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GENERALIZABLE BIOGRAPHICAL DATA VALIDITY CAN BE ACHIEVED WITHOUT MULTI-ORGANIZATIONAL DEVELOPMENT AND KEYING

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This research showed that the validity of a biodata instrument developed and keyed within a single organization can generalize to other organizations. It also examines a criterion measure—rate of promotional progress—that has not been used extensively in biodata research, but has several characteristics that make its use attractive. The validity of the biodata component of the Manager Profile Record (MPR), developed and keyed within a single organization, as a predictor of rate of managerial progress was cross-validated on a sample of 7,334 managers and staff professionals in 24 organizations. Results indicate the MPR was a valid predictor of rate of promotional progress across all organizations and that validity did not vary greatly across organizations ($\rho = .53$, $SD_\rho = .05$). The MPR was also a valid predictor for both sexes, as well as for managers of all age groups, lengths of company service, and education levels. These findings demonstrate that multiple-firm development and keying of a biodata instrument was not required for generalizable validity, and argue against the hypothesis of situational specificity. Suggestions for developing biodata instruments in single organizations that will generalize to other organizations include careful attention to the validity and reliability of criterion measures and developing validity at the item level.

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Biodata practitioners and researchers have a continuing interest in factors that affect the generalizability of the validity of biodata instruments. Prior research has investigated the appropriateness of particular samples for use in key development (e.g., applicants vs. incumbents: Stokes, Hogan, & Snell, 1993) and faking and other forms of response distortion (e.g., Lautenschlager, 1994). Others have examined the generalizability of biodata instruments across cultures (e.g., Dalessio, Crosby, & McManus, 1996; Hinrichs, Haanpera, & Sonkin, 1976; Laurent, 1970).

This paper describes the second in a series of studies examining factors that affect the generalization of biodata validities across organizations. In the first study, Rothstein, Schmidt, Erwin, Owens, and Sparks (1990) found that items screened for job relevance and keyed using large samples drawn from multiple organizations produced generalizable validities. Their sample of 11,000 first-line supervisors yielded a cross-validity of .32 against a criterion of job performance ratings. This validity generalized across organizations and demographic (racial, gender, and age) groups, as well as across levels of education, work experience, and company tenure. Their finding of generalizable validity supported the hypothesis of many early biodata theorists and researchers that it is possible to develop biodata instruments with generalizable validities (Campbell, Dunnette, Lawler, & Weick, 1970; Laurent, 1962, 1970; Owens, 1968, 1976; Owens & Schoenfeld, 1979; Sparks, 1983), and was contrary to hypotheses that empirically keyed biographical scales are situationally specific (cf. Dreher & Sackett, 1983; Hunter & Hunter, 1984; Thayer, 1977).

In the current study, we extended this line of inquiry by investigating whether a biodata instrument developed and keyed within a single organization can produce generalizable validity. We hypothesized that a biodata instrument that focuses on factors relevant to management activities in general would have validity that would generalize across organizations—within and between industries. That is, we posited that multi-organization selection and keying of items is not a necessary condition for producing generalizable validity. Our study differs from Rothstein et al. (1990) in three ways. First, the instrument used in their study was developed and keyed using a multi-organizational sample. In our study, the developmental sample was taken from a single organization. Second, our study used a different criterion measure, rate of promotional progress. Rothstein et al., like most biodata researchers, used performance ratings as their criterion measure. We argue below that our criterion measure is particularly reliable and construct valid. And finally, the current study examines a different job family than did Rothstein et al. Participants in our study were managers at all levels above first-line

supervisor, whereas the Rothstein et al. study involved first-line supervisors only. Before presenting the methods used in this study, we provide some historical background on the instrument we used.

Background on the Biodata Instrument Investigated

The biodata instrument investigated in this study was the empirically keyed autobiographical component of the Manager Profile Record (MPR).[1] The MPR had its genesis in the Early Identification of Management Potential (EIMP) research program begun in 1955 (Campbell et al., 1970; Laurent, 1962, 1970, Sparks, 1983). The EIMP program was sponsored by Standard Oil of New Jersey (SONJ) and was designed to develop tools that could be used to identify, early in their careers, individuals who are most likely to become successful managers.

Researchers working in the EIMP project found that one of the most difficult parts of the development effort was determining realistic criteria for management success (Laurent, 1962). They eventually agreed upon two criteria. The first, which they called a "success" index, was a composite measure of actual advancement rate and present job level. It incorporated job level, age, and length of company service. The second was an estimate of "potential," expressed in terms of the highest job level likely to be achieved in the course of each employee's career as judged by regional/divisional career development committees.

The original EIMP research study assessed 443 managers, all drawn from SONJ and representing various functional areas and levels of management from first and second line supervisors to executives. Assessments of both the success and potential criteria as well as autobiographical information available from tests, questionnaires and company records were collected. These data were subjected to item-level analysis in a double cross-validation procedure (Katzell, 1951) designed to produce a scoring key for each criterion.

Laurent (1962) noted that for the original group of 443 managers in the EIMP research program, validity relationships remained the same "when we separate men [*sic*] by functional activity. This indicated to us that there was some general characteristic of management which runs through all of these areas" (1962, p. 36). The EIMP biodata instrument was believed to sample that common core of general management characteristics—identifying individuals with high potential for success in overall management, not just in functional specialties. Laurent de-

[1] In addition to the biodata component investigated here, the complete Manager Profile Record contains a judgment questionnaire and a perception questionnaire. The Manager Profile Record is described in detail in Richardson, Bellows, Henry, and Co. (1992).

scribed the EIMP biodata instrument as "a sort of personality test [believed to measure] such things as independence, maturity, sociability, social responsibility, and certain kinds of vocational and avocational interests" (1962, p. 34).

