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Confirmatory Factor Analysis of the Interpersonal Support Evaluation List[1]

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Cohen and Hoberman (1983) designed the Interpersonal Support Evaluation List (ISEL) to measure the perceived availability of four relatively independent social support resources and thus to provide tests of stress-buffering hypotheses. The utility of the ISEL for such tests requires evidence that it actually measures distinct functional support dimensions. A confirmatory factor analysis of the ISEL for 133 college students showed that a four-factor model provided a reasonable fit to the data, but the large correlations among the four factors were strongly suggestive of a general, second-order social support factor. However, scoring the ISEL as a unidimensional measure only would result in the loss of unique information contained in the four subscales. Researchers should therefore follow Cohen and Hoberman's procedure of analying ISEL subscale scores and *the total score.*

In recent years, researchers investigating the effects of life stress on physical and psychological well-being have become increasingly interested in the role social support plays in this relationship. However, the studies do not provide a simple explanation of the process or processes through which social support performs its health maintenance function. In fact, there is considerable empirical evidence for two distinct models: (a) The main effect or additive burden model holds that social support has significant health-preserving

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effects, regardless of the level of stress currently experienced by the individual; and (b) the buffering or vulnerability model proposes that social support is effective only for those under high stress; that is, support serves to protect or buffer such individuals from the deleterious effects of stressors (Dohrenwend & Dohrenwend, 1981).

Based on a comprehensive review of the social support literature, Cohen and Wills (1985) concluded that the evidence favors the main effect model when support *structure* (e.g., the number of persons in one's support network) is measured, whereas buffering effects are found in studies that employ measures of support *function* (e.g., the kind of support provided by an individual or group). The rationale for this conclusion is as follows: Embeddedness in a social structure provides the individual with a sense of security and self-worth, based perhaps on the reassuring knowledge that one's life situation is reasonably stable, predictable, and rewarding. Structural support, then, provides the individual with more or less constant, generalized benefits which are not tied to the presence or absence of a particular stressor. As a result, measures of structural support tend to generate findings in favor of main effect hypotheses. On the other hand, a particular stressful life event elicits the need for a support resource related specifically to that stressor. For example, an impending life decision may elicit the need for support in the form of an honest appraisal from a close friend or relative, and the effects of the stressful event are buffered to the extent that this particular resource, appraisal support, is available to the individual. Buffering hypotheses, then, would be substantiated in studies that test for the presence or absence of relevant, stressor-specific support resources.

The Interpersonal Support Evaluation List

From the preceding discussion of social support models, it follows that adequate tests of buffering hypotheses require a measure of social support that assesses the availability of multiple, relatively independent support functions (Cohen & Wills, 1985). To address this need, Cohen and Hoberman (1983) developed the Interpersonal Support Evaluation List (ISEL), a questionnaire designed to measure the *perceived* availability of four specific support resources: (a) tangible support, the perceived availability of material aid; (b) appraisal support, the perceived availability of someone with whom to discuss issues of personal importance; (c) self-esteem support, the presence of others with whom the individual feels he/she compares favorably; and (d) belonging support, the perception that there is a group with which one can identify and socialize.[3] This particular set of support dimensions derives in large part from a classification scheme proposed by House (1981).

[3]The ISEL published in Cohen and Hoberman (1983) is the college version of the scale. A general population version is described in Cohen, Mermelstein, Kamarck, and Hoberman (1985).

Although the ISEL was intended to assess the availability of four distinguishable support resources, there is some question about the underlying structure of the scale. Cohen and Hoberman's (1983) assertion that the four ISEL subscales "evidence reasonable independence from one another" (p. 104), implies a four-factor model. However, their use of a total ISEL score in several analyses suggests that a single-factor model is also a logical possibility. Furthermore, high correlations among the appraisal, belonging, and self-esteem subscales in the general population version of the ISEL (reported in Cohen, Mermelstein, Kamarck, & Hoberman, 1985) led House and Kahn (1985) to conclude that the scale actually differentiates only two independent support functions, tangible versus the others. To date, then, there is at least implicit endorsement of one-, two-, and four-factor models for the ISEL. Finally, the high subscale correlations just alluded to raise the possibility of a higher order structure underlying the first-order factors (see Figure 1).

