

Psychometric Evaluation of the Interpersonal Support Evaluation List–Short Form in the ARIC Study Cohort

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Abstract

The impact of social support on health outcomes is well documented. The current study evaluated a short form of the Interpersonal Support Evaluation List (ISEL-SF) administered to 14,257 participants in the Atherosclerosis Risk in Communities study. Using confirmatory factor analysis, we attempted to replicate the subscale structure of the full-scale version. Additional analyses were conducted to examine the relationship of ISEL scores to key demographic variables, as well as the relationship with the Lubben Social Support Scale. We replicated the existing full-scale ISEL subscale structure in this short version. In addition, subscale scores were found to differ across gender, race, level of educational attainment, and marital status, although the magnitude of the various effects was modest. Correlations with another established measure of social support provide convergent validity for this abbreviated instrument. Results suggest this brief measure of perceived social support is a psychometrically valid instrument. An evaluation of its clinical utility is warranted.

Keywords

social support, health outcomes, confirmatory factor analysis, interpersonal support evaluation list (ISEL), African Americans

Background

Extensive literature attests to the salutary effects of social support across a variety of diseases (Blazer, 1982; Broadhead et al., 1983; Cassel, 1976; Cohen, 1988; Steptoe, 2000), including cardiovascular (Berkman, Vaccarino, & Seeman, 1993; Kawachi et al., 1996; Uchino, Carlisle, Birmingham, & Vaughn, 2011). Its mechanisms have been considered from a number of theoretical perspectives, including the health beliefs model (Montgomery et al., 1989) and social cognitive theory (Bandura, 1994), among others. Research has identified the importance of diverse supportive functions, including receiving practical information, obtaining direct assistance, feeling accepted by others, and other stress-buffering aspects, which then appear to influence immune function, mood, coping, and health behaviors (Chesney & Antoni, 2002; Paykel, 2001; Umberson & Montez, 2010; Wills & Fegan, 2001).

Less consensus exists regarding the specific dimensions or types of support most likely to affect health outcomes. The various ways in which support has been defined and operationalized across studies has prompted calls for greater specificity in defining the social support construct. This would permit the evaluation of the unique contributions of specific dimensions of support (Barrera, 1986; Cohen & Wills, 1985;

Fishbein, Triandis, Kanfer, Becker, & Middlestadt, 2001; Mermelstein, Cohen, Lichtenstein, Baer, & Kamarck, 1986).

The emerging literature documenting differences in social support across population subgroups is germane to these considerations. Perhaps the most extensively studied dimension is gender. For example, men tend to respond more negatively to support than women (Nagurney, Reich, & Newsom, 2004), but men may be more receptive to certain types of support when attempting to modify health-related behaviors, such as smoking (Westmass, Wild, & Ferrence, 2002). Women tend to derive greater benefit later in life as a function of their broader support systems relative to men (Gurung, Taylor, & Seeman, 2003). These studies highlight that type, timing, and receptivity to support may be critical issues in determining the ultimate impact of supportive activities.

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Social support may function differentially across race as well. Numerous studies suggest that members of minority groups may maintain stronger and larger social support systems relative to European Americans in an effort to manage an overall higher level of adversity in their lives (Broman, 1996; Holahan, Moos, Holahan, & Cronkite, 1999). A recent study demonstrated that a higher quality of interpersonal functioning among minorities appeared to protect individuals from experiencing more severe depressive symptoms (Plant & Sachs-Ericsson, 2004).

The Atherosclerosis Risk in Communities (ARIC) study provides a unique opportunity to examine these issues further. ARIC is a prospective, population-based investigation of the natural history of cardiovascular disease and associated risk factors in a cohort of European Americans and African Americans in four U.S. communities. Participants completed the ISEL-SF, a short version of the Interpersonal Support Evaluation List (ISEL), which assesses the perceived availability of functional social support resources, that is, those supportive functions afforded by social relationships (Cohen & Hoberman, 1983; Cohen, Mermelstein, Kamarck, & Hoberman, 1985). In the current study, we sought to confirm the factor structure of the ISEL-SF as well as examine differences in subscale scores across gender, race, and other demographic characteristics. This study is a necessary precursor to an investigation of the relationship between the ISEL-SF and health outcomes in the ARIC cohort, as it will provide important data regarding scale characteristics and population subgroup differences.