EIMP research supported the notion that biodata validities might be generalizable. At that time, however, the EIMP biodata instrument had been validated only for white males and only in one firm. Thus, characteristics of the EIMP sample left unanswered questions about the extent of that generalizability.

Development of the MPR

The initial development of the MPR occurred in 1972–1973 as a follow up to the EIMP project. The items that form the MPR were drawn from instruments used in the EIMP research program, including a biodata instrument constructed specifically for that research. Several researchers who had participated in the EIMP program, none of whom are among the current authors, selected items based on their EIMP scoring key weights for the "success" (position and salary level) and "potential" (rankings of highest likely job grade) criteria. The selected items were modified to contain only gender-neutral references and were rewritten where necessary to be applicable to job candidates rather than current employees. The most unique characteristic of the MPR development is that validity was established at the item level, rather than total-score level. No item was included in the MPR unless response patterns on one or more of the alternatives were significantly related to the criterion and the weighting involved could be explained in rational, behavioral terms.

The resulting MPR contains 196 autobiographical items and is untimed. At the request of managers from a firm supporting the MPR development effort, the items were grouped into five subscales by a rational analysis of item content, guided by factor analytic data. The five subscales were labeled developmental influences, academic achievements, present self-concept, present family and social orientation, and present work orientation. Items representing each of the subscales are presented in the Appendix. The purpose of the subscales is only to communicate the types of information that are assessed by this instrument. That is, subscale scores are not used. A single MPR score is computed from all items across all five subscales.

The first use of the MPR biodata key was its application to the responses of 1,745 managers drawn from the same organization that contributed the original EIMP data. These individuals had taken the instrument at an early point in their careers, but, like the original EIMP sample, their scores were never used in determining work assignments, train-

ing opportunities, promotions, or for any other decisions during their careers. The demand characteristics of this assessment setting are not known. It is unlikely the subjects were told (or believed) that this assessment would be used solely for research purposes, so some reason may have existed for respondents to attempt to "fake good." However, since these individuals were already employees, the motivation to do so is not likely to have been very strong.

In that sample, scores on the MPR key produced observed validities of $r = .52$ for both criterion measures (success and potential). Observed subgroup validities ranged from .40 for female employees ($N = 50$) against the success (i.e., job performance) criterion to .70 for manufacturing employees ($N = 90$) against the criterion of job-level potential (Richardson, Bellows, Henry, & Co., 1992).

Method

Sample

By 1985, a total of 9,017 persons had been given the MPR in a series of concurrent validation studies. As described below, 7,334 of these people are included in our analysis. (Note that the 1,745 managers from the original EIMP organization were *not* included in our sample.) Subjects in the current study were taken from 24 organizations, representing industries as varied as pharmaceuticals, insurance, glass and paper production, coal mining, steel production, bakery products, chemical manufacturing, banking, hotel and motel management, and office products. Approximately half of the sample came from the banking industry. The number of subjects per organization ranged from 37 and 45 for the two smallest firms to 785 and 1,537 for the two largest firms. They ranged in age from 21 to 70, with a mean of 41 years. The mean value for years of work experience was just over 19, with an average of slightly more than 12 years of service to their current organization. Education levels varied: 19% had received no more than a high school education, 41% had received some education beyond high school, but had not received a bachelors degree, and 40% had received either a bachelors, masters, or doctoral degree.

Of the 9,017 managers who had completed the MPR, those who had 5 or more years of work experience (or 5 years of company service in those organizations without work experience data) were selected, yielding a sample of 7,334. As discussed below, this was done to ensure that all individuals in the sample had had a reasonable opportunity to differentiate themselves on the criterion measure.

The Criterion Measure

The criterion measure collected in the validation studies was the individual's level of progression within his or her organization. Progression was measured by one of three types of information provided by the participating organizations. In approximately 60% of the organizations, progression was measured in terms of salary. In the remaining organizations, progression was based on either the Hay Job Points assigned to the current job or a measure of management level achieved (four or five levels). Where data were available, validities were determined for more than one criterion. Although different criteria frequently resulted in different observed validities for a single organization, in all but one case the differences were less than .05 (Richardson, Bellows, Henry & Co., 1992). Initial analyses indicated there were no systematic differences across organizations related to the type of criterion, although the job grade criterion was associated with slightly lower validities. In those cases where multiple criterion measures were available (e.g., salary and Hay Job Points), we selected one at random for inclusion in our meta-analysis. Including multiple validity coefficients for some organizations, but not others, would have biased our results.

Salary and promotional measures have been used frequently in managerial validation studies (cf. Campbell et al., 1970; Thornton and Byham, 1982). These measures have potential limitations, as noted by Borman (1991):

> Regardless of the corrections made, promotion rate and salary criteria are susceptible to contaminating influences. Situational factors such as timing of higher-level position openings and market value of a particular specialty can adversely affect measures of these criteria. In addition, politics within the organization, when it results in promotion and salary decisions based on factors other than merit, can introduce error into these criterion measures. Finally, as a practical restriction, it is difficult to compare individuals who enter the organization at very different levels and salaries. Promotion rate and salary criteria are best applied in organizations that promote from within (p. 303).

Meyer (1987) has argued, however, that measures of performance over time, such as salary progress or rate of advancement, may be more reliable and valid measures of job performance than single supervisory ratings, because they represent the combined judgment of many evaluators across several rating periods (cf. Laurent, 1962). In addition, promotional decisions are typically characterized as rankings of potential candidates. Ranking methods are generally believed to be more reliable than are ratings (Kane & Lawler, 1978; Miner, 1988); the reliability

of extreme rankings (e.g., top rankings used in promotion decisions, or bottom rankings used for downsizing) may be especially high.

