mother report and behavioral observation suggested that higher levels of anxiety/depression were associated with a better treatment response (e.g., lower levels of externalizing behaviors). These findings are congruent with those that report youth with comorbid CD and depression have improved treatment outcome when compared to youth with CD alone.

**Synthesis and Integration**

The comorbidity of AD and conduct problems is over three times greater than what would be expected by chance. In both epidemiological and clinical samples, the rate of conduct problems in youth with ADs is approximately 10% and the rate of ADs in youth with conduct problems is approximately 40% (Angold et al. 1999a, b; Garland and Garland 2001; Greene et al. 2002; Kendall et al. 2001). This congruence of comorbidity rates across epidemiologic and clinical samples suggests that methodological reasons alone do not account for comorbidity rates exceeding chance estimates. Substantive reasons for comorbidity are vital for understanding clinical presentation and outcome of AD and conduct problems. Current literature is limited, as comorbid AD/externalizing youth may have higher levels of both internalizing symptoms and externalizing symptoms when compared to youth with single ADs, though it is unclear how youth with AD and conduct problems differ from youth with other comorbidities (Franco et al. 2006; Kendall et al. 2001). Similarly, children with comorbid AD and conduct problems may be less likely to be involved in social activities and have worse peer relationships when compared to youth with a single AD. However, it is not known how social dysfunction differs in the comorbid group when compared to youth with conduct problems alone (Franco et al. 2006). Greater parent psychopathology, perceived parenting style, and physical discipline are related to both AD and conduct-related symptoms in youth, but it is unclear if the relationship is stronger for youth with AD and conduct problems when compared to youth with either disorder alone (Lansford et al. 2005; Roelofs et al. 2006; Yahav 2006). Lastly, there is conflicting evidence regarding the comorbid profile in relation to treatment outcome, and it may be that outcomes worsen as youth transition to adolescence. Overall, there is evidence that youth with comorbid AD and conduct problems may suffer increased risk in terms of symptomatology, social impairment, and family impairment. However, age may protect comorbid youth from increased impairment. Thus, further research on the presentation, course, and outcome of youth with comorbid AD and conduct problems is needed.

**Future Directions for Research and Practice**

Comorbidity of AD and conduct problems may have important implications for diagnosis, assessment, and treatment. For example, one means of conceptualizing comorbid AD and conduct problems may be to utilize diagnostic categories that incorporate symptoms of both disorders. One potential approach involves creating subcategories of a given disorder (e.g., AD with oppositional features) (Angold et al. 1999a, b). Yet another approach is to create new diagnostic categories that represent comorbid conditions. For example, the purpose of the ICD-10 Category of mixed disorder of conduct and emotions was to allow a single diagnosis to capture heterogeneous symptomatology (Angold et al. 1999a). However, Zoccolillo (1992) rejected the notion of such an approach and instead
argued separate disorders should be diagnosed when comorbid conditions of conduct and emotional disorders occur. Specifically, he proposed that anxiety represented a dysfunction in affect regulation, whereas conduct disorder/ODD represented a form of social dysregulation. This hypothesis is enlightening, given the potential importance of distinguishing between social anxiety and withdrawal in outcome research. Moreover, the creation of new diagnostic categories/subcategories may be problematic as they may lead to a greater preponderance of disorders. Thus, the utility of creating additional classifications is questionable.

Multi-informant issues and strategies for assessing children with ADs and conduct problems are worthy of further consideration (De Los Reyes and Kazdin 2005; Grills and Ollendick 2002; Jensen et al. 1999). In terms of assessment approaches, the “gold standard” is typically a semi-structured or structured diagnostic interview with multiple informants. For childhood ADs, the Anxiety Disorders Interview Schedule (ADIS) for parent and child informants has been shown to possess good reliability and validity (Silverman et al. 1994). One limitation to the ADIS is that the child is not asked about symptoms of oppositionality; this module is completed exclusively during the parent interview. For child disruptive behavior disorders, the NIMH Diagnostic Interview Schedule for Children Version IV (DISC-IV) is commonly used in research investigations (Shaffer et al. 2000). The DISC-IV is comprehensive but highly structured and may allow for less flexibility than a semi-structured report. The DISC-IV is also limited in its ability to assess for symptoms of anxiety. Other interviews used for both internalizing and externalizing disorders include the Schedule for Affective Disorders and Schizophrenia for School-Age Children (Ambrosini 2000) and the Diagnostic Interview for Children and Adolescents (Reich 2000).

In a comprehensive approach to assessment, obtaining self-, parent-, and teacher-reports of AD and conduct problems is also important. The CBCL measures psychopathology via multiple sources using DSM-IV criteria as well as other factors of relevance, including anxiety, depressed/withdrawal, aggression, and delinquent behaviors (Achenbach 1991b). One example of an anxiety-specific measure is the Multidimensional Anxiety Scale for Children (March et al. 1997), while symptoms of ODD can be measured through the Revised Behavior Problems Checklist (Quay and Peterson 1988). All of these measures require more distinction between age-norms and atypical disruptive behavior (Loeb et al. 2000).

Behavioral observation is another useful means of obtaining useful diagnostic information (e.g., family interaction) without the biases of the various informants (Hudson and Rapee 2000). For example, one task has been used in the measurement of parent–child interactions in children with anxiety and disruptive behavior disorders. This task involves assigning the dyad to a puzzle task (Tangram) that they are unable to complete within an allocated time. The coders then assess for interactions along the dimensions of overcontrol/underinvolvement and criticism/warmth.