Method

Participants

The design of the ARIC study has been described previously (ARIC Investigators, 1989). Briefly, a total of 15,792 women and men aged 45 to 64 were recruited from probability samples in four U.S. communities: Forsyth County, North Carolina; Jackson, Mississippi (African Americans only); suburbs of Minneapolis, Minnesota; and Washington County, Maryland. Geographic and racial/ethnic balance, census borders, and potential for community member participation were considered in selecting the four communities. The initial examination, which included a variety of physical, vascular, medical, and psychosocial measures, was conducted during 1987 to 1989 (ARIC Investigators, 1989). Follow-up examinations were conducted approximately every 3 years through 1999. The ISEL-SF was administered to 14,348 participants at the Visit 2 examination conducted in 1990 to 1993. Exclusions from the analysis include 42 individuals not racially classified (self-report), as well as the only African Americans ($n = 49$) from the Washington County, Maryland, and Minneapolis, Minnesota, sites, leaving a total sample size of 14,257.

Measures

Demographic information and self-report questionnaires were collected by trained ARIC interviewers using standardized protocols established for all ARIC study sites (see ARIC Manuals of Operation: <http://www.csc.unc.edu/aric/>).

ISEL-SF. The ISEL-SF was included in the study protocol as an index of perceived social support. The original 40-item scale contains four theoretically derived subscales that measure conceptually distinct dimensions thought to buffer the effects of stressful events (Cohen & Hoberman, 1983). An initial factor analysis provided evidence for a four-factor model, with moderate intercorrelations noted among subscale scores (Brookings & Bolton, 1988). Because multiple social, psychological, and health assessment instruments are included in the clinical examination components of large epidemiological studies such as ARIC, the time burden for participants must be considered. Consequently, it is often impractical to administer lengthy questionnaires. To reduce the survey time burden for ARIC study participants, a short form was derived from the original ISEL scale. The ISEL-SF consists of 16 items drawn from the full scale. The items selected were those that possessed the highest factor loadings within each of the four subscales from the original analysis of the full ISEL instrument (Brookings & Bolton, 1988).

The short form was constructed by the original ARIC investigators as four 4-item subscales, consistent with the original instrument. These four subscales are (a) Appraisal Support (AP)—the perceived availability of someone to discuss issues of personal importance, (b) Tangible Assets Support (TA)—the perceived availability of material aid, (c) Belonging Support (BE)—the perceived availability of others to interact with socially, and (d) Self-Esteem Support (SE)—the perceived availability of others with whom one compares favorably. The ISEL-SF also yields an aggregate index of social support (TOT), ranging from 0 to 48, with higher scores indicating greater perceived social support. The ISEL-SF was modified from a true-false response format to a 4-point rating scale (*definitely true*, *probably true*, *probably false*, and *definitely false*; scored 0-3), presumably on an assumption of improved response sensitivity.

Lubben Social Network Scale (LSNS). The 11-item LSNS assesses structural components of social support (Lubben, 1988). Items address the number of family and friends and frequency of contact. The total score ranges from 0 to 50, and includes five subscales (not examined in this study). The relationship between the LSNS and ISEL-SF was examined to provide an index of convergent validity.

Statistical Analysis

All analyses were conducted using SAS software, version 8.2 (SAS Institute, 1999). Factor analyses were performed using

Table 1. Sample Characteristics

	AA women	AA men	EA women	EA men	Total
Total N	2,225	1,303	5,675	5,054	14,257
Years of education (%)					
≤11	38.9	41.4	15.3	16.9	21.9
12-16	29.5	26.1	51.6	39.3	41.5
≥17	31.6	32.5	33.1	43.8	36.6
Marital status (%)					
Married	51.1	75.8	80.3	90.5	78.9
Divorced	15.1	10.5	8.2	5.0	8.4
Never married	3.5	2.5	1.9	1.5	2.1
Separated	9.3	7.8	1.2	1.1	3.0
Widowed	21.0	3.4	8.4	1.9	7.6
Age, M (SD)	56.19 (5.73)	56.42 (5.92)	56.91 (5.66)	57.67 (5.69)	57.03 (5.73)

Note: AA = African American; EA = European American.

a confirmatory approach for estimation and assessment of measurement models (Hatcher, 1999). All groupwise comparisons for continuous dependent variables were performed using ANOVA and ANCOVA, as appropriate. These analyses were performed using the SAS general linear models procedure (SAS Institute, 1999), with zero/one dummy coded variables for multilevel categorical covariates.