Measures of promotional progress may also be a more construct valid measure of performance than are performance ratings. In most organizations, promotion decisions are based on more than just current job performance. Both a consistent record of performance and the potential to perform well in new and more responsible positions are generally considered. In addition, individuals making promotion decisions for positions higher in the organizational hierarchy might be expected, in general, to have more highly developed decision-making skills and a better understanding of how performance is to be measured (Miner, 1988). Promotional mistakes at higher organizational levels are likely to be more costly than mistakes at lower levels (Hunter, Schmidt, & Judiesch, 1990), and recognition of these costs probably results in greater attention being given to promotion decisions. This likely adds to the validity as well as the reliability of these selections. To the extent that salary and promotion (progression) measures are more reliable and construct valid than performance ratings, we would expect them to yield higher observed validities than would performance ratings.

Controlling for Opportunity Bias. The criterion of real interest in this study is the maximum organizational level a person will achieve during his or her working career. However, many early and mid-career managers have not yet achieved the maximum organizational level they will attain during their careers. It is not unreasonable to assume that age and experience would be related to level of promotional progress, because older and more experienced employees have had more opportunities to progress. To control for differences in opportunity to progress in this study, we developed a measure that considers the managers' current criterion levels and the amount of opportunity the manager has had to progress.

The relationship we used to measure the validity of the MPR in this study was the semi-partial correlation between the MPR score and the progression score (i.e., salary, Hay job points, or management level), with years of work experience partialed out of the progression score. We selected work experience as the most appropriate measure of opportunity to progress, because, unlike age or length of service in the current organization, work experience captures all work history. Partialing out work experience also addresses one of Borman's (1991) concerns by improving the comparability of individuals who enter the company at different levels and salaries.

Four organizations did not have years of work experience data available. In those organizations, length of company service was used as the measure of opportunity to progress. Semi-partial correlations for these

organizations were calculated by partialing the effects of length of company service out of the progression score. The validity generalization analysis was performed on the semi-partial correlations.

Semi-partial validity coefficients were calculated for each organization (and each moderator subgroup within each organization, as discussed below) and then meta-analyzed across organizations. A potential alternative method would have been to aggregate data across organizations prior to calculating correlations. We chose not to do so, because the use of three different measures of the criterion (i.e., salary, Hay job points, or management level) prevents direct comparison of the raw criterion data across organizations. Generally, this difficulty could be resolved by standardizing the criterion within organizations. In these data, however, standardization does not assure comparability across organizations.

Meaningful aggregation of data across organizations would be possible only if the criterion scores from one organization were directly comparable to scores from other organizations. However, differences in organizational growth and management policies result in differing patterns of opportunity across organizations. Those differences are not accounted for by standardization within organizations alone. For example, consider two equally capable managers who begin their careers at the same time, but in different organizations. Stan is hired by Organization A, which is experiencing slow growth in a mature industry and has a relatively stable corps of middle and upper managers. Therefore, there are few opportunities for promotion. Susan finds a much different set of circumstances in Organization B, where organizational growth provides many opportunities for promotion. After a few years on the job, both managers have outpaced their cohort groups within their respective organizations. But Stan has reached a job level just below the mean for his organization, while Susan has reached a point above the mean for her organization. Consider another manager from Organization B, Alan, who started at the same time as Susan, and whose true score is less than Susan's (and Stan's). If Alan has achieved the mean level of progression in Organization B, then standardizing the criterion within organizations results in both Susan and Alan receiving higher criterion scores than Stan. This is true even though Stan's "true score" is equal to Susan's and greater than Alan's. If these standard scores were combined across organizations, the true score ranking of individuals on the criterion would not be maintained. Hence, correlations between the MPR and the criterion, which are sensitive to rank order, would be attenuated.

Calculating correlations within organizations (i.e., before meta-analyzing across organizations) avoids these problems. Correlating MPR

and criterion scores within single organizations maintains the appropriate rank order of individuals on the criterion, that is the order imposed by the organization's system of promotions. This maximizes the comparability of results across studies and can be done either with or without standardization of variables. Standardizing the criterion within organizations does, however, aid in the comparisons of means and standard deviations of criterion scores between subgroups. Therefore, because these comparisons are of interest, we also standardized the criterion measures within organizations.

Potential Moderators

Our primary focus in this study was on the analysis of validities across organizations. But because some have suggested that age, experience, education, gender, and race are potential moderators of biodata validity (Asher, 1972; Laurent, 1962; Thayer, 1977), we also present and briefly discuss the results of several meta-analyses that were performed to examine the potential moderating effects of those variables.

Length of company service was coded into five levels, with separate categories for individuals with 5–9 years, 10–14 years, 15–19 years, 20–24 years, and more than 25 years of company service, respectively. Education was coded into nine levels ranging from less than a high school graduate to doctoral degree or equivalent. Five age groupings were formed. Individuals aged 21–29, 30–39, 40–49, 50–59, and 60 or more were coded into separate groups. Individuals for whom a specific piece of information was missing (e.g., age, education, length of company service) were not included in the meta-analysis for that variable. For this reason, sample sizes vary from one meta-analysis to another.

Meta-Analysis Methods

In the present study, it was possible for us to correct each observed validity coefficient for range restriction and criterion unreliability. This method of meta-analysis is more exact than the more commonly used method that employs distributions of artifacts. Details are presented in Hunter, Schmidt, and Jackson (1982, Chapter 3) and in Hunter and Schmidt (1990, Chapter 3).

