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ABSTRACT

The report is concerned with the feasibility of matching people and jobs as proposed by the Theory of Work Adjustment; according to the third proposition of this theory, satisfaction is a function of the correspondence between the reinforcer system of the work environment and the individual's needs, with certain qualification. In the study, the construct of correspondence is explicated in terms of statistical measures and applied to the prediction of job satisfaction. Measures of needs and general job satisfaction were administered to 635 employees in six different occupations for which occupational reinforcer patterns had been previously obtained. Nineteen indexes of need-reinforcer correspondence were compared in terms of the efficiency with which they could predict general job satisfaction across the six occupational groups. Using the criterion of consistency of outcomes across occupational groups, the results show product moment correlation and d squared prime to be the best statistical indexes to measure correspondence. Implications for the operational and theoretical development of the concept of correspondence are discussed. (Author/AJ)

# A Comparison of Need-Reinforcer Correspondence Indices as Predictors of Job Satisfaction

James B. Rounds, Jr., and Rene' V. Dawis

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## Abstract

According to the third proposition of the Theory of Work Adjustment, satisfaction is a function of need-reinforcer correspondence. The construct of correspondence is explicated in terms of statistical measures and applied to the prediction of job satisfaction. Measures of needs and general job satisfaction were administered to employees in six different occupations for which occupational reinforcer patterns had been previously obtained. Nineteen indices of need-reinforcer correspondence were compared in terms of the efficiency with which they could predict general job satisfaction across the six occupational groups. Using the criterion of consistency of outcomes across occupational groups, the results show product-moment correlation and $d^2$ prime to be the best statistical indices to measure correspondence. Implications for the operational and theoretical development of the concept of correspondence are discussed.

# A Comparison of Need-Reinforcer Correspondence Indices as Predictors of Job Satisfaction[1]

James B. Rounds, Jr., and Rene' V. Dawis

This report is concerned with the feasibility of matching people and jobs as proposed by the Theory of Work Adjustment (TWA; Dawis, Lofquist, & Weiss, 1968). Within the framework of TWA this matching process is conceptualized in part as a "good fit" between an individual's vocational needs and the work environment's reinforcers. The third proposition of TWA (Dawis, et al., 1968) states that "Satisfaction is a function of the correspondence between the reinforcer system of the work environment and the individual's needs, provided that the individual's abilities correspond with the ability requirements of the work environment."

Previous research on need-reinforcer "correspondence" as the predictor of job satisfaction has been contradictory and inconclusive. Three research studies (Betz, 1968; Warren, 1970; Vessey, 1973) have attempted to operationalize the construct of correspondence by considering the problem one of profile similarity. These studies have several features in common: (a) All occupational samples were assessed with parallel measures of needs (Minnesota Importance Questionnaire) and of job satisfaction (Minnesota Satisfaction Questionnaire); and (b) The measurement of environmental reinforcers (using the Minnesota Job Description Questionnaire) derived from the ratings of either employees or supervisors. Betz (1968) investigated the use of six correspondence indices with cashiers, checker-markers, and sales clerks. She found that G indices (Holley & Guilford, 1964) with similarity bands defined by $\pm$ 1 standard deviation and by the first to the third quartile, and utilizing the employee's reinforcer ratings, provided the best predictors of job

satisfaction for cashiers and sales clerks. Validity coefficients (phi) for cashiers ahd sales clerks were, respectively, .37 and .35 for G with a ± 1 SD band and .32 and .45 for the interquartile band G measure. Warren (1970) employed a similar design with telephone operators, telephone service representatives, and rehabilitation counselors, using $d^2$ (Cronbach & Gleser, 1953) and six different variations of the $d^2$ index as correspondence indices. Although a few correlations between the various $d^2$ measures and job satisfaction scores were statistically significant, the majority of correlations were low and frequently in the wrong direction. Vessey (1973) conducted a longitudinal study with two replications on a sample of police recruits. Vessey's results showed that supervisor's ratings of work reinforcers were useful in the prediction of employee job satisfaction. However, the data for only one of the three police recruit subject groups produced statistically significant correlations, using $d^2$ (validity r=.35) and product moment correlation (validity r=.31) as measures of correspondence.