The dimensionality of the ISEL is an important issue because it was designed to provide tests of the stress-buffering model and, as the preceding discussion suggests, its utility for such tests requires evidence that it indeed measures distinct social support functions. To date there have been no analyses of the ISEL's factor structure, but because several plausible models have been proposed, confirmatory factor analysis can be used to provide a more rigorous and systematic test of alternative factor structures than is possible within the framework of exploratory factor analysis. In the present study, the factor models in Figure 1 were assessed using Jöreskog and Sörbom's (1984) LISREL VI program. For each factor model, LISREL provides maximum likelihood estimates of factor loadings and factor correlations, along with statistics reflecting how closely the proposed model fits the data.

METHOD

Subjects

The subjects were 133 college students (45 male, 88 female) who completed the ISEL as part of their participation in a longitudinal study of life stress and depression.

Instrument

The college version of the ISEL (Cohen & Hoberman, 1983) consists of 48 dichotomous items designed to assess the perceived availability of the four social support functions described earlier: tangible, appraisal, self-esteem, and belonging. Each subscale contains 12 items, 6 phrased positive-

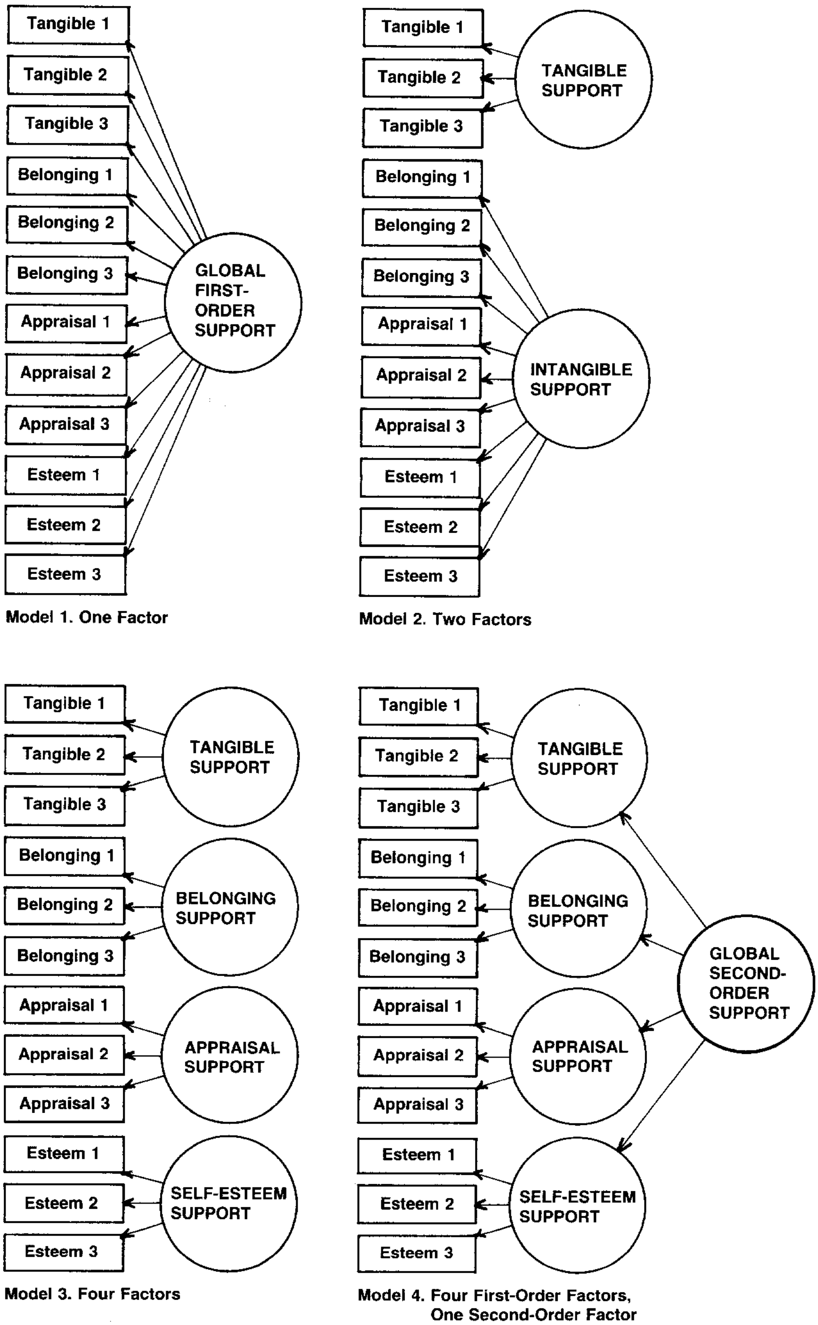

Fig. 1. Alternative factor models for the Interpersonal Support Evaluation List.