Range restriction calculations were based on differences in the standard deviation of the MPR scores of incumbent managers in each organization and moderator subgroup as compared to the standard deviation of the MPR scores for a separate multiorganizational sample of 10,496 applicants for management jobs (SD = 4.49). The applicant pool included current employees seeking promotion to management and exter-

nal applicants. Standard deviations of the MPR scores for the 24 organizational samples varied from a low of 3.15 to a high of 5.59. Separate range restriction corrections were computed for each correlation used in every moderator analysis. Because the standard deviation of the MPR scores across organizations and other moderator subgroups varied both above and below the standard deviation of the MPR scores in the applicant population (as estimated from the applicant pool), corrections for both range restriction and range enhancement were required. A correction for range enhancement reduces the size of the observed validity coefficient to a level comparable to those expected in the population of interest. The more common correction for range restriction removes the attenuating effects of reduced variability within a sample.

Criterion reliability was estimated to be .9 across all subsamples. This approach results in a conservative estimate of both validity and generalizability. A reliability of .9 recognizes the downward impact on validity that occurs with any imperfect measure, but it results in only a modest correction to the estimate of mean true validity. Our generalizability estimates are conservative, because the use of a single reliability estimate did not permit us to estimate the variance in observed validities that is due to differences in criterion reliability. This results in underestimates of variance due to artifacts, and therefore overestimates of the variability of true (operational) validities. Because scores on any selection instrument must be used as collected, we made no corrections for unreliability of the predictor as part of this study.

Meta-analyses were then performed on the semi-partial correlations. The mean and the variance of the corrected validities were computed, weighting each correlation by the product of its sample size and the squared artifact attenuation factor ($N_i A_i^2$; this procedure is described in Hunter & Schmidt, 1990, Chapter 3). To determine the effect that semi-partialing had on these results, we also performed meta-analysis on the zero-order correlations. Zero-order correlations measure the relationship between MPR scores and criterion scores, without regard for differences in opportunity to advance. The pattern of results obtained using zero-order correlations was identical to the pattern obtained using semi-partial correlations. Therefore, these results are not reported here, but are available on request from the first author.

Results

Results of the meta-analyses are presented in Table 1. The first three columns of numbers in Table 1 contain the total sample sizes, number of validity coefficients analyzed, and the uncorrected (i.e., observed) mean validities. The next three columns contain the standard deviation

TABLE 1

Validity Generalization Moderator Analyses—Semi-Partial Correlations

Moderator type	N	K	M Obs. r	Sr_c	S_e	% Var acctd	ρ	$SD\rho$	90% C.V.
Organization	7,334	24	.48	.068	.048	51%	.53	.047	.47
Gender	7,296	43	.44	.115	.071	38%	.50	.090	.38
Service	7,159	110	.48	.142	.107	58%	.55	.093	.43
Education	6,916	120	.38	.134	.137	104%	.49	.000	.49
Age	5,172	75	.43	.168	.113	45%	.51	.125	.35
Means			.44	.125	.095	53%	.52	.071	.42

Note: N = total sample size; K = number of validity estimates; Obs. r = the observed validity from each study; Sr_c = standard deviation of the validity estimates following correction for attenuation due to error of measurement in the criterion measure and range restriction; S_e = standard deviation of the validity estimates attributable to sampling error; %Var acctd = the percentage of variance in the validities following correction for study artifacts which can be accounted for by sampling error; ρ = estimated true validity; $SD\rho$ = standard deviation of the estimate of the true validity; 90% C.V. = the lower bound of a 90% credibility interval. Ninety percent of all true validities are expected to be greater than this number.

of the corrected validity coefficients, the standard deviation of these correlations predicted by sampling error, and the percent of variance in the corrected correlations accounted for by sampling error (i.e., the ratio of sampling error variance to observed variance). The last three columns report the means, standard deviations, and 90% credibility values for each of the true validity distributions. The last row of Table 1 presents the mean value in each column across all analyses. Each item in this row, except the percent of variance accounted for, is the arithmetic mean of the entries in that column. The mean percent of variance accounted for was computed by the method advocated by Callendar and Osburn (1988).

Across organizations, the mean observed validity of the MPR scores for predicting rate of managerial progression was $r = .48$. Estimated true validity, following corrections for range variation and criterion unreliability, was $\rho = .53$. With $SD_\rho = .05$, the 90% credibility value for true validities was .47. Thus, it is estimated 90% of all true validities are .47 or larger. This result clearly demonstrates that the validity of the biodata key, created in a single organization generalized across organizations and industries.

Because we did not control for variability due to the use of three different types of criteria across organizations, our estimate of SD_ρ, although only .05, is probably an overestimate of true variability of validity coefficients. An analysis by criterion type, reported in Table 2, did show that validities for the job grade criterion were slightly smaller (.48 vs. .51 and .53) and more variable (.07 vs. .05 and .00) than those for the salary and Hay Job Points criterion types.

TABLE 2

Validity Generalization Moderator Analyses by Criterion Type, Gender, Age, and Length of Company Service

Moderator type	N	K	*M* Obs. r	Sr_c	S_e	% Var acctd	ρ	$SD\rho$	90% C.V.
Criterion									
Salary	2,779	14	.50	.072	.053	54%	.51	.049	.44
Hay job points	1,873	5	.50	.037	.037	102%	.53	.000	.53
Job level	2,682	5	.44	.075	.033	19%	.48	.068	.40
Gender									
Males	5,924	24	.47	.068	.055	65%	.53	.040	.48
Females	1,372	19	.32	.139	.115	69%	.35	.078	.25
Length of company service									
5–9 years	2,013	24	.44	.106	.103	95%	.51	.025	.48
10–14 years	1,442	21	.51	.097	.101	108%	.58	.000	.58
15–20 years	842	19	.60	.094	.109	135%	.68	.000	.68
20–25 years	618	15	.56	.116	.120	110%	.65	.000	.65
25+ years	816	14	.54	.110	.101	84%	.61	.044	.55
Age									
20–29	584	14	.26	.170	.184	118%	.33	.000	.33
30–39	1950	20	.43	.144	.093	42%	.49	.110	.35
40–49	1578	20	.48	.160	.099	38%	.55	.126	.39
50–59	964	17	.46	.156	.120	59%	.55	.100	.42
60+	96	4	.39	.249	.203	67%	.51	.144	.33