It is difficult to compare results and draw conclusions from studies using different correspondence indices, occupational samples, and procedures. However, some common threads emerge from these studies: (a) The prediction of job satisfaction from need-reinforcer correspondence should make use of supervisor rather than employee ratings of occupational reinforcers (Warren, 1968; Vessey, 1973); and (b) No single correspondence index has produced consistent results across occupational samples.

The purpose of the present investigation was to compare various statistical indices of need-reinforcer correspondence in the prediction of job satisfaction, and to test the proposition that job satisfaction is a function of the correspondence between an individual's needs and work reinforcers. The Betz and Warren data were reanalyzed, the original analyses being extended by using additional statistical indices across all six occupational samples.

Vessey's data were not included because Vessey's design differed from Betz and Warren's.

## Method

Samples. The samples consisted of 635 workers employed in six occupations: cashier (N=91), checker-marker (N=64), vocational rehabilitation counselor (N=196), salesperson (N=117), telephone service representative (N=89), and telephone operator (N=78). The cashiers, checker-markers, and salespersons were employed by a chain of discount stores; the operators and service representatives were employed by a Midwestern telephone company; and the rehabilitation counselors were employees of state vocational rehabilitation agencies in Illinois, Iowa, and Minnesota.

The diversity of the occupational samples studied is reflected by the differences in sex, age, and tenure. The checker-marker, service representative, and telephone operator samples were entirely composed of females, whereas the cashier sample was 82% female and 18% male, the counselor sample was 18% female and 82% male, and the salesperson sample was 72% female and 28% male. Age for the total group ranged from 18 to 67 years with mean age of cashiers being 36.7 years, checker-markers 28.9 years, counselors 34.9 years, salespersons 36.1 years, service representatives 26.8 years, and telephone operators 29.0 years. Tenure for the total group ranged from 1 month to 43 years, with median tenure for cashiers being 23.7 months, checker-markers 19.0 months, counselors 19.3 months, salespersons 22.3 months, service representatives 28.0 months, and telephone operators 35.0 months.

Procedure. The Minnesota Importance Questionnaire (MIQ; Gay, Weiss, Hendel, Dawis, & Lofquist, 1971) and Minnesota Satisfaction Questionnaire (MSQ; Weiss, Dawis, England, & Lofquist, 1967) were administered to the six occupational groups. The MIQ is a self-report inventory of work needs in a paired-comparison format. The instrument yields scale scores ranging from -4.0 to 4.0

for 20 need dimensions. Two forms of the MSQ were utilized: (a) a 100-item Likert-format instrument (long form) yielding 20 scale scores, and (b) a 20-item Likert-format instrument (short form) yielding three scale scores. The long form was administered to the cashier, checker-marker, and salesperson groups; the short form was administered to the counselor, service representative, and telephone operator groups. With the long form a general satisfaction score is derived by summing the item responses to the 20 items most highly correlated with the 20 scales. These 20 scales parallel the 20 need scales of the MIQ. With the short form a general satisfaction score is derived by summing the responses to the 20 items. These 20 short-form items are the same items used to score general satisfaction for the long form.

Though the measurements of needs and job satisfaction were taken at the same point in time, the method of data collection varied. Counselors, service representatives, and telephone operators were mailed the MSQ and MIQ; salespersons, checker-markers, and cashiers were administered the instruments during a company-sponsored testing program. To obtain measurements of job reinforcers, occupational reinforcer patterns (ORPs) were developed from supervisor reinforcer ratings (a more detailed discussion of ORP development is presented by Borgen, Weiss, Tinsley, Dawis, & Lofquist, 1968b).

Correspondence Measures. Table 1 lists the statistical formulas defining each of the correspondence indices used in this study. The following notation is used to facilitate the description of the correspondence indices:

$X_{ij}$ = the score of person i on variable j

$\bar{X}_{gj}$ = the mean score of group g on variable j

j designates any variable, which are K in number

i designates any person, which are N in number

g designates an occupational group which are six in number

Each index is briefly discussed in the order introduced in Table 1. The

various indices are denoted by the subscripted letter C (see Table 1).

Insert Table 1 about here

The high point index ($C_1$), a proportion measure, provides information on the joint occurrence of "highly" or "moderately important" needs for an individual and reinforcers "highly" or "moderately descriptive" of the work environment. "High" or "moderate" scale scores are defined as individual need scores (Gay, et al., 1971) and work reinforcer scores (Borgen, et al., 1968b) equal to or greater than 1.0. Actual joint occurrence is expressed as a proportion of possible joint occurrence. The high point index, therefore, ranges from 0 to 1.