Results

The average age of the current sample was 57 years, 55.4% were female, 24.7% were African American, 78% completed at least high school, and 79% were married (Table 1).

Internal Consistency

Cronbach's alpha was calculated as an index of internal consistency, yielding an overall value of 0.83, suggesting a high degree of interrelatedness among items. Indices for each original subscale were as follows: AP: 0.67, TA: 0.66, BE: 0.61, and SE: 0.53. Separate analyses within gender and racial subgroups yielded negligible differences.

Confirmatory Factor Analysis (CFA)

CFA was performed using the SAS covariance analysis of linear structural equations procedure (SAS Institute, 1999). In the original factor analysis for the long form (Brookings & Bolton, 1988), it was noted that items demonstrated an extreme negative skew. This was also confirmed for the present data set with estimates of skew ranging from -0.06 to -2.51. In all, 10 of the 16 items had skew less than or equal to -1.25. To overcome these departures from normality, we used the asymptotically distribution free (ADF) estimation method appropriate for large ($N > 5,000$) nonnormal data sets. The CFA model was estimated, allowing the four latent factors related to the instrument subscales to covary without restriction. The model fit the data quite well, with fit

indices as follows: root mean square error of approximation (RMSEA) = 0.043 with 90% confidence interval (CI) = [0.042, 0.045], and goodness of fit index (GFI) = 0.92. Table 2 displays the path coefficients for each item. Table 3 reports the correlations among the linear composite subscales, as well as the estimated latent subscales (see Tables 2 and 3).

Using the maximum likelihood (ML) method for performing the CFA resulted in a less optimal model fit than the ADF method. The ML method resulted in an RMSEA estimate 0.082 (95% CI = [0.081, 0.084]), which was not less than 0.05 as typically desired to infer good model fit. The ML method resulted in a smaller GFI estimate (0.897) than that of the ADF (0.919). Other fit indices included the following: Adjusted Goodness of Fit Index (AGFI) = 0.8878 (greater than or equal to 0.9 means good fit) and Normed Fit Index (NFI) = 0.631 (greater than or equal to 0.9 means good fit).

Demographic Characteristics

Correlations between subscale scores and age were either nonsignificant or significant but of very low magnitude ($r < .10$). We then analyzed data for gender differences, racial differences, and Gender \times Race interaction effects. Women scored higher than men on AP, $F(1, 14102) = 163.14$, $p < .0001$; BE, $F(1, 14073) = 270.06$, $p < .0001$; and TOT, $F(1, 13920) = 42.50$, $p < .0001$, scores. Men scored higher on TA, $F(1, 14072) = 24.39$, $p < .0001$, and SE, $F(1, 14040) = 23.09$, $p < .0001$. European Americans scored higher than African Americans on TA, $F(1, 14072) = 163.47$, $p < .0001$; BE, $F(1, 14073) = 10.97$, $p < .0001$; and TOT, $F(1, 13920) = 11.74$, $p < .001$. African Americans scored higher than European Americans on SE, $F(1, 14040) = 9.21$, $p < .003$, and there were no differences on AP ($p > .15$). Race \times Gender interactions were evident for TOT and all subscales except TA (Table 4 displays details and post hoc comparisons). For AP, BE, and TOT, European American women generally reported the highest levels of support, followed by African American men, African American women, and