Note: N = total sample size; K = number of validity estimates; Obs. r = the observed validity from each study; Sr_c = standard deviation of the validity estimates following correction for attenuation due to error of measurement in the criterion measure and range restriction; S_e = standard deviation of the validity estimates attributable to sampling error; %Var acctd = the percentage of variance in the validities following correction for study artifacts which can be accounted for by sampling error; ρ = estimated true validity; $SD\rho$ = standard deviation of the estimate of the true validity; 90% C.V. = the lower bound of a 90% credibility interval. Ninety percent of all true validities are expected to be greater than this number.

Moderator Analyses

Because the moderator analyses were of secondary interest, most of them are discussed only briefly here. We performed an analysis of each potential moderator by first grouping individuals within their own firm with respect to the moderator of interest. Validities for each organizational subgroup were calculated, and then we meta-analyzed these coefficients across organizations. For example, in the gender moderator analysis, we divided data for each organization into gender subgroups, and then meta-analyzed the validity coefficients for men and for women. Analogous procedures were used in the analyses of age, length of service, and education level. Some samples did not contribute data to every moderator analysis. For instance, in the gender analysis, samples from five organizations did not include any women. These organizations contributed data to the analysis for men, but not for women.

Estimates of true validity ranged from .49 in the education analysis to .55 for length of service. Standard deviations of the estimated true validities ranged from .00 for education to .13 for age. In each of these analyses, SD_ρ, the estimated standard deviation of true validities, is small relative to the size of the estimated true validity. As a result, the 90% credibility values are uniformly high, ranging from .35 for age to .49 for education. This is evidence that MPR scores are valid predictors of rate of advancement across organizations, ages, education levels, lengths of service, and for both men and women. Specific results for each moderator analysis are presented in Table 2. We discuss the gender and race analyses briefly here.

In our data, the MPR has higher validity for men ($\rho = .53$) than for women ($\rho = .35$). Validities were also less variable for men ($SD_\rho = .04$) than for women ($SD_\rho = .08$). Although this resulted in 90% credibility values that were quite different for men (.48) than for women (.25), these values indicate that the MPR is a valid predictor of rate of progression for both genders.

Further analysis indicated the existence of factors that may have attenuated the validity for women. First, many of the organizations in our sample had few women in management positions. In 30% of the organizations, women represented less than 10% of respondents. Further, across all organizations, the mean criterion value achieved by women was lower and less variable than that for men. Table 3 presents a breakdown of criterion means and standard deviations by gender for each of the levels of length of service and age. In the length of service analysis, the mean standardized criterion score for men was 0.17 ($SD = 0.99$), but for women the standardized mean criterion score was only −0.56 ($SD = 0.34$). That is, in this sample women had lower and less variable criterion scores than men, despite the fact that women were distributed across age and length of company service subgroups in patterns generally similar to those of men. To the extent that factors other than the true potential and performance of women account for the lack of variability in the criterion scores for women in this sample, the validity of the MPR presented here is underestimated. We address this point further in the discussion.

Sample sizes for the race analyses were smaller. Validity for Blacks ($N = 269$; 15 organizations) was $\rho = .48$ ($SD_\rho = .11$) and validity for Hispanics ($N = 110$; 9 organizations) was $\rho = .40$ ($SD_\rho = .00$). An examination of criterion variability found that, similar to the analysis for women, criterion scores for these two groups were also lower and less variable than those found for men in general.

TABLE 3

Criterion Means and Standard Deviations by Gender by Subgroup for the Length of Company Service and Age Moderator Analysis

	Men			Women		
Subgroup	*N*	*M*	*SD*	*N*	*M*	*SD*
Length of company service						
5–9 years	1,558	−.039	.891	456	−.615	.405
10–14 years	1,148	.136	.920	316	−.575	.393
15–19 years	717	.260	1.071	158	−.496	.493
20–24 years	572	.366	1.045	89	−.543	.364
25+ years	757	.421	1.147	119	−.387	.574
Column totals/means	4,752	.170	.989	1,138	−.558	.344
Age						
21–29 years	473	−.448	.607	146	−.660	.396
30–39 years	1,646	−.017	.883	302	−.536	.487
40–49 years	1,405	.126	.988	173	−.513	.580
50–59 years	858	.229	.986	123	−.594	.388
60+ years	144	.339	1.208	14	−.429	.247
Column totals/means	4,526	.040	.931	758	−.562	.468

Discussion

Like Rothstein et al. (1990), this study provides evidence that biodata validities are not intrinsically specific to individual organizations. Our study extends the Rothstein et al. findings by showing that validities for a biodata instrument created and keyed within a single organization can generalize across organizations, even to organizations in other industries. This argues that generalizable biodata validities can be produced without multiorganization development and keying samples.

The generalizability of biodata validities appears to be dependent on both conceptual and practical issues. Table 4 lists four factors that appear to influence the generalizability of the validities of biodata instruments. These include, (a) a reasonable expectation that whatever is captured by the instrument will generalize to other populations or situations, (b) selecting and developing a valid and reliable criterion measure for keying items, (c) establishing validity at the item level rather than the scale level, and (d) adequate sample size.