Another proportion measure, the G index ($C_2$ and $C_3$), was first suggested by Holley and Guilford (1964) for use with dichotomized variables and later generalized for "multipoint" (polychotomized) variables (Lienart, 1973). The G index requires the determination of "agreement" within score pairs. An error band around the ORP scale scores is used to determine the "agreements" between the MIQ and ORP scale scores. "Agreements" may then be expressed as all-or-none scores as required by the G index. The standard error bands are computed for each scale score of the ORP from an analysis of the circular triad scores in the supervisors' MJDQ responses.

The product moment correlation ($C_4$) is widely employed as an index of match between two profiles. In addition, Cronbach and Gleser (1953) have discussed the use of two rank order correlational methods for assessing profile similarity; Spearman's Rho ($C_5$) and Kendall's Tau ($C_6$). Although these two measures are correlated, they differ in terms of assumptions, sampling distributions, and procedures for resolving tied ranks.

Introduced by Osgood and Suci (1952), the $d^2$ index ($C_7$) is the sum of the squared differences between profile elements. Beginning with $d^2$ as an index

which includes all possible profile information of elevation, shape, and scatter, Cronbach and Gleser (1953) subsequently demonstrated that each of these profile components can be separated from the other components. They derived a separate index of shape and scatter, $d^2$ prime ($C_8$). The present investigators have isolated the profile characteristic of elevation, deriving an elevation $d^2$ index ($C_9$).

Three properties of the $d^2$ index limit its use as a measure of correspondence. Need-reinforcer correspondence can be interpreted to mean that the strength of the reinforcer is equal to or greater than the strength of the need and noncorrespondence is when the strength of the need is greater than the strength of the reinforcer. With the $d^2$ index the absolute differences between need and reinforcer scale values are squared, thereby removing the direction of the difference. This nondirectional property of $d^2$ creates an interpretive problem.

In addition to its nondirectional property, $d^2$ does not differentially weight for the location of the need-reinforcer difference on the scale. A given difference is weighted the same if it occurs in the "unimportant" range of the scale as in the "important" range. For instance a $d^2$ score equal to 2.25 can be obtained by a combination of MIQ and ORP scale scores of 2.0 and 0.5, or 0.0 and -1.5, respectively. In the former instance the need is important whereas in the latter instance the need is not important. The prediction of job satisfaction from need-reinforcer correspondence may be moderated by the importance of the need. According to this hypothesis, the more important the need is (as indicated by the level of the scale score), the more important the need-reinforcer difference will be in the prediction of job satisfaction.

Finally, the $d^2$ index does not differentiate between needs and/or reinforcers greater than zero or less than zero. The scaling of the MIQ implies that needs above the zero point are important and needs below the zero point are not important in the individual's ideal job. Likewise, the scaling of ORPs

implies that reinforcers above the zero point are present in the work environment and reinforcers below the zero point are not present in the work environment.

The authors modified the $d^2$ index to account for directionality, importance, and the zero point, resulting in 10 $d^2$ indices ($C_{10}$ through $C_{19}$). Directionality was investigated by computing $d^2$ scores for both directional conditions of ORP scale score > MIQ scale score and MIQ scale score > ORP scale score. Weighting of the $d^2$ index by importance was accomplished by multiplying the square of need-reinforcer difference by the need scale score. The zero point interpretation was satisfied by computing $d^2$ scores only for conditions where ORP scale scores > 0, MIQ scale scores > 0, and both ORP and MIQ scale scores > 0. For a set of five $d^2$ indices ($C_{10}$, $C_{11}$, $C_{12}$, $C_{13}$, $C_{14}$), the direction of difference scored only when ORP scale scores > MIQ scale scores, and for an additional set of five $d^2$ indices ($C_{15}$, $C_{16}$, $C_{17}$, $C_{18}$, $C_{19}$) the direction of difference was scored only when MIQ scale scores > ORP scale scores. Two $d^2$ indices of the first set ($C_{11}$, $C_{13}$) and the second set ($C_{16}$, $C_{18}$) gave weight to importance. In addition, for the $C_{12}$ and $C_{13}$ indices differences were scored only when ORP scale score > 0, for the $C_{17}$ and $C_{18}$ indices, only when MIQ scale score > 0, and for the $C_{14}$ and $C_{19}$ indices, only when both ORP and MIQ scale scores > 0.