Overall, comorbidity is best measured through a comprehensive assessment battery including a (semi)structured interview with parent-, teacher-, and child-reports of psychopathology and behavioral observation. The discrepancies among the various measures should be disentangled via clinician expertise.

To date, no empirically validated treatments have been developed for children and adolescents with comorbid AD and conduct problems. One promising approach used in several investigations involves modifying evidence-based treatments for AD or disruptive behavioral disorders so as to treat symptoms of both disorders (Chorpita et al. 2004; Levy et al. 2007). In this vein, several treatments hold promise for targeting both AD and conduct problems in children. Given cognitive-behavioral therapies for ADs and conduct problems have been empirically supported, a modification of pre-existing treatments to target one disorder may be a useful approach in developing treatments geared to target comorbid conditions.

One such investigation compared traditional cognitive-behavior therapy for AD to a cognitive-behavior therapy targeting both anxiety and aggression to children with co-occurring symptoms of anxiety and aggression (Levy et al. 2007). Results indicated little difference between the two active treatments, as both treatments led to significant reductions in parent-reported internalizing and externalizing symptoms. Although both groups experienced significant reductions in AD diagnoses and ODD diagnoses following treatment, there were no differences across conditions. One exception to these findings was significant improvements in parent-reported stress, anxiety, and depression in the anxiety-only treatment condition. Although such results are initially puzzling, similar trends were observed across both treatment conditions but were of only borderline significance for the combined treatment condition. The authors posit that the treatment approaches in both conditions improved parent psychopathology, which, in turn, improved parenting approaches in the reduction in child psychopathology. To date, there is no empirical evidence to support this hypothesis, however. A future direction may include validating such conclusions via mediational analyses of longitudinal data (for an example of a such mediational analysis, see findings from Egger and Angold 2006) Given these findings, it is not clear if a treatment geared to treat anxiety and aggressive symptoms can be effective over and above a treatment for anxiety symptoms alone.
Similarly, other treatment approaches such as modular cognitive-behavioral therapy utilize a modification of a traditional cognitive-behavioral therapy to target comorbid conditions in youth (Chorpita et al. 2004). This treatment modified a standardized treatment approach for child anxiety while allowing the treatment to be tailored to the individual needs of the child through use of a guiding algorithm. Specifically, the modular CBT approach consisted of 13 treatment modules including self-monitoring, psychoeducation, exposure, cognitive restructuring, social skills training, rewards, differential reinforcement strategies, time-out, and maintenance and relapse prevention. The treatment first used a core approach of self-monitoring, education about anxiety, practice of feared situations, and education about maintaining new skills. Within the framework of this core approach, the treatment of the AD was addressed first. Then, if moderate to severe disruptive behavior was reported, the treatment called for a “time-out” module. If mild disruptive behavior was reported, an active ignoring component was added to the treatment.

Chorpita and colleagues (2004) used a multiple baseline design to treat 11 children with an AD between the ages of 7–13 years. Among the 7 completers, all principal diagnoses were absent at post-treatment and at 6-month follow-up assessments. Moreover, measures of anxiety symptoms and global functioning improved for most of the children across the various informants. The majority of children in the study had comorbid ADs or comorbid anxiety and depressive disorders. Thus, while none of the seven children treated in the multiple baseline design had comorbid anxiety and conduct problems, the treatment was designed so it could be tailored to treat anxiety and conduct problems, as well as other comorbid conditions.

Several other investigations have adapted Parent–Child Interaction Therapy, a treatment developed primarily for use with children with ODD, to treat SAD in youth with considerable success (Choate et al. 2005; Pincus et al. 2005). Given SAD may have symptom overlap with ODD, this treatment adaptation may be particularly useful for children with these comorbid features. The treatment aimed at modifying maladaptive family environment to alleviate symptoms associated with SAD. The use of “special time,” which is a common feature of many behavior treatments for ODD in children, was positively received by parents of anxious youth, and all pilot families indeed reported a subsequent increase in warmth. Since both child anxiety and oppositionality are related to lack of parental warmth, this treatment component may be particularly useful for improving family environment for comorbid individuals.

Thus, overall, there are some promising directions underway in research and clinical domains pertaining to comorbid AD and conduct problems in children. Additional research, particularly using clinical samples, is needed to clarify substantive reasons for comorbidity, such as symptom presentation, nature of social impairment (withdrawal versus social anxiety), and family environmental factors (parent psychopathology, parenting behaviors, physical discipline) in relation to youth with comorbid AD and conduct problems when compared to youth with either disorder alone or other comorbidities. It will also be useful to examine whether relationship between these variables differ based on the type of ADs comorbid with type of conduct problem (e.g. ODD versus CD), and sociodemographic factors, such as the age and gender of the youth. Once such factors are more strongly identified as correlates with the AD/conduct problems subgroup, treatment approaches can be refined. For example, given the relationship between parent psychopathology and youth with AD and conduct problems in the current literature review, targeting parent psychopathology in treatment may be useful for improving youth treatment outcomes. Similarly, identifying and targeting social impairment may be beneficial for such youth. While there are still many issues to resolve regarding the comorbidity of AD and conduct problems, there are some clear trends in the literature, which can provide valuable insights toward successfully understanding, assessing, and treating these substantively co-occurring conditions.

References