A sound reason to expect that the validity of an instrument will generalize to other populations or situations is a prerequisite. Procedures and mechanisms designed to improve the generalizability of instruments allow potential generalizability to be realized. No methodological slight of hand can improve the generalizability of validities for an instrument

TABLE 4

Factors Believed to Influence the Generalizability of Biodata Validities

Factor	Example/explanation
Theory	Are there sound reasons to expect that the validity of a biodata instrument should generalize to other populations and situations?
	No methods can make an instrument generalize more than it is theoretically possible for the instrument to generalize. Some predictive relationships would not be expected to generalize outside limited populations or situations.
Criterion	Has a valid criterion been selected and has a reliable measure of that criterion been constructed for use in key development?
	The greater the validity of the criterion measure the more accuracy is possible in identifying relationships between items and the criterion.
Item level analysis	Has the validity of each item been determined?
	Assuring that both empirical and conceptual justifications exist for each item's validity reduces the sample dependence of an instrument. Sample dependence is increased when strictly empirical analyses are performed.
Sample size	Does an adequate sample exist?
	Larger samples are always preferred in the development sample. The larger the sample, the more representative that sample is likely to be of the larger population and the more likely that validities in the development sample will generalize to population.

beyond its theoretical potential. The MPR was designed to assess items relevant to management activities in general, not to functional specialties or the possession of unique knowledge or skills. There was, therefore, good reason to expect that this instrument should generalize to all management positions across functions and organizations.

The selection of a valid criterion and the development of a reliable criterion measure for use in key development can improve the accuracy of keying efforts. That is, enhanced reliability and validity in the criterion measure facilitate the accurate identification of items associated with that criterion. The MPR development effort was aided by the careful attention given to the criterion measures used in the EIMP research program. The MPR scoring key was developed using validity evidence based on the EIMP criterion measures.

Generalizability is enhanced by developing validity at the item level, rather than at the scale or instrument level. Ensuring that there are both empirical and conceptual justifications for each item's validity reduces the sample dependence of an instrument. Sample dependence is increased when strictly empirical analyses are performed. In the development of the MPR, only those items that demonstrated a relationship

to the criterion and for which there was a sound rational or behavioral justification for their validity were retained.

Finally, sample size also plays a role, with larger samples always preferred in the development sample. The larger is the sample, the more representative that sample is likely to be of the larger population and the more likely it is that validities in the development sample will generalize to the population. The generalizability of this biodata instrument, keyed using data from a relatively small sample, is notable. It may be that the other characteristics of the MPR development effort compensated for the modest size of its development sample. Although we do not have the data to verify this hypothesis, it may be that historical arguments for extremely large development samples are a consequence of factors such as the widespread use of poor criterion measures in the development of biodata instruments.

One question raised by Rothstein et al. (1990) concerns the amount of reduction in validity that would occur if an instrument developed using a large sample within a single organization were cross-validated in other organizations. In this study, there was only a slight reduction in validity on cross-validation in different organizations as compared to the original within-organization cross-validation sample (N = 1,745). Validities in the within-organization cross-validation sample were r = .52 for the rate of advancement and current job performance criteria (Richardson, Bellows, & Henry, Co., 1992), as compared to our cross-validated validity of r = .48 (ρ = .53; from Table 1).

A common finding in biodata research is that the validities of empirically keyed biodata items decay over time (Brown, 1978; Hunter & Hunter, 1984, Thayer, 1977). Although the question of temporal specificity or stability is not directly addressed in this study, we can present some indirect evidence on this issue. Data used in this cross-validation study were collected over a 10-year time period, and the empirically derived scoring key of the MPR yielded substantial validities up to 11 years after construction of the key. We used a correlation technique described in Hunter and Schmidt (1990, p. 302) to determine if time moderated these validities. Large negative correlations between the year in which the study was begun and the study's corrected validity would argue for decay in MPR validity over time. The resulting correlation of .14 argues against decay in validity of the MPR over time.

A question remains as to whether we believe the generalizability findings would have been the same if, rather than being conducted in a single organization, the development and keying of the biodata component of the MPR had been constructed using a sample composed of many different organizations. Our belief is that performing the initial keying of the biodata component of the MPR using a multiple organization sam-

ple would likely have resulted in generalizability similar to that found by using a single organization. Expecting that validities would have been higher had multiple organizations been used would indicate an hypothesis that idiosyncratic features of organizations would impact upon the validity of such an instrument. For instruments assessing managerial or supervisory competence, it is difficult to construct hypotheses that would argue for such differences.

Brown (1981) concluded that, although a biodata instrument used in the life insurance industry to predict sales performance showed validity generalization across 12 organizations, substantial differences in validities existed for two subgroups of companies that differed in their HR practices. We believe that *observed* validities of the MPR might also vary across subgroups of companies, where differences in HR practices affect individual opportunity to advance. *True* validities, though, would not be affected. Clearly, a rate-of-progression criterion measure is influenced by the extent that there is opportunity to progress. In extreme cases, where factors (e.g., downsizing, not promoting from within) result in little or no opportunity for advancement, the rate of advancement will be slowed for all managers, even for those who are the most capable. This restricts the emergence of differences in rate of promotional progress thereby attenuating observed validities. Differences in observed validity across companies would be largely an artifact of these opportunity differences.

It is likely that organizations that recruit and select effectively are also more likely to manage employees in ways that allow them to reach their potential. Brown's (1981) results, though, may be partially explained by an additional methodological artifact. In Brown's data, differences across firms in recruiting and selection practices, and perhaps subsequent management and development efforts, may have resulted in restricted ranges of performance in the less effective organizations (a lack of top producers). Brown corrected for range restriction using the standard deviations of biodata scores, similar to the methods we employed in this study. However, sales performance data are highly positively skewed. Basing the range restriction calculation on differences in the standard deviations of biodata scores that are more normally distributed likely resulted in an under-correction for the effects of the range restriction and lower validities in the less effective organizations. Here, differences in the validities are artifacts of the criterion measure and are not reflective of differences in the true validities of the instruments.