Analysis. For each worker in each occupational sample, 19 MIQ-ORP correspondence index scores were calculated, using the appropriate ORP. The index scores were then correlated with the workers' MSQ general satisfaction scores for each occupational sample.

## Results

Table 2 shows the correlation of the 19 correspondence indices with job satisfaction for the six occupational groups. The correspondence indices are labeled $C_1$, $C_2$ ... $C_{19}$ in accordance with formulas in Table 1.

Examination of the correlation coefficients presented in Table 2 shows generally low correlations, with 42 of 114 correlations significantly different from zero. Correlations varied within occupational groups, with 13 of 19 correlations statistically significant for telephone operators, 10 for service representatives, 6 for checker-markers, 5 for salespersons and 4 for cashiers and counselors.

Insert Table 2 about here

Inspection of Table 2 indicates that the type of correspondence index employed makes a noticeable difference in the prediction of job satisfaction. Use of the three proportion measures of high point ($C_1$), G $\pm$ 1 SE ($C_2$), and G $\pm$ 2 SE ($C_3$) resulted in statistically nonsignificant correlations, ranging from -.09 to .15 for the high point index, from -.10 to .08 for G $\pm$ 1 SE, and from -.08 to .12 for G $\pm$ 2 SE. Moreover, two correlations for high point, four correlations for G $\pm$ 1 SE, and three correlations for G $\pm$ 2 SE were negative (i.e., contrary to prediction).

In contrast, use of the three correlational indices of product moment ($C_4$), rho ($C_5$), and tau ($C_6$) resulted in low correlations but in the predicted direction, with a considerable number of statistically significant correlations across the six occupational samples. Correlations for the product moment index ranged from .16 to .23 with five correlations being statistically significant; for the rho index, correlations ranged from .04 to .29, with three statistically significant correlations; and for the tau index, correlations ranged from .09 to .27, with three statistically significant correlations. Among the three indices, use of the product moment index produced the highest average correlation of .20 across the six occupational samples, followed by average correlations of .17 for rho and .16 for tau.

Compared with the three correlational indices, use of the 13 distance

indices, with the exception of $d^2$ prime ($C_8$), resulted in lower correlational coefficients, fewer statistically significant correlations, and many correlations in the direction opposite that predicted by TWA. Correlation of the $d^2$ ($C_7$) correspondence scores with job satisfaction resulted in one correlation coefficient in the direction opposite that predicted by TWA, and other low nonsignificant correlations, with the exception of that for the checker-marker sample ($r = -.25$, $p < .05$). Use of the five ORP > MIQ directional and composite directional-importance-zero point $d^2$ measures ($C_{10}$, $C_{11}$, $C_{12}$, $C_{13}$, $C_{14}$) resulted in higher correlations ranging from -.32 to .06, with 14 statistically significant correlations. Most correlations between these five indices and satisfaction were negative, indicating that the greater the need-reinforcer difference the less the job satisfaction. With the exception of $C_{14}$, an index scoring the direction of difference only when both MIQ and ORP scale scores > 0, the composite directional $d^2$ indices ($C_{11}$, $C_{12}$, $C_{13}$) did not differ in level of correlation from the referent directional $d^2$ index ($C_{10}$).

In comparison, use of the five MIQ > ORP directional and composite directional-importance-zero point $d^2$ indices ($C_{15}$, $C_{16}$, $C_{17}$, $C_{18}$, $C_{19}$) resulted in correlations less consistent across the occupational samples, ranging from -.24 to .30, with 10 statistically significant correlations. A very similar pattern and level of correlations was obtained across the five indices; no index differed from any other index in pattern and level of correlations. Correlations for four of six occupational samples were positive indicating that the greater the need-reinforcer difference the greater the job satisfaction. This last finding goes counter to TWA.

The component indices of $d^2$ elevation ($C_9$) and $d^2$ prime ($C_8$) resulted in a contrasting pattern of correlation coefficients, with five positive correlations for $d^2$ elevation and six negative correlations for $d^2$ prime. Use of the $d^2$ prime correspondence index produced the highest average correlation ($\underline{M}_r = -.21$) with job satisfaction among the nineteen indices, but with one more statistically

nonsignificant correlation coefficient than the product moment index.

