Research Integration: An Essential for Department of Defense Psychological Research

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Abstract

This paper presents a procedure for integrating the findings of psychological research of interest to the Department of Defense (DoD). In recent years, there has been increasing emphasis on applying more objective, quantitative methods to the integration of research results. This paper reviews various approaches to research integration, describes the meta-analysis approach of Glass (1977), and suggests some directions for the application of meta-analytic procedures to military psychological research.

Introduction

The number of research studies has rapidly increased in many disciplines, including psychology. Within the psychological arena lies a sizable body of research of interest to the Department of Defense (DOD). For decades, a wide variety of psychological research has been conducted in military settings and with military populations (Oliver, in press). Yet this proliferation of research seems not to have advanced the state of science to the extent that one might have expected. In considering the problem of so much research and the relatively few conclusions that can be drawn from it, Frank Schmidt concluded that "the most important problem in psychology and the social sciences today is the failure to produce cumulative knowledge" (Schmidt, 1980).

Accordingly, the purpose of this paper is to review various approaches to research integration, to describe in more detail the meta-analysis approach of Glass (1977), and to suggest some directions for the application of meta-analytic procedures to military psychological research.

Approaches to Research Integration

In this paper, research integration refers to combining the research results of a group of studies. Several procedures that can be used to integrate research findings are described below.

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[1]The views expressed in this paper are those of the author and do not necessarily reflect the views of the US Army Research Institute or the Department of the Army.

Literary approach. The literary or narrative approach has been the traditional procedure for integrating research findings. The reviewer reads the studies on a given topic and attempts to derive generalizations about the outcomes of that body of research. This can be an extraordinarily difficult task, especially if the number of studies is large or the results conflict. In addition, due to the subjective nature of this process, different reviewers may reach different conclusions when integrating the results of essentially the same body of research (Smith, Glass, & Miller, 1981). Such reviews typically end with a call for more research to resolve the conflicts.

Box-score approach. In the box-score or vote-counting approach, a directional hypothesis is assumed. The reviewer classifies the findings of each study into positive significant, negative significant, and nonsignificant categories and tallies the results. (Reviewers usually do not indicate the direction of the nonsignificant results.) Again, the results may conflict and make it difficult for the reviewer to draw firm conclusions about the research being integrated. One objection to the box-score approach is that it does not take into account the magnitude of the significant results. Hedges and Olkin (1980) have also demonstrated that the probability is high of failing to conclude there is a positive effect when in fact there is and also that the probability of making this error may increase as the number of studies increases.

Meta-analysis. According to Glass (1977), meta-analysis is the statistical analysis of the analytic results from a number of independent studies. To accomplish such an analysis, the findings of the individual studies must be quantified. The approach developed by Glass and his colleagues (Glass, McGaw, & Smith, 1981) is described in the next section of this paper. However, there are other, related meta-analysis procedures. Hunter, Schmidt, and Jackson (1982) have expanded their validity generalization techniques into a full-fledged meta-analytic approach. Hedges and Olkin (1980, in press) have advanced statistical theory and applications to meta-analysis. Also, Rosenthal (1978) has summarized a number of methods for combining the probabilities obtained from the result of two or more studies.

The Meta-Analysis Approach

The meta-analysis procedure most frequently employed to date (and the one which will be described below) has been the one developed by Glass and his colleagues. The unit of analysis in this approach is a standardized mean difference called the effect size.

To calculate the effect size. In their meta-analysis of psychotherapy research, Smith and Glass (1977) (see also Smith, Glass, & Miller, 1980) have defined the effect size as the difference between the means of the experimental and the control groups on a given dependent variable divided by the standard

deviation of the control group. That is,

$$\text{Effect Size} = \frac{M_E - M_C}{SD_C}$$

Using this formula, it is possible to express the standing of the average experimental group subject in terms of the control group distribution (see Smith & Glass, 1977; Spokane & Oliver, 1983). As McGaw and Glass (1980) warn, effect size is a simple concept, but its calculation can be complicated by differences in experimental design and the metric used. These authors suggest using the control group standard deviation as the denominator (McGaw & Glass, 1980, pp. 106-123). Hunter et al. (1982) agree with Glass that the experimental group treatment may affect the experimental group standard deviation as well as the experimental group mean. However, they argue for using the within-group standard deviation because the control group standard deviation has more sampling error and also because research reports are likely to contain values for *t* and *F* and fail to report the control group standard deviation (Hunter et al., 1982, p. 101).

Reports lacking means and standard deviations. If the data (means and standard deviations) are not reported in the study in question, it may be possible to estimate or retrieve the required data from those statistics that are reported (such as *t* and *F*). Procedures are also available for calculating effect sizes from correlation coefficients, nonparametric statistics, and dichotomous outcome variables (Glass et al., 1981). Occasionally, data can be obtained from the author of the article or report, but this procedure is time-consuming and generally unproductive (Oliver & Spokane, 1983).

Sometimes it is impossible to retrieve enough data (either from the research report or the author) to calculate effect sizes (Oliver & Spokane, 1982; 1983). The inadequacies of research reporting were dramatically apparent recently when the author and a colleague surveyed the research on senior leadership to determine the feasibility of using a meta-analysis approach on this literature. Of the 64 studies previously identified as empirical studies of senior leadership (Kimmel, 1981), only about 10% were suitable for use in a meta-analysis. This was a disappointing outcome, for senior leadership is currently of great interest to the Army. It had been hoped that a quantitative synthesis of the empirical findings in the area would be useful to the leader development research program being conducted by the Army Research Institute.

Suggestions

Following are some suggestions for capitalizing on research already accomplished and providing direction for future research in the DoD.

The meta-analysis approach has been used to integrate research findings in dozens of topical areas, primarily in the disciplines of psychology and education. It is important that such efforts be continued in order to determine what we can confidently conclude from our research as well as to identify gaps in our knowledge. In fact, it is likely that journal editors eventually will require that a meta-analysis approach be used for all literature reviews.

Until now, most research integration has concerned the civilian sector. These findings will have their greatest applicability for DoD civilian research. Little quantitative integration seems to have been accomplished for research relating to military populations and settings. At present, we are not certain to what extent findings based on civilian populations apply to the military. It will be important to use the meta-analysis approach to integrate the military research and then to compare the resulting findings with those of research conducted in the civilian sector.

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