Magnitude of the Effect Size

This study also provides additional evidence that the validities of well-constructed biodata instruments are not only generalizable, but also of substantial magnitude. The age and length of service analyses indicate that validity estimates approach an asymptote as either age or length of service increase. The estimated true validity for the sample with more than 10 years of service ($\rho = .62$, $SD_\rho = .02$) may provide the single best estimate of the true MPR validity. In this sample, individuals appear to have had adequate opportunity to approach their ultimate criterion value.

The magnitude of the validities found here are consistent with those found for the biodata component in the original EIMP studies. However, they are .20 or more higher than those for Supervisory Profile Record (SPR) in the Rothstein et al. (1990) study and .15 or more higher than mean biodata validities reported in reviews of the biodata literature (Hunter & Hunter, 1984; Reilly & Chao, 1982). Although similar methods were used to develop the SPR and MPR instruments, several possible explanations exist for the higher validities found here. These include the use of concurrent (job incumbents) versus predictive (job applicants) studies, manipulation of the sample by removing individuals with little work experience, and the criterion measure employed here.

All validities used in the current study are concurrent validities using job incumbents. It is possible that predictive studies of the MPR's validity using applicants for managerial jobs might result in somewhat smaller validity estimates. Research by Lautenschlager (1994) and Stokes et al. (1993) has demonstrated that individuals whose responses to biodata instruments will have consequences for their employment are more likely to attempt to "fake good" on items in an attempt to raise their scores. This can reduce validities in predictive studies if faking good is practiced differentially by the applicants, that is, resulting in changes in the rank order of candidates on the instrument, or if faking good causes scores to center around the highest possible scores, thus reducing variance on the predictor. Biodata scores exist for over 15,000 applicants who have taken the MPR (but so far have not had their scores used in selection or promotion decisions). These individuals do have slightly higher and slightly less variable predictor scores than the cross-validation sample (M=22.08, SD = 4.36 for applicants vs. M = 18.74, SD = 4.59 for the sample used in this study). This is consistent with the faking good hypothesis. However, the reduced variability of the applicant scores does not appear to result in ceiling effects (scores bunched at the high end of scale). Further, discussions with managers within the individual firms contributing data indicate that they believe the appli-

cants, who were tested during the late 1980s and early 1990s, appeared to be of a higher and more consistent "quality" than many of their current employees. This is an alternative explanation for the higher mean and lower variability of the applicant scores. But, perhaps the best evidence that the validity of the MPR will not likely drop substantially in predictive studies is provided by a comparison of these results to those in the initial validation study (N = 1,745). This initial study was predictive and produced validities similar to those found here (r = .52).

It is also possible that by removing managers with less than 5 years of work experience, we created an older and more experienced sample. This may have enhanced variability in the criterion, resulting in an overstatement of validities. We do not believe this to be true. Instead, we argue that given the criterion used in this study, retaining inexperienced individuals would have resulted in an underestimate of true validity. In other words, retaining individuals who have not had sufficient opportunity to distinguish themselves on the advancement criterion would have inappropriately attenuated validities.

As noted above, we used semi-partial correlations to remove the effects of differing amounts of work experience (an estimate of the time to achieve the criteria) from the criterion measures. Because the true score on this criterion is gradually revealed over the course of one's career, current criterion measures of managers with relatively little work history are less reliable predictors of our true criterion than are criterion measures of their longer tenured coworkers. At some low level of work experience, this lack of reliability, and the concomitant lack of variance in the criteria for these groups, makes interpretation of these data tenuous. In our sample, managers with less than 5 years of work experience have relatively little variability on measures of promotional progress. As noted in the gender analysis, we suspect that this is due to a lack of opportunities for these individuals to progress. The criterion-relevant progress they do show may be largely a function of time on the job, and therefore of little value in differentiating them from their cohort group. Our data support this notion. Even after removing managers with less than 5 years of work experience from the sample, we still observed lower criterion variability in the 21–29 year-old subgroup (SD = 0.61) and in the 30–39 year old sample (SD = 0.88) than in those 40 and older (SD = 1.05). Therefore, removing managers with less than 5 years of work experience results in a sample whose criterion measures more closely approximate the true relationship.

That this study does not use supervisor ratings is notable. For managers, the measures of promotional progress used in the current study are closer to what Thorndike (1949) described as the "ultimate criterion" than are ratings. As discussed earlier, rate of promotional progress

represents a series of decisions made by a variety of persons over the course of the individual's entire career, rather than a one-time assessment made by a single rater. Previous research has found higher validities for advancement criteria than for ratings criteria. Meyer (1987) reported higher validities for advancement than for ratings in two validation studies where both types of criterion data were available. The meta-analytic findings of Schmitt, Gooding, Noe, and Kirsch (1984) indicated that validities for criteria such as salary and other "objective" measures were higher, on the whole, than those for ratings. The fact that Meyer's studies used cognitive aptitude predictors, and that Schmitt et al. examined a variety of predictors mutes the argument that biodata predicts advancement so well because both are contaminated by the same social acceptability factors.

Neither Meyer's (1987) nor Schmitt et al.'s (1984) results were corrected for attenuation due to error of measurement. Had they used reliability estimates similar to those used in this study (r_{yy} = .50 and r_{yy} = .90 for supervisor ratings and promotional progress, respectively) to correct their validities for attenuation due to measurement error, much of the difference in the results by criterion would disappear. A meta-analysis by Gaugler, Rosenthal, Thornton, and Bentson (1987), which corrected for the effects of measurement error in criterion measures, indicated that assessment centers are more valid predictors of rated job potential (ρ = .53) than of job performance (ρ = .36). Gaugler et al. also report a validity for assessment centers using career advancement as the criterion that was lower (ρ = .34) than the validity for measures of potential. However, this validity estimate is likely to be attenuated by several of the factors discussed above including failure to remove low tenure individuals and not accounting for the effects of differences in opportunity to advance.