## Discussion

The correspondence indices based on the profile characteristics of either shape (product moment, tau, rho) or shape and scatter ($d^2$ prime) were found to have a consistent, significant relationship with job satisfaction. In turn, these results provide support for the proposition that job satisfaction is a function of the correspondence between individual needs and work reinforcers. Although correspondence is best measured by both the product moment ($C_4$) and $d^2$ prime ($C_8$) indices, the $d^2$ prime index is more versatile because it is easily amenable to weighting the components of the correspondence score and to scoring the MIQ-ORP profile in terms of directional assumptions.

Analyses of the size and direction of the correlations between the distance indices and job satisfaction suggest the following conclusions: (a) Weighting the need-reinforcer difference by the importance of the need in either directional condition of ORP > MIQ and MIQ > ORP resulted in little or no improvement in prediction ($C_{11}$ contrasted with $C_{10}$, and $C_{16}$ contrasted with $C_{15}$, respectively); (b) Utilizing need or reinforcer scale scores greater than the zero point in either directional conditions of ORP > MIQ and MIQ > ORP resulted in no improvement in prediction ($C_{12}$ contrasted with $C_{10}$, and $C_{17}$ contrasted with $C_{15}$, respectively); (c) Utilizing both need and reinforcer scale scores greater than zero in the directional condition of ORP > MIQ resulted in improvement in the prediction of job satisfaction for some groups ($C_{14}$ contrasted with $C_{10}$); and (d) Predicting job satisfaction is contingent on the direction of need-reinforcer differences. Scoring need-reinforcer differences only when ORP > MIQ improved the prediction of job satisfaction ($C_{10}$ contrasted with $C_7$), whereas scoring the differences only when MIQ > ORP resulted in little or no improvement in prediction ($C_{14}$ contrasted with $C_7$).

For at least two groups, the relationship of the MIQ > ORP directional $d^2$

and elevation $d^2$ indices with job satisfaction ran counter to expectations from TWA. In retrospect, these results could be explained as follows: (a) The units used to measure the individual's needs may not be equivalent to the environmental reinforcer units; (b) Individuals may differ significantly in their perception of the amount (level) of job reinforcers in the work environment; (c) Other personality variables, e.g. vocational interests, personality style (Dawis & Lofquist, 1975), may moderate the relationship between need-reinforcer correspondence and job satisfaction; and (d) Need-reinforcer correspondence may be more accurately described by a compensatory model (deficient reinforcement on some needs is compensated for by adequate reinforcement on other needs) rather than by a need reduction model.

Generally low correlations were found between correspondence scores and job satisfaction. By using employees rather than applicants, the individuals whose needs were least correspondent with the work reinforcers were not included in the occupational samples. This restricts the range of correspondence scores obtained, which in turn attenuates the relationship observed between correspondence and job satisfaction. The restricted range of general job satisfaction supports this explanation and also contributes to obscuring the relationship between correspondence and job satisfaction. The mean job satisfaction score for the cashiers was 59.7, for the checker-markers 59.3, for the counselors 65.5, for the salespersons 61.1, for the service representatives 63.1, and for the telephone operators 59.4. These job satisfaction mean scores indicate that the average employee in each job group studied was satisfied.

Correlational results were frequently consistent across the six occupational samples with the exception of the checker-marker sample. For the elevation $d^2$ and the 10 directional $d^2$ indices, correlations obtained on the checker-marker sample were opposite in direction to those for the other five occupational samples. These results can be reasonably attributed to the use of the marker ORP for a mixed occupational sample of checkers and markers.

Although the primary concern of the present study was to select an operational measure of correspondence, a major result has been the further explication of the construct of correspondence. Further research is needed to investigate correspondence in terms of the issues of directionality and importance weighting, and the role of the profile characteristics of shape, elevation, and scatter in these issues.

## References


Betz, E. L. Occupational reinforcer patterns and need-reinforcer correspondence in the prediction of job satisfaction. Unpublished doctoral dissertation, University of Minnesota, 1974.

Borgen, F. H., Weiss, D. J., Tinsley, H. E. A., Dawis, R. V., & Lofquist, L. H. Occupational reinforcer patterns (first volume). Minnesota Studies in Vocational Rehabilitation, 1968a, 24.

Borgen, F. H., Weiss, D. J., Tinsley, H. E. A., Dawis, R. V., & Lofquist, L. H. The measurement of occupational reinforcer patterns. Minnesota Studies in Vocational Rehabilitation, 1968b, 25.

