leaves little room for other factors to influence lung cancer (e.g., diet, exercise, genetic predispositions).

Regarding our own meta-analysis, Block and Crain (2007) stated that we “did not provide references for the studies included in their meta-analysis; therefore it is impossible to replicate their study or determine if they again used the faulty transformation to convert odds ratios, relative risk to correlation coefficients” (p. 252). We did not include references for the studies in our meta-analysis because the editor of American Psychologist thought it would be better to have interested individuals contact us directly for these references rather than to use valuable journal space listing hundreds of references. These references are readily available from Brad J. Bushman.

We do agree with Block and Crain’s (2007) conclusion that violent media effects constitute an important and controversial topic and that the results from scientific studies on media-related aggression need to be accurate and replicable. Our 2001 article relied heavily on meta-analytic procedures to integrate the literature on media-related aggression. Meta-analytic procedures are more objective, accurate, and replicable than are traditional narrative procedures (e.g., Bushman & Wells, 2001; Cooper & Rosenthal, 1980). Although violence in the media is not the only factor that increases aggression, or even the most important factor, it is not a trivial factor.

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Transforming Odds Ratios Into Correlations for Meta-Analytic Research

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Block and Crain (2007, this issue) stated, “There is no data transformation that converts an odds ratio or relative risk into a correlation. One needs more data” (p. 252). The purpose of this comment is to explain how an odds ratio or relative risk can be transformed to approximate a product–moment correlation. Such transformations have important applications in meta-analytic research.

Meta-analysis often involves the combination of product–moment correlations obtained from multiple published studies. A product–moment correlation between two quantitative variables (X and Y) is commonly referred to as a Pearson correlation. If one variable is naturally dichotomous (male/female, Treatment A/Treatment B, etc.) while the other variable is quantitative, the product–moment correlation between X and Y is called a point-biserial correlation. If both X and Y are naturally dichotomous, the product–moment correlation between X and Y is called a phi coefficient.

In contrast to naturally dichotomous variables, quantitative variables are sometimes measured on dichotomous scales. For instance, in survey research, where certain questions are of a sensitive nature (e.g., income, alcohol consumption, body weight), the response rate is often higher if the respondent is simply asked to check one of two broad categories (e.g., less than $40,000 per year, $40,000 or more per year) rather than a specific quantitative value. In other applications, genetic or psychometric theory predicts the existence of a latent quantitative variable that is observable only on a dichotomous scale as a result of the latent variable exceeding, or not exceeding, some unknown threshold value. Quantitative variables that are measured on dichotomous scales are referred to as artificially dichotomous.

When X and Y are naturally or artificially dichotomous, data from a sample of n respondents may be summarized in a 2 × 2 contingency table as shown in Table 1, where p_{11} are the cell proportions, p_{1+} is a marginal row proportion, and p_{+1} is a marginal column proportion. The association in a 2 × 2 contingency table is often reported in terms of an odds ratio,

\[ OR = \frac{p_{11}p_{22}}{p_{12}p_{21}}, \]

or a relative risk,

\[ RR = \frac{p_{11}/p_{1+}}{p_{21}/p_{2+}}, \]

where X is the predictor variable and y_{1} is the response category of interest. A relative risk may be transformed into an odds ratio using the following equality:

\[ OR = RR\left(\frac{1 - p_{12}/p_{2+}}{1 - p_{11}/p_{1+}}\right). \]

In applications where the response category (y_{1}) is rare, note that p_{11} and p_{21} may be very small so that p_{11} \approx p_{12}, p_{21} \approx p_{22}, and thus RR \approx OR.

The problem of estimating the Pearson correlation between two quantitative variables using information from a 2 × 2 contingency table is one of the oldest problems in statistics (Pearson, 1900) and involves the computation of a tetrachoric correlation. The computation of the exact tetrachoric correlation is complicated but may be obtained in the current version of SAS. If a study reports the odds ratio but does not provide enough additional infor-

Table 1

<table>
<thead>
<tr>
<th>2 × 2 Contingency Table</th>
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<tbody>
<tr>
<td>x₁</td>
</tr>
<tr>
<td>p₁₁</td>
</tr>
<tr>
<td>p₂₁</td>
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<tr>
<td>p₁⁺</td>
</tr>
</tbody>
</table>

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mation to reconstruct the $2 \times 2$ contingency table, the following tetrachoric approximation suggested by Pearson (1900),

$$\cos(\pi(1 + OR^{1/2})),$$

or the following tetrachoric approximation suggested by Digby (1983),

$$(OR^{3/4} - 1)/(OR^{3/4} + 1),$$

could be used. Pearson’s approximation will be more accurate than Digby’s approximation when the marginal proportions are approximately equal; otherwise, Digby’s approximation is usually preferred.