Table 2. ISEL-SF Items and Standardized Path Coefficients

Item/subscale	Item content	Standardized path coefficient			
		AP	TA	BE	SE
5 AP	There really is no one who can give me an objective view of how I'm handling my problems.	.56			
8 AP	When I need suggestions on how to deal with a personal problem, I know someone I can turn to.	.74			
12 AP	There is really no one I can trust to give me good financial advice.	.61			
15 AP	There is at least one person I know whose advice I really trust.	.56			
6 TA	If I were sick and needed someone (friend, family member, or acquaintance) to take me to the doctor, I would have trouble finding someone.		.53		
7 TA	If I were sick, I could easily find someone to help me with my daily chores.		.57		
11 TA	If I had to go out of town for a few weeks, it would be difficult to find someone who would look after my house or apartment (the plants, pets, garden, etc.).		.60		
14 TA	It would be difficult to find someone who would lend me their car for a few hours.		.57		
2 BE	When I feel lonely, there are several people I can talk to.			.68	
3 BE	I often meet or talk with family or friends.			.64	
4 BE	I feel like I am not always included by my circle of friends.			.42	
9 BE	I don't often get invited to do things with others.			.65	
1 SE	Most of my friends are more interesting than I am.				.42
10 SE	Most of my friends are more successful at making changes in their lives than I am.				.60
13 SE	I am more satisfied with my life than most people are with theirs.				.38
16 SE	I have a hard time keeping pace with my friends.				.60

Note: ISEL-SF = Interpersonal Support Evaluation List–Short Form; ISEL subscales: AP = Appraisal, TA = Tangible Assets, BE = Belonging, SE = Self-Esteem.

Table 3. Correlations Among the ISEL-SF Subscales and Latent Factors

	Total	Subscales			Latent Factors		
		AP	TA	SE	AP	TA	SE
AP	.81						
TA	.79	.53			.81		
SE	.71	.40	.41		.65	.62	
BE	.81	.58	.50	.44	.85	.67	.67

Note: ISEL-SF = Interpersonal Support Evaluation List–Short Form; AP = Appraisal; TA = Tangible Assets; SE = Self-Esteem; BE = Belonging. All correlations are significant at $p < .0001$. *N*s vary from 13,937 to 14,076.

European American men. For SE, African American men reported higher levels than all others.

Marital status was related to subscale scores (Table 5). Married participants had higher AP scores than divorced or separated participants, $F(4, 14101) = 6.7, p < .0001$. TA

scores were higher for married participants than all other groups, $F(4, 14071) = 50.25, p < .0001$. With regard to SE scores, married and divorced participants scored significantly higher than widowed participants, $F(4, 14039) = 12.19, p < .0001$. Divorced individuals also scored higher on SE than single individuals, and married participants scored higher than separated individuals. No significant differences were observed for BE scores.

Higher educational achievement was associated with higher social support scores on all subscales: AP, $F(2, 14095) = 57.72, p < .0001$; TA, $F(2, 14065) = 94.81, p < .0001$; BE, $F(2, 14066) = 62.83, p < .0001$; and SE, $F(2, 14034) = 239.43, p < .0001$. All post hoc pairwise comparisons across educational levels were statistically significant (Table 5).

Structural Support

A moderate relationship was present between the LSNS and total ISEL-SF TOT score ($r = .45$), as well as for all subscales (AP, $r = .37$; TA, $r = .35$; SE, $r = .26$; BE, $r = .38$; all