Cattell, R. B. rp and other coefficients of pattern similarity. Psychometrika, 1949, 14, 279-298.

Cronbach, L. J., & Gleser, G. C. Assessing similarity between profiles. Psychological Bulletin, 1953, 50, 456-473.

Dawis, R. V., & Lofquist, L. H. Personality style and the process of work adjustment. Manuscript submitted for publication, 1975.

Dawis, R. V., Lofquist, L. H., & Weiss, D. J. A theory of work adjustment (a revision). Minnesota Studies in Vocational Rehabilitation, 1968, 23.

Gay, E. G., Weiss, D. J., Hendel, D. D., Dawis, R. V., & Lofquist, L. H. Manual for the Minnesota Importance Questionnaire. Minnesota Studies in Vocational Rehabilitation, 1971, 28.

Holley, J. W., & Guilford, J. P. A note on the G index of agreement. Educational and Psychological Measurement, 1964, 24, 749-753.

Lienert, G. A. On a generalized G index of agreement. Educational and Psychological Measurement, 1973, 33, 767-772.

Osgood, C. E., & Suci, G. J. A measure of relation determined by both mean difference and profile information. Psychological Bulletin, 1952, 49, 251-262.

Vessey, T. M. A longitudinal study of the prediction of job satisfaction as a function of the correspondence between needs and the perceptions of job reinforcers in an occupation. Unpublished doctoral dissertation, University of Minnesota, 1974.

Warren, L. W. The prediction of job satisfaction as a function of the correspondence between vocational needs and occupational reinforcers. Unpublished doctoral dissertation, University of Minnesota, 1974.

Weiss, D. J., Dawis, R. V., England, G. W., & Lofquist, L. H. Manual for the Minnesota Satisfaction Questionnaire. Minnesota Studies in Vocational Rehabilitation, 1966, 22.

## Footnote

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Table 1

Methods of Estimating Need-Reinforcer Correspondence

| Description | Recommended by | Formula |
|---|---|---|
| High point index | | $C_1 = \dfrac{\sum_{j=1}^{k} \phi_{gj}}{\sum_{j=1}^{k} m_{ij}}$ |
| | | where $\phi_{gj} = 1$ if $\bar{x}_{gj} \geq 1$ and if $\dot{x}_{ij} \geq 1$ |
| | | otherwise $\phi_{gj} = 0$ |
| | | where $m_{ij} = 1$ if $\dot{x}_{ij} \geq 1$ |
| | | otherwise $m_{ij} = 0$ |

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Table 1, cont.

| Description | Recommended by | Formula |
|---|---|---|
| G ± 1 standard error band index of agreement | Holley-Guilford (1964)<br>Lienert (1973) | $C_2 = 2\left(\frac{\sum_{j=1}^{k} g_{ij}}{k}\right) - 1.0$<br>where $g_{ij} = 1$<br>if $\bar{x}_{gj} + 1SE_{gj} \geq x_{ij} \geq \bar{x}_{gj} - 1SE_{gj}$<br>otherwise $g_{ij} = 0$<br>where $SE_{gj}$ = standard error of group g for variable j. |
| G ± 2 standard error band index of agreement | Holley-Guilford (1964)<br>Lienert (1973) | $C_3 = 2\left(\frac{\sum_{j=1}^{k} g_{ij}}{k}\right) - 1.0$<br>where $g_{ij} = 1$<br>if $\bar{x}_{gj} + 2SE_{gj} \geq x_{ij} \geq \bar{x}_{gj} - 2SE_{gj}$<br>otherwise $g_{ij} = 0$<br>where $SE_{gj}$ = standard error of group g for variable j. |

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Table 1, cont.

| Description | Recommended by | Formula |
|---|---|---|
| Product moment correlation | Cattell (1949) | $C_4 = \dfrac{\sum_{j=1}^{k} x_{ij}\,\bar{x}_{gj} - \dfrac{\sum_{j=1}^{k} x_{ij} \sum_{j=1}^{k} \bar{x}_{gj}}{k}}{\sqrt{\left[\sum_{j=1}^{k} x_{ij}^2 - \dfrac{\left(\sum_{j=1}^{k} x_{ij}\right)^2}{k}\right]\left[\sum_{j=1}^{k} \bar{x}_{gj}^2 - \dfrac{\left(\sum_{j=1}^{k} \bar{x}_{gj}\right)^2}{k}\right]}}$ |
| Spearman's rank order correlation | Cronbach-Gleser (1953) | $C_5 = 1 - \left(\dfrac{6 \sum_{j=1}^{k} \left(r_{ij} - \bar{r}_{gj}\right)^2}{k\,(k^2 - 1)}\right)$ where $r_{ij}$ = rank order of variable j associated with person i. $\bar{r}_{gj}$ = rank order of variable j associated with group g. |