Table I. Descriptive Statistics for the ISEL Subscales and Total Scale[a]

	1	2	3	4	*M*	*SD*	KR2O
1. Tangible	–	.32	.40	.50	10.5	1.9	.69
2. Appraisal	.41	–	.29	.50	10.7	2.1	.83
3. Self-esteem	.30	.36	–	.54	8.9	1.9	.64
4. Belonging	.49	.48	.46	–	9.2	2.1	.61
5. Total					39.3	6.1	.86

[a]Subscale intercorrelations for the present study (n = 133) and median correlations from Cohen, Mermelstein, Kamarck, and Hoberman (1985) are presented above and below, respectively, the principal diagonal.

ly and 6 negatively. Respondents are instructed to indicate whether each statement is "probably true" or "probably false" about themselves. The items are scored so that for each subscale and the total scale, higher scores reflect greater perceived availability of support resources.

The means, standard deviations, and internal consistency reliabilities (Kuder Richardson 20) in Table I are generally consistent with those reported by Cohen et al. (1985). Also, as Table I shows, the median subscale intercorrelations for five different studies summarized by Cohen et al. (1985) are similar in pattern and magnitude to those in the present study. There were no sex differences on the subscale scores, total score, or the subscale intercorrelations; therefore, all subsequent analyses were performed on the total sample of 133 students.

Preliminary Analyses

Examination of the item response distributions indicated extreme negative skew in a majority of the items; for 33 of the 48 items, at least 80% of the subjects endorsed the alternative indicative of high social support.[4] Factor analyses of such items are inappropriate for two major reasons: (a) Items with similar marginal splits correlate more highly with each other than with another item related to the same factor but having a different split, thus producing factors that represent the different distributions, or, as they are known in the abilities literature, "difficulty factors" (Gorsuch, 1983); and (b) The chi-square values and standard errors computed for confirmatory maximum likelihood solutions assume multivariate normal distributions and may be influenced by extreme departures from normality in ways that are

[4]According to S. Cohen (personal communication, July 11, 1986), negative skew is also reported by other investigators using the ISEL. Cohen and his colleagues are now using a four-point response format for the ISEL items, in hopes of obtaining more variability in the item score distributions.

not yet fully understood (see Herting, 1985). Because procedures for conducting confirmatory factor analyses of dichotomous items are still in the developmental stage and the interpretation of such analyses is often problematic (see Jöreskog & Sörbom, 1984, chap. 4), we elected instead to perform the factor analyses on item *parcels* (Cattell, 1956; Comrey, 1973).

A parcel is a "miniscale" formed by adding together the scores of, typically, four to six items. All items are summed into parcels of approximately equal size, and the parcels are then factor analyzed. This strategy overcomes the major problems associated with factor analyzing dichotomous items in that much of the error associated with individual items is averaged out in the process of forming the parcels and distributional differences among parcels are likely to be less extreme than is the case with individual items (Gorsuch & Yagel, 1981).

In the present study, each of the four ISEL subscales was represented by three four-item parcels. Within subscales, items were assigned at random to one of the three parcels, with the constraint that each parcel contain two positively phrased items and two negatively phrased items. Then, to evaluate the consistency of the findings across different item groupings, all of the analyses were repeated for two additional sets of within-subscale parcels. These parcels were formed to minimize overlap in the item composition of parcels across analyses while maintaining the requirement that all parcels contain equal numbers of positively and negatively phrased items. For each set of 12 parcels, a variance/covariance matrix was computed for the factor analyses.[5]

Confirmatory Factor Analysis

Confirmatory factor analysis involves the specification and estimation of one or more putative factor models, each of which proposes a set of latent variables (factors) to account for covariances among a set of observed variables. In LISREL, model specification is accomplished by fixing or constraining elements in three matrices that are analogous to the factor pattern matrix, factor correlation matrix, and communalities from a common factor analysis. Higher order factor models require the specification of an additional matrix containing loadings of the first-order factors on the higher order factors (for an excellent discussion of first- and higher order factor model parameterization with LISREL, see Marsh, 1985; Marsh & Hocevar, 1985).