Table 4. ISEL-SF M (SE) Subscale and Total Scores for Race × Gender Subgroups

ISEL-SF factor subscale	Subgroup	M (SE)	Subgroup	M (SE)	Difference (SE)	p
AP	AAM	9.61 (0.06)	AAW	9.48 (0.05)	0.13 (0.01)	ns
			EAM	9.12 (0.03)	0.49 (0.03)	<.05
			EAW	9.78 (0.03)	−0.17 (0.03)	ns
	AAW	9.48 (0.05)	EAM	9.12 (0.03)	0.36 (0.02)	<.05
			EAW	9.78 (0.03)	−0.30 (0.02)	<.05
			EAW	9.78 (0.03)	−0.66 (0)	<.05
TA	AAM	9.27 (0.07)	AAW	9.44 (0.05)	0.28 (0.02)	ns
			EAM	10.15 (0.03)	−0.43 (0.04)	ns
			EAW	10.01 (0.03)	−0.29 (0.04)	ns
	AAW	9.44 (0.05)	EAM	10.15 (0.03)	−0.71 (0.02)	ns
			EAW	10.01 (0.03)	−0.57 (0.02)	ns
			EAW	10.01 (0.03)	0.14 (0.00)	ns
BE	AAM	9.27 (0.06)	AAW	9.33 (0.05)	−0.06 (0.01)	ns
			EAM	9.05 (0.03)	0.22 (0.03)	<.05
			EAW	9.79 (0.03)	−0.52 (0.03)	<.05
	AAW	9.33 (0.05)	EAM	9.05 (0.03)	0.28 (0.03)	<.05
			EAW	9.79 (0.03)	−0.46 (0.02)	<.05
			EAW	9.79 (0.03)	−0.74 (0.00)	<.05
SE	AAM	8.36 (0.06)	AAW	7.99 (0.05)	0.37 (0.01)	<.05
			EAM	8.06 (0.03)	0.30 (0.03)	<.05
			EAW	7.96 (0.03)	0.40 (0.03)	<.05
	AAW	7.99 (0.05)	EAM	8.06 (0.03)	−0.07 (0.02)	ns
			EAW	7.96 (0.03)	0.30 (0.02)	ns
			EAW	7.96 (0.03)	0.10 (0.00)	ns
Total score	AAM	37.00 (0.20)	AAW	36.34 (0.16)	0.66 (0.04)	<.05
			EAM	36.42 (0.10)	0.58 (0.10)	<.05
			EAW	37.57 (0.09)	−0.57 (0.11)	<.05
	AAW	36.34 (0.16)	EAM	36.42 (0.10)	−0.08 (0.06)	ns
			EAW	37.57 (0.09)	−1.23 (0.07)	<.05
			EAW	37.57 (0.09)	−1.15 (0.00)	<.05

Note: ISEL-SF = Interpersonal Support Evaluation List–Short Form; AP = Appraisal; AAM = African American men; AAW = African American women; EAM = European American men; EAW = European American women; TA = Tangible Assets; BE = Belonging; SE = Self-Esteem.
 ns = not significant at $p < .05$.

Table 5. ISEL-SF M (SD) Subscale Scores Across Marital Status and Years of Education

	AP	TA	BE	SE
Marital status				
Married	9.52 (2.15)	10.09 (2.01)	9.43 (2.09)	8.08 (1.94)
Divorced	9.33 (2.35)	9.49 (2.52)	9.34 (2.24)	8.05 (2.18)
Single	9.47 (2.19)	9.38 (2.45)	9.35 (2.20)	7.66 (2.15)
Separated	9.07 (2.43)	9.34 (2.68)	9.16 (2.15)	7.84 (2.36)
Widowed	9.38 (2.23)	9.48 (2.47)	9.38 (2.18)	7.71 (2/32)
p	<.0001	<.0001	.06	<.0001
Years of education				
<11	9.21 (2.27)	9.49 (2.56)	9.07 (2.18)	7.54 (2.29)
12-16	9.41 (2.16)	10.00 (2.08)	9.41 (2.10)	7.90 (1.96)
≥17	9.72 (2.14)	10.15 (1.90)	9.61 (2.08)	8.48 (1.79)
p	<.0001	<.0001	<.0001	<.0001

Note: ISEL-SF = Interpersonal Support Evaluation List–Short Form; AP = Appraisal; TA = Tangible Assets; BE = Belonging; SE = Self-Esteem.

ps < .0001, *N* range = 13,116-13,278). Negligible gender differences were evident. Comparison of intraracial correlations revealed higher values for European Americans than African Americans on TOT (.47 vs. .38), AP (.40 vs. .31), TA (.37 vs. .33), SE (.28 vs. .23), and BE (.41 vs. .31) scores (*N* range for African Americans = 3,140-3,188; *N* range for European Americans = 9,976-10,068). Thus, for European Americans, structural and functional components of support appear to be more highly interrelated, relative to African Americans.