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Table 1, cont.

| Description | Recommended by | Formula |
|---|---|---|
| Kendall's tau coefficient | Cronbach-Gleser (1953) | $C_6 = \frac{P - Q}{1/2\ k\ (k - 1)}$<br>P = number of times rankings agree.<br>Q = number of times rankings disagree. |
| $d^2$, sum of squared differences | Osgood-Suci (1952)<br>Cronbach-Gleser (1953) | $C_7 = \sum_{j=1}^{k} (x_{ij} - \bar{x}_{gj})^2$ |
| $d^2$ prime | Cronbach-Gleser (1953) | $C_8 = \sum_{j=1}^{k} \left[ (x_{ij} - m_i) - (\bar{x}_{gj} - m_g) \right]^2$<br>where $m_i = \frac{\sum_{j=1}^{k} x_{ij}}{k}$<br>and $m_g = \frac{\sum_{j=1}^{k} \bar{x}_{gj}}{k}$ |

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Table 1, cont.

| Description | Recommended by | Formula |
|---|---|---|
| Elevation $d^2$ | | $C_9 = k \left[ \left( \frac{\sum_{j=1}^{k} x_{ij}}{k} \right) - \left( \frac{\sum_{j=1}^{k} \bar{x}_{gj}}{k} \right) \right]^2$ |
| Directional $d^2_{r>n}$[a] | | $C_{10} = \sum_{j=1}^{k} d_{ij}^2$ <br> where $d_{ij} = \bar{x}_{gj} - x_{ij}$ <br> if $\bar{x}_{gj} > x_{ij}$ <br> otherwise $d_{ij} = 0$ |
| Directional $d^2_{r>n}$ weighted by importance | | $C_{11} = \sum_{j=1}^{k} d_{ij}^2 \, (x_{ij} + 4.0)$ <br> where $d_{ij} = \bar{x}_{gj} - x_{ij}$ <br> if $\bar{x}_{gj} > x_{ij}$ <br> otherwise $d_{ij} = 0$ |

[a]The subscript r > n signifies that the directional $d^2$ score was computed using only need (n) and reinforcer (r) pairs in which the reinforcer scale score exceeded the need scale score.

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Table 1, cont.

| Description | Recommended by | Formula |
|---|---|---|
| Zero point directional $d^2_{r>n}$ | | $C_{12} = \sum_{j=1}^{k} d_{ij}^2$ <br> where $d_{ij} = \bar{x}_{gj} - x_{ij}$ <br> if $\bar{x}_{gj} > 0$ <br> and <br> if $\bar{x}_{gj} > x_{ij}$ <br> otherwise $d_{ij} = 0$ |
| Zero point directional, $d^2_{r>n}$ weighted by importance | | $C_{13} = \sum_{j=1}^{k} d_{ij}^2 \, (x_{ij} + 4.0)$ <br> where $d_{ij} = \bar{x}_{gj} - x_{ij}$ <br> if $\bar{x}_{gj} > 0$ <br> and <br> if $\bar{x}_{gj} > x_{ij}$ <br> otherwise $d_{ij} = 0$ |

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Table 1, cont.

| Description | Recommended by | Formula |
|---|---|---|
| Double zero point directional $d^2_{r>n}$ | | $C_{14} = \sum_{j=1}^{k} d_{ij}$ <br> where $d_{ij} = \bar{x}_{gj} - x_{ij}$ <br> if $\bar{x}_{gj}$ and $x_{ij} > 0$ <br> and <br> if $\bar{x}_{gj} > x_{ij}$ <br> otherwise $d_{ij} = 0$ |
| Directional $d^2_{n>r}$[b] | | $C_{15} = \sum_{j=1}^{k} d_{ij}^2$ <br> where $d_{ij} = \bar{x}_{gj} - x_{ij}$ <br> if $x_{ij} > \bar{x}_{gj}$ <br> otherwise $d_{ij} = 0$ |

[b] The subscript $n > r$ signifies that the directional $d^2$ score was computed using only need (n) and reinforcer (r) pairs in which the need scale score exceeded the reinforcer scale score.