One additional possible explanation for the comparatively high validity found in the current study is that the criterion measure (i.e., rate of promotional progress) is conceptually more distinct from ratings of job performance than previous research seems to indicate. Promotional progress is related to performance; good performance is normally a necessary, but not a sufficient condition for promotion. It is likely that certain personality factors and job-related skills or abilities are also necessary. These may then be more strongly related to progression over time than to ratings of performance in any one particular job. If the MPR captures critical determinants of promotional progress more effectively than the instruments used in other biodata studies capture the critical determinants of their respective criterion measures, then the MPR's validity for predicting promotional progress would be expected to result in a higher validity than other biodata instruments.

Gender Effects

Our findings with respect to criterion scores by gender are also notable. Mean criterion scores for women were lower and much less variable than those for the full organization. Further, the highest mean criterion score for women in any subgroup was less than the lowest mean criterion score for any men's subgroup. This pattern of criterion scores indicates that most women in this sample did not achieve even average job levels or salaries at any point in their careers.

Several factors may have contributed to these differences. Gerhart and Milkovich (1992) discuss causes of gender-based differences in starting pay for women and how this pay differential is perpetuated throughout women's careers. An alternative explanation is that women in these organizations were systematically offered fewer promotions then men. This position is consistent with discussions of "glass ceiling" effects in organizations (Powell & Butterfield, 1994). However, these data were collected during the period 1975 to 1984 and it is likely that data collected today would show smaller gender differences.

Another possibility is that some deficiency in the MPR leads to less accurate prediction of women's promotion progress. We do not believe that this is true. We argue, instead, that the lower validities result from the fact that there was relatively little promotional progress among women to be predicted by the MPR. Because the source of attenuation affects women's criterion scores, the MPR's validity for women in the absence of these factors may approach that of men. Unfortunately, however, although the factors that lead to lower mean and less variable criterion scores for women (and minorities) are less prevalent today then when these data were collected, they still exist. This has implications not only for the reported validity of the MPR for women, but for any selection instrument using a similar criterion measure. In addition, the limited data in our race analysis suggests that using this criterion measure may also influence the reported validities of instruments for the two minority groups examined here. We assume that promotions are based on merit. To the extent that this is not true in some organizations, validities based on data from those organizations will be attenuated and less generalizable.

Conclusion

In summary, this research found that a biodata instrument developed and keyed within one organization produced validity that generalized across organizations. This study provides additional evidence that the validities of well-constructed biodata instruments can be sub-

stantial and generalizable across organizations and important demographic subgroups. These may be particularly useful findings for those engaged in managerial selection. The size of the generalized validities observed here for prediction of managerial success suggests that a biodata instrument such as this can be a powerful addition to a management identification-selection program.

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APPENDIX

Sample Items from the Conceptual Subdivisions of the MPR

Developmental Influences

The developmental influences scale focuses on experiences in youth and early adulthood. It includes items assessing the degree to which family atmosphere was supportive and emotionally comfortable, development of independent interest and personal competence was encouraged, relating to others and controlling emotions was learned early, and the extent of involvement in school and social activity.

During my high school years, I was a member of: (Mark all that apply)

1. an athletic team
2. a social club, fraternity or sorority

3. a school group (debating team, political science club, musical organization, etc.)
4. an honor society or the honor roll
5. I never had an opportunity to be a member of these groups

Academic Achievement

The academic achievement scale assesses the extent to which the individual adapted well and achieved a high level of scholastic, organizational and social success, irrespective of the educational environment. Items assess progression relative to peers, the extent to which high scholastic achievement was achieved at each education level, the extent of memberships in chosen school-related social clubs, and how frequently positions of leadership were held and their significance.

My usual scholastic standing in high school was in the:

1. top 5%
2. upper third, but not top 5%
3. middle third
4. lower third
5. I do not know

Present Self-Concept

The present self-concept scale explores the degree to which the individual sees him or herself as worthy, capable, and possessing the potential to take on any task, given the proper preparation and support. Items assess feelings of self-worth, confidence in existing abilities and in the capacity to develop new skills, and the extent which opportunities for self-development and advancement are anticipated.

Without any false modesty, I believe that the highest level I could reach in the course of a career in a major company is:

1. president or chairman of the board
2. the top executive level (vice-president, director, or a principal officer)
3. the top management level below the executives (head of a major function or area)
4. the next level below (a top staff or top specialist position or head of a division of a major function or area)
5. the next level below (a supervisor or staff position)
6. a nonsupervisory or operating position

Present Family and Social Orientation

The scale measuring present family and social orientation assesses the applicant's participation in off-the-job activities and the extent to which this participation adds to on-the-job effectiveness, rather than competing with it or detracting from it. Items tap the degree to which

the individual tries to be well-informed, enjoys an active social life, participates in and leads community and social activities, and has supportive family relationships and living environment.

On the average, the number of off-work hours a week I spend reading technical or professional journals, magazines, or books is:

1. none
2. less than 1
3. 1 to 3
4. 4 to 7
5. more than 7

Work Orientation

The work orientation scale measures the degree to which the individual has a clear concept of the manager's role and is committed to self-development as the avenue to assuming greater organizational responsibilities. Items assess the extent to which the individual values good communication skills, values organization of time and planning of work, takes initiative in problem solving, prefers administrative to technical work, and believes self development will be an essential aid to long run progress.

I feel that of the following the most important contributor to my success has been:

1. ability to get along with my peers or coworkers
2. ability to get along with my supervisors
3. ability to organize the details of work
4. ability to meet and deal with many people
5. my skills and experience