[5]A set of supplementary tables which includes the variance/covariance matrices for each of the three sets of item parcels and parameter estimates for all analyses is available upon request from the first author.

As noted earlier, previous theoretical and empirical work with the ISEL suggests at least four plausible factor models (shown in Figure 1). Using LISREL VI (Jöreskog & Sörbom, 1984), each model in Figure 1 – plus a null model, which specified no common factors (Bentler & Bonett, 1980) – was assessed three times, once for each of the three sets of item parcels. Because no one statistic is universally accepted as an index of model adequacy, our interpretation of results emphasizes substantive considerations and practical criteria, in addition to the following fit indices.

The chi-square goodness-of-fit statistic is a global test of a model's ability to reproduce the sample variance/covariance matrix. A *nonsignificant* chi-square indicates high congruence between model and data, but even trivial residual variance tends to produce significant chi-squares in large-sample problems (see Fornell, 1983). Consequently, many researchers instead emphasize the *ratio* of chi-square to the degrees of freedom, which provides information on the relative efficiency of competing models in accounting for the data. There are no significance tests associated with this statistic, but ratios of 2 or less are generally interpreted as indicating adequate fit.

The root mean square residual (RMSR) (Jöreskog & Sörbom, 1984) reflects the average residual obtained by taking the difference between the model-generated and sample variance/covariance matrices. Smaller values are associated with better fitting models. The normed fit index (NFI; Bentler & Bonett, 1980) assesses the fit of a model, relative to the fit of a null model, by scaling the chi-square value from 0 to 1. Zero represents the null model chi-square and 1 a perfect-fitting model. Finally, for higher order models, the target coefficient (Marsh & Hocevar, 1985) is a ratio of the chi-square of a first-order model to the chi-square of a higher order model and reflects the extent to which a higher order factor (or factors) accounts for correlations among the first-order factors. Like the NFI, the target coefficient is scaled from 0 to 1 and larger values are indicative of better models.

RESULTS AND DISCUSSION

Fit indices for the factor models are shown in Table II.[6] The tabled values are *ranges* from identical analyses conducted on the three different

[6]Significant chi-squares were obtained for all models assessed in this study. As noted earlier, this is often the case in covariance structure analyses, but many researchers then use diagnostic information provided in the LISREL output (e.g., modification indices) to free parameters fixed in the initial model, thus obtaining a reduced chi-square reflective of better fit. We elected not to do so because (a) LISREL recommended slightly different model modifications for the three analyses performed on each model, so that the effects of the modifications would have been difficult to interpret; and (b) we did not have a new sample of subjects available to cross-validate an amended model (Cliff, 1983; Tanaka & Huba, 1984).

Table II. Goodness-of-Fit Indices for the ISEL Factor Models: Ranges for Three Different Sets of Item Parcels[a]

Model	χ^2 (*df*)	χ^2/df	NFI	RMSR
0. Null model	510.73-538.99 (66)	7.74-8.17	–	.21-.22
1. 1 First-order factor	165.00-215.97 (54)	3.06-4.00	.60-.68	.06-.07
2. 2 First-order factors	154.29-193.67 (53)	2.91-3.65	.64-.70	.06-.07
3. 4 First-order factors	81.62- 89.34 (48)	1.70-1.86	.82-.85	.05-.06
4. 4 First-order factors, 1 Second-order factor	98.11-106.45 (53)	1.85-2.01	.79-.82	.06-.06

[a]The normed fit index (NFI) compares the fit of each model relative to the null model. The root mean square residual (RMSR) is a measure of average residual variances and covariances. For the second-order model, target coefficients ranged from .82 to .88.

sets of item parcels. As expected, the null model provides a poor fit to the data. The χ^2/df ratios are all greater than 7 and the RMSRs are greater than .20. Models 1 and 2 provide a better fit, relative to the null model, as evidenced by lower χ^2/df ratios and RMSRs less than .10. However, the χ^2/df criterion of 2 is not met by either model and the NFIs are considerably lower than for Models 3 and 4. In general, Models 1 and 2 provide a poor fit to the data, relative to Models 3 and 4.

Models 3 and 4 differ only in the latter's inclusion of a second-order factor to account for correlations among the four primary factors, and both fit the data equally well. The median χ^2/df ratios are less than 2 and median NFIs are greater than .80. Also, target coefficients for the three analyses of the higher order model, ranging from .82 to .88, indicate that a second-order, general support factor provides a good representation of the correlations among the first-order factors.