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Table 1, cont.

| Description | Recommended by | Formula |
|---|---|---|
| Directional $d^2_{n>r}$ weighted by importance | | $C_{16} = \sum_{j=1}^{k} d_{ij}^2 \, (x_{ij} + 4.0)$ <br> where $d_{ij} = \bar{x}_{gj} - x_{ij}$ <br> if $x_{ij} > \bar{x}_{gj}$ <br> otherwise $d_{ij} = 0$ |
| Zero point directional $d^2_{n>r}$ | | $C_{17} = \sum_{j=1}^{k} d_{ij}^2$ <br> where $d_{ij} = \bar{x}_{gj} - x_{ij}$ <br> if $x_{ij} > 0$ <br> and <br> if $x_{ij} > \bar{x}_{gj}$ <br> otherwise $d_{ij} = 0$ |

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Table 1, cont.

| Description | Recommended by | Formula |
|---|---|---|
| Zero point directional $d^2_{n>r}$ weighted by importance | | $C_{18} = \sum_{j=1}^{k} d_{ij}^2 \, (x_{ij} + 4.0)$ where $d_{ij} = \bar{x}_{gj} - x_{ij}$ if $x_{ij} > 0$ and if $x_{ij} > \bar{x}_{gj}$ otherwise $d_{ij} = 0$ |
| Double zero point directional $d^2_{n>r}$ | | $C_{19} = \sum_{j=1}^{k} d_{ij}$ where $d_{ij} = \bar{x}_{gj} - x_{ij}$ if $\bar{x}_{gj}$ and $x_{ij} > 0$ and if $x_{ij} > \bar{x}_{gj}$ otherwise $d_{ij} = 0$ |

Table 2

Correlation of Correspondence Indices and General Job Satisfaction for Six Occupation Groups

| Correspondence Indices | Occupation Groups: Cashier N = 91 | Checker-Marker N = 64 | Counselor N = 196 | Sales-person N = 117 | Service Representative N = 89 | Telephone Operator N = 78 | $\bar{r}$ [a] |
|---|---|---|---|---|---|---|---|
| $C_1$ | 15 | 14 | 02 | -09 | 09 | -01 | -- |
| $C_2$ | -10 | 08 | 07 | -04 | -02 | -08 | -- |
| $C_3$ | 02 | 12 | -04 | -07 | 00 | -08 | -- |
| $C_4$ | 21* | 16 | 18** | 21* | 23* | 19* | 20 |
| $C_5$ | 29** | 10 | 20** | 04 | 21* | 18 | 17 |
| $C_6$ | 27** | 09 | 19* | 09 | 20* | 14 | 16 |
| $C_7$ | -10 | -25* | -05 | -03 | -03 | 13 | -- |
| $C_8$ | -23* | -13 | -15* | -13 | -40** | -22* | -21 |
| $C_9$ | 00 | -20* | 05 | 02 | 19* | 30** | -- |
| $C_{10}$ | -11 | 05 | -06 | -18* | -22* | -23* | -- |
| $C_{11}$ | -13 | 06 | -08 | -18* | -25** | -24* | -- |
| $C_{12}$ | -11 | 06 | -08 | -19* | -23* | -24* | -- |
| $C_{13}$ | -13 | 06 | -08 | -19* | -26** | -25* | -- |
| $C_{14}$ | -15 | 02 | -08 | -04 | -31** | -32** | -- |
| $C_{15}$ | -05 | -23* | 07 | 06 | 13 | 22* | -- |
| $C_{16}$ | -05 | -24* | 06 | 06 | 12 | 22* | -- |
| $C_{17}$ | -05 | -23* | 07 | 06 | 13 | 22* | -- |
| $C_{18}$ | -05 | -24* | 06 | 06 | 12 | 22* | -- |
| $C_{19}$ | 03 | -24* | 06 | 05 | 13 | 30** | -- |

[a]Correlational coefficients were averaged only for correspondence indices with unidirectional coefficients across the six occupation groups.

*$p < .05$, one-tailed test of significance.

**$p < .01$, one-tailed test of significance.