Discussion

In large studies, practical considerations of participant burden often require compromises in the breadth and depth of the assessments conducted. Brief measures with established psychometric properties are necessary and invaluable. In the ARIC study, an abbreviated version of the ISEL was included as a measure of perceived functional social support based on existing data attesting to the reliability and validity of the original scale. The current findings provide support for the ISEL-SF in that (a) the four-factor structure of the original scale was replicated, (b) it was found to be internally consistent, and (c) differences across important population subgroups were identified. The primary limitation of this short form is that the small number of items precludes the capacity to score the tertiary (third tier) subscales that are available in the full-scale version.

With respect to reliability, the internal consistency estimates obtained indicate a set of items that are highly interrelated for the overall scale, and moderately so for subscales. Given available data on the original ISEL, this was expected and confirmed. In addition, the moderate level of intercorrelation across subscales suggests the presence of somewhat independent dimensions of perceived support.

It would have been useful to validate the ISEL-SF against the full-scale ISEL, but this was not possible. Acknowledging this limitation, it is noteworthy that the four-factor solution of the original ISEL scale (Brookings & Bolton, 1988) was replicated using CFA in the present study despite substantial methodological differences, including (a) length of the scale (16 vs. 40 items), (b) response format (true-false vs. 4-point), (c) sample size (133 vs. ~14,000), and (d) sample characteristics (college students vs. middle-aged, population-based). In addition, the large pool of participants consisting of African and European American men and women across educational levels and marital categories from different geographic locations strengthens the validity and generalizability of our findings.

Notable racial and gender differences emerged. Consistent with previous research, women endorsed higher overall levels of support compared with men. Subscale differences suggest that women prefer to draw support from trusted individuals and those available for social interaction (AP and BE). However, men appeared to preferentially value support

from those perceived as similar or from whom necessary resources were available (SE and TA).

Previous research has raised the possibility that the moderating effects of social support on health outcomes may be differentially related to gender and race, as well as the influence of specific support dimensions (Berkman et al., 1993; Brownley, Light, & Anderson, 1996). In the current investigation, European Americans indicated higher levels of overall support, including higher TA and BE; SE was higher for African Americans. Examination of interaction effects revealed interesting subgroup differences (Table 4) that suggest the value of further exploration. Finally, the differential magnitude of subscale intercorrelations across race suggests that structural and functional facets of support operate more independently for African Americans relative to European Americans. It is unclear why this may be the case, or under which circumstances this may be advantageous. One broad possibility is that such an organization may confer greater flexibility in the utilization of support resources. Alternately, race may play a role in determining the nature and degree of community cohesiveness and support. These observations and tentative explanations await confirmation from further research.

Higher levels of education were positively associated with all types of support, again confirming previous work. Similarly, results related to marital status suggest that being married is associated with higher levels of AP, TA, and SE support scores, as would be expected. The lack of difference across marital subgroups on BE seems reasonable as well, as this type of support may be derived primarily outside the marriage. A somewhat anomalous finding was that divorced individuals scored as high on SE support as married individuals. It may be that those who have ended a relationship perceive they possess the personal resources necessary to "move on."

While the characteristics of the ISEL-SF are promising, it is important to consider that the constructs tapped by the ISEL-SF (and original ISEL) are limited. A comprehensive evaluation of social support on health and health outcomes must also address complementary constructs such as structural support, negative support, social isolation, and other factors (Mermelstein et al., 1986; Wills & Fegan, 2001).

Conclusion

The results of this study provide support for the utility of the ISEL-SF as a brief, internally consistent instrument that discriminates among individuals of varying demographic characteristics. The large, diverse sample studied permits a high degree of confidence in the stability of the results. The full scale and subscales possess adequate internal consistency to suggest reliable measurement of key constructs, while the results of the CFA and evidence of a moderate correlation with another measure of social support attest to validity of the instrument. Finally, the brief form of this

instrument underscores its value for inclusion in studies where time is of concern. Future studies are required to determine whether the ISEL-SF is associated with health outcomes, and to elucidate the relative contribution of the specific support dimensions addressed.

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Declaration of Conflicting Interests

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Bios

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