Introduction to Section on Meta-Analysis

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Although meta-analysis has grown rapidly in popularity since its introduction, many researchers and practitioners remain unclear as to the utility and meaning of the statistics associated with such research. In an attempt to remedy some of these effects, this section of the journal will be devoted to a collection of articles exploring meta-analysis as it applies to assessment, treatment, and research in the area of forensic psychology. Ultimately, the hope of this section is to encourage a greater understanding of meta-analysis and how it may be applied to issues related to forensic psychology. Those with experience related to meta-analysis or conducting research that involves meta-analysis are encouraged to submit articles.

Meta-analysis was first coined by Gene Glass and referred to as "the analysis of analyses" (Glass, 1976). The procedure of meta-analysis involves the statistical examination of a collection of individual studies for the purpose of integrating the findings into a meaningful summary. This summary is intended to inform what is known regarding empirical research in a particular area and to address a specific hypothesis. Although synthesizing research findings has a documented history dating back to the 1930s, Glass is considered to have "reinvented" the method in 1974 while attempting to refute the conclusion of H. J. Eysenck that psychotherapy was ineffective (Noble, 2006). The term "meta" is derived from the Greek for "after." Meta-analysis, therefore, refers to the analysis of at least two primary datasets after each has been scrutinized for scientific merit. Since its introduction, meta-analysis has become widely accepted across various disciplines. Currently, searches of the Education Resource Information Center (ERIC) and PsycINFO produce over 3,000 and 4,000 articles on meta-analyses written since 1967, respectively.

Meta-analysis has been proposed to strengthen empirical findings in multiple ways. It allows for the summarization of effects across available studies to provide a more meaningful interpretation in practical as well as statistical terms (Lipsey & Wilson, 1993). It allows for a more objective evaluation of evidence, reducing disagreement (Egger & Smith, 1997). It is helpful in clarifying the true effect among studies that are conflicting (Egger & Smith, 1997). Fixed-effects meta-analysis (i.e., model in which the assumption is that there is one true effect size that underlies all of the studies in the analysis and that all differences in observed effects are due to sampling error) has been shown to increase statistical power by reducing the standard error of the weighted average effect size and, as a result, reducing the confidence interval around the effect size (Cohn & Becker, 2003). According to Wolf (1986), meta-analysis may provide a method to overcome problems associated with traditional literature reviews (e.g., subjective weighting of studies and their interpretation). In sum, the method of meta-analysis provides an avenue for deciphering meaningful results across multiple studies.

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Despite the many strengths associated with meta-analysis, the method also poses numerous potential weaknesses. As noted by Bornstein (1989), common criticisms of meta-analysis generally fall into four distinct areas. The first relates to sampling bias, which is often referred to as *the file drawer problem*. That is, individuals using meta-analysis are at risk of introducing error through sampling bias should the meta-analysis fail to incorporate or account for unpublished, nonsignificant findings. Research has demonstrated the tendency for larger effect sizes in published articles relative to those found in dissertations (Bangert-Drowns, Kulik, & Kulik, 1984; Smith, 1980). Although the reasons behind this difference remain unclear, Bangert-Drowns (1986) suggested that such a bias may relate more to editorial preference, politics of research finance, or the differential capabilities and biases of professional and graduate students than true treatment effects. Should a meta-analyst include only those studies that have been published, the resulting meta-analysis may overestimate the true effect size. The second area of criticism relates to the variability that exists in the methodological soundness of different studies. Those arguing from this perspective suggest that all studies are not created equal; with some being more methodologically sound than others. Such methodological differences are feared to be ignored if studies are given equal consideration for inclusion in the meta-analysis. The third area of criticism is related to averaging effect sizes across studies that have marked variability with regard to methodologies, variables, subjects, etc. (sometimes referred to as *the apples and oranges problem*). Much like the second area of criticism, those arguing from this perspective fear that variability across studies will lead to inaccurate summary effect estimates. The final area of criticism relates to summarizing broad, complex issues with a few overall effect-size estimates. Those arguing from this perspective express concerns that the summary effects offered through meta-analysis are overly simplifying complex relationships among variables, thereby ignoring potentially valuable information.

Although meta-analysis is not free from potential pitfalls, there are proposed solutions to address many of the weaknesses described above. These solutions include, but are not limited to:

- performing a broad-scoped, comprehensive search of the literature with a particular focus on including a representative selection of unpublished works;
- remaining mindful of potential methodological inferiorities that may influence the quality of the resulting meta-analysis while avoiding the application of stringent and haphazard determinations of inclusion standards, which may inject biases and influence the resulting summary effect;
- using statistical analyses that assess for the potential presence and influence of bias prior to drawing conclusions from a summary effect (e.g., funnel plot, Rosenthal's *Fail-safe N*, Orwin's *Fail-safe N*, Duval and Tweedie's *Trim and Fill*).

Those interested in further guidance on the process of literature searches and statistical analyses may consult Borenstein, Hedges, Higgins, and Rothstein (2009); Rothstein and Hopewell (2009); Noble (2006); and/or Reed and Baxter (2009).

Similar to other disciplines, the field of forensic psychology has benefited tremendously from the development and implementation of meta-analysis. In addition to providing a

meaningful summary from a collection of research literature that provides information from a substantially larger sample, meta-analysis has provided researchers and clinicians with the ability to draw conclusions from samples that were otherwise limited by low base rates. Ultimately, a well-constructed meta-analysis enables those in the field to draw more confident conclusions regarding relationships that may have been previously attributed to spurious findings.

Those in the field of forensic psychology interested in evaluating the quality of a meta-analysis are encouraged to apply many of the same methods for evaluating the quality of a primary research finding. Suggestions include, but are not limited to, evaluating:

- whether the research question(s) is/are well formulated;
- whether a comprehensive review was conducted (e.g., consideration of unpublished research, non-English articles);
- whether the meta-analysis addresses the degree of potential publication bias;
- what, if any, inclusion/exclusion criteria were used with accompanying rationale; whether selection criteria were implemented to limit bias (e.g., additional reviewers);
- whether the reliability and validity of individual studies is addressed;
- whether inclusion of assessments to evaluate for the presence of heterogeneity across studies was completed.

Further guidance for the reporting and reviewing of meta-analyses is provided by the APA Publications and Communications Board Working Group on Journal Article Reporting Standards (2008).

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