Because initial attempts to fit the second-order model resulted in improper solutions and additional constraints were needed to generate the proper solutions reported here, the fit indices and parameter estimates for Model 4 analyses should be interpreted with caution. Accordingly, our examination of parameter estimates is confined to Model 3. Nevertheless, the discussion of Model 3 shows that the data are still strongly suggestive of a second-order factor; the improper solutions, which are quite common in maximum likelihood analyses (see Jackson & Chan, 1980), do not alter this conclusion.

For purposes of illustration, "standardized" parameter estimates (Dwyer, 1983) are presented in Table III for the first analysis of Model 3. For each estimated parameter, critical ratios are given in parentheses. These ratios can be interpreted as *t* values, so that values greater than 2.0 indicate parameters that are significantly different from zero ($p < .05$). As Table III shows, all estimated loadings of the item parcels on their hypothesized factors are statistically significant and large, as are the interfactor correlations. In fact, across the three analyses of Model 3, the median interfactor correlation was .63.

Table III. Standardized Parameter Estimates and Critical Ratios for the First Analysis of Model 3: A Four-Factor First-Order Model[a]

Parcel	Factor loadings			
	Tangible	Belonging	Appraisal	Self-esteem
Tangible 1	.53*	0	0	0
Tangible 2	.39 (4.33)	0	0	0
Tangible 3	.46 (4.40)	0	0	0
Belonging 1	0	.56*	0	0
Belonging 2	0	.72 (6.52)	0	0
Belonging 3	0	.44 (4.72)	0	0
Appraisal 1	0	0	.51*	0
Appraisal 2	0	0	.69 (8.24)	0
Appraisal 3	0	0	.70 (7.42)	0
Self-esteem 1	0	0	0	.55*
Self-esteem 2	0	0	0	.52 (4.76)
Self-esteem 3	0	0	0	.43 (5.06)
	Factor correlations			
Tangible	—			
Belonging	.84 (3.63)	—		
Appraisal	.38 (2.59)	.64 (4.08)	—	
Self-esteem	.75 (3.54)	.88 (4.46)	.41 (2.97)	—

[a]Asterisk indicates a parameter fixed at 1.0 in the original solution. Critical ratios for each estimated parameter are listed in parentheses.

Statistically, the large interfactor correlations are not surprising; most of the individual ISEL items are skewed in the same direction and the subscale correlations (Table I) range from .29 to .54. What is at issue is the interpretation of these correlations. On the one hand, because the ISEL is a measure of perceived social support, it is possible that the interfactor correlations reflect the generalized influence of construct-irrelevant variables, such as personality characteristics (see Monroe & Steiner, 1986) as well as social support. On the other hand, it is reasonable to assume that supportive persons tend to provide more than one kind of support. In other words, the large correlations simply reflect the influence of the higher order, general support factor posited in Model 4. Consistent with this interpretation, Cohen et al. (1985) reported that the general population version of the ISEL is highly correlated with other social support scales and shows adequate discriminant validity with respect to measures of personality characteristics.

In summary, it is clear from the large correlations among the four primary factors in Model 3 that it is defensible to think of the ISEL as a measure of a general social support construct. However, the superiority of both Model 3 and Model 4 over the one-factor model (Model 1) makes it equally clear that analyzing the ISEL solely as a unidimensional measure results in the loss of unique information carried by the four subscales.

SUMMARY AND CONCLUSIONS

Cohen and Syme (1985) suggested that the most methodologically sound way of assessing the stress-buffering properties of different functional support dimensions is through the introduction of experimental manipulations designed to elicit needs for specific support resources, and we agree. Of course, such tests are feasible only to the extent that it is possible to separate the support dimensions empirically. The results reported here indicate that despite considerable covariation among the latent variables corresponding to the four ISEL subscales, covariation that most likely represents the influence of a general second-order support factor, there is also evidence that the four subscales provide sufficient unique information to warrant their retention in the ISEL.

From a practical standpoint, this means that researchers using the college version of the ISEL should follow Cohen and Hoberman's (1983) precedent of analyzing both individual subscale scores *and* the total support score. In the meantime, improvements in the distributional properties of the individual ISEL items, perhaps through the four-point item response format adopted recently by Cohen and his colleagues, should lead to more refined measurement of the functional support dimensions represented in the ISEL subscales and, subsequently, to more sensitive analyses of the stress-buffering mechanisms associated with different support resources.

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