The phi coefficient,

$$(p_{11}p_{22} - p_{12}p_{21})/[p_{11}p_{22} + p_{12}p_{21}]^{1/2},$$

may be the preferred measure of association when both variables are naturally dichotomous. If the marginal proportions are approximately equal, the phi coefficient is well approximated by

$$(OR^{1/2} - 1)/(OR^{1/2} + 1),$$

which is Yule’s $Y$ coefficient (Yule, 1912).

The problem of estimating a point-biserial correlation from a $2 \times 2$ contingency table was considered by Thorndike (1949), who proposed adjusting a phi coefficient to define a biserial-phi coefficient. A more accurate point-biserial approximation, which is a function of the odds ratio, was recently proposed by Ulrich and Wirtz (2004). The Ulrich–Wirtz approximation is

$$\ln(OR)/\ln(OR^2) + 2.89n_1^2/n_1, n_2$$

where $n = n_1 + n_2$ and $n_1$ is the number of respondents at each level of the naturally dichotomous variable. The following transformation may be used to approximate Cohen’s $d$:

$$r/[pq(1 - r^2)]^{1/2},$$

where $r$ is the Ulrich–Wirtz point-biserial approximation, $p = n_1/(n_1 + n_2)$, and $q = 1 - p$, with the sign of $r$ assigned to the sign of $d$. This approximation to Cohen’s $d$ should be about as accurate as the best approximations examined by Sánchez-Meca, Martín-Martínez and Chacón-Moscoso (2003).

The above results show how product–moment correlations may be approximated from an odds ratio. More accurate approximations are possible with additional information regarding the marginal proportions. In studies that report an odds ratio but do not report the values of $p_+$, or $p_-$, expert opinion or information from previous studies might be used to obtain an accurate subjective estimate of the smallest marginal proportion ($p_{min}$). If an accurate subjective estimate of $p_{min}$ can be obtained, the following tetrachoric approximation proposed by Bonett and Price (2005) should be more accurate than the Pearson (1900) or Digby (1983) tetrachoric approximations,

$$\cos(\pi(1 + OR^3)/4),$$

where $c = (1 - p_{1+} + p_{+1})/(5 - (1/2 - p_{min})^3)/2$, and the following phi approximation proposed by Bonett and Price (2007) should be more accurate than Yule’s $Y$,

$$(OR^2 - 1)/(OR^2 + 1),$$

where $g = 1/2 - (1/2 - p_{min})^2$. The standard errors of all of the above product–moment approximations are easy to compute because the approximations are simple functions of an odds ratio (see Bonett & Price, 2005, 2007).

It is possible to impute all four cell proportions in the $2 \times 2$ contingency table if information about the marginal proportions is provided along with the odds ratio. Given values of OR, $p_{1+}$, $p_{2+}$, $p_{+1}$, and $p_{+2}$, the cell proportions are equal to

$$p_{11} = (a - b)/2(OR - 1)$$

$$p_{12} = p_{1+} - p_{11}$$

$$p_{21} = p_{+1} - p_{11}$$

$$p_{22} = p_{+2} - p_{21},$$

where $a = OR(p_{1+} + p_{+1}) + p_{2+} - p_{+2}$ and $b = (a^2 - 4p_{1+}p_{+1}OR - 1)^{1/2}$. The exact value of a tetrachoric correlation or a phi coefficient, rather than the approximations given above, may then be computed from the four imputed cell proportions.

Researchers who report an odds ratio or relative risk also should report enough information to reconstruct a $2 \times 2$ contingency table for the benefit of future meta-analytic studies. Unfortunately, many published articles do not provide enough information to reconstruct a $2 \times 2$ contingency table, and the approximation methods presented here will be helpful in those cases.

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**The Demise of the Increasingly Protracted APA Journal Article?**

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Reis and Stillier (1992) tabulated various publication characteristics of the *Journal of Personality and Social Psychology (JPSP)* for the publication years of 1968, 1978, and 1988 and found significant increases over time in pages, studies, and references per article. More recently, Adair and Vohra (2003) sampled journals in physics, biology, sociology, and social and experimental psychology from 1972 to 2000 and found that the number of references per article had increased, but drastically so for social and experimental psychological journals. The goal of the present comment was to empirically examine and describe the temporal trends in article length for American Psychological Association (APA) primary journals over the last 20 years (1986–2005) and the extent to which these trends were moderated by differences in journal impact factor (i.e., frequency of article citation).