ARTICLE

CONFIRMATORY FACTOR ANALYSIS OF THE SENSE OF COMMUNITY INDEX AND DEVELOPMENT OF A BRIEF SCI

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The Sense of Community Index (SCI) is the most widely used measure of the construct, despite the lack of confirmation of its intended dimensions or subscales. Yet psychometric appraisals of the SCI have never used the proper tool for evaluating an established dimensional construct: confirmatory factor analysis (CFA). The Block Booster Project data set (of residents of 47 street blocks in Brooklyn and Queens, New York) used in developing the original SCI in 1985 was used here in its reassessment, along with a 1-year follow-up survey expanded to 61 blocks. The Sense of Community Index reanalysis using CFA yielded poor model fit for McMillan and Chavis' (1986) original theoretical formulation as well as for a single-factor index, prompting development of a Brief SCI. The eight-item, three-factor BSCI showed good model fit with CFA, reliable construct validity in multilevel correlational analyses, and it differentiated street block neighborhoods reliably based on intragroup agreement, while retaining the profile of a cognitive-perceptual construct, which does not crossover with other popular community psychology constructs such as place attachment and community satisfaction. The authors, however, recommend future uses of the BSCI employ a 5-point Likert-type response format to increase the measure's variability, sensitivity, and internal reliability.

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Pretty and colleagues (Chavis & Pretty, 1999; Chipuer & Pretty, 1999) recently reviewed and reported on the use and psychometric properties of the Sense of Community Index (SCI; Perkins, Florin, Rich, Wandersman, & Chavis, 1990), the most popular instrument for empirically measuring the construct introduced to psychology by Sarason (1974) and systematized by McMillan and Chavis (1986). For example, the 12-item SCI, or adaptations of it, have been employed with adults in the workplace (Brodsky & Marx, 2001; Catano, Pretty, Southwell, & Cole, 1993; Mahan, Garrard, Lewis, & Newbrough, 2002; Pretty & McCarthy, 1991; Pretty, McCarthy, & Catano, 1992), religious communities (Miers & Fisher, 2002), immigrant groups (Sonn, 2002), residential neighborhoods (Brodsky & Marx, 2001; Brodsky, 1999; Chipuer, 1992, as cited in Chipuer & Pretty, 1999; Kingston, Mitchell, Florin, & Stevenson, 1999), students in collegiate communities (McCarthy, Pretty, & Catano, 1990; Pretty, 1990), adolescents in residential neighborhoods (Pretty, Andrewes, & Collett, 1994; Pretty, Conroy, Dugay, Fowler, & Williams, 1996), and sixth graders in school (Bateman, 2002). However, such popularity might be deemed a dubious honor because sense of community (SOC) has been measured in numerous and varied ways (see Chavis & Pretty, 1999), perhaps even to the point SOC research has "become stuck at the stage of construct definition and measurement" (p. 645). At the risk of furthering this trend, here we will attempt to overcome some of the psychometric deficiencies and omissions of past studies using the SCI and related measures. Although we grant that theory-driven research is the preferred method, we will make the case that positing four dimensions of SOC is, in fact, an empirical question. Hence, furthering the trend of using descriptive methods alone to validate McMillan and Chavis's four-dimensional model may be contributing to the disconnect between theory and empirical work.

The SCI is often incorrectly cited and so it may help to briefly explain its history. It was developed in 1984–1985 by David Chavis with the help of Paul Florin, Doug Perkins, John Prestby, Richard Rich, and Abraham Wandersman as part of the present data set, the New York City Block Booster action-research project. The scale items were published in the Appendix of Perkins et al. (1990). As we will discuss, although it was based on McMillan and Chavis' (1986) theory, their four dimensions have not been confirmed empirically using the factor analysis in the Perkins et al. (1990) study that first presented the SCI nor in other data. Chavis, Hogge, McMillan, and Wandersman (1986) are often mistakenly cited as the source of the SCI, but they used a 46-item scale (including factor scale items) called the Sense of Community Profile, which is much broader and includes many other constructs (see below).

In the first-of-its-kind study of the internal reliability and factor structure of the SCI using four different data sets (with adolescents and adults, in neighborhoods and a workplace), Chipuer and Pretty (1999) reported overall SCI alphas ranging from .64 to .69 and subscale alphas ranging from .07 to .72. They reported no dimensional consistency to the SCI, either empirically (from sample to sample) or theoretically (relating to McMillan and Chavis's theory). The method they chose for empirically evaluating the dimensional structure of the SCI was less than ideal, however. When theoretical and empirical evidence exists for a multidimensional construct, confirmatory factor analysis (CFA) is the appropriate procedure for (dis)confirming the fit of the theoretical structure.

Because empirical evidence exists for the SCI as a viable single-factor index and a theoretical precedence exists for a four-factor solution (McMillan & Chavis, 1986), CFA is clearly most appropriate for (re)evaluating the SCI. As has been common in the past, Chipuer and Pretty (1999) used principal components analysis but discussed it in terms of exploratory factor analysis (EFA). Methodologists have made the case that those terms and procedures should not be used interchangeably. (For review of factor analytic procedures, see e.g., Fabrigar, Wegener, MacCallum, & Strahan, 1999.) Principal component analysis (PCA) is appropriate for *data reduction* in which resulting components can be used to compute scores for individuals. Hence, PCA "defines each measured variable as a linear function of principal components, with no separate representation of unique variance" (Fabrigar et al., 1999, p. 275). Exploratory factor analysis, by contrast, produces *latent* (i.e., unobservable) factors whose properties cannot be produced per individual person; this is because EFA differentiates between unique *and* common variance. Finally, Chipuer and Pretty recommend reverting back to the original, unwieldy 46-item Sense of Community Profile (Chavis et al., 1986) rather than building on the wealth of existing and varied research findings available to us.

Although Chavis et al.'s (1986) application of Brunswick's (1947; 1952) model was thorough, a number of problems exist. For example, if what we need is a measure of *psychological* SOC, are not demographic variables, such as home ownership and length of residence, too tangential to the cognitive–emotional construct of SOC? Additionally, several community-focused cognitive constructs, such as community satisfaction and collective efficacy, and behaviors, such as participation and neighboring, have emerged in the community psychology literature that are argued to be related to, yet distinct from, SOC. Each of these constructs is clearly tapped by the SOC Profile, which also requires a complex weighting of items. Such weighting and complexity, along with its length and being so broad as to be virtually meaningless, have likely been and will continue to be deterrents to researchers using that index.

It is also necessary to review Buckner's (1988) scale assessing "sense of community/cohesion" (p. 782). Buckner set out to create a measure of neighborhood community cohesion, arguing that such a construct should encompass three independent constructs: attraction-to-neighborhood, neighboring, and psychological sense of community.

Both Buckner (1988) and Perkins et al. (1990) argued that SOC should operate at both the individual and the collective level. Perkins et al. (1990) and Perkins and Long (2002) tested the social "climate" properties of SOC and related community cognitions and behaviors using the three criteria advocated by Shinn (1990). They found that there is a significant amount of agreement among individuals within a community about the level of social cohesion, that communities vary in their degree of cohesion, and that those variables significantly relate to other variables of interest (e.g., civic participation) at the community level. The results suggest that SOC and the other cohesion variables operate simultaneously, but sometimes differently, at both the individual and community levels.

In his factor analytic stage of scale construction, however, Buckner did not find evidence for his three theoretical components of cohesion, eventually settling on an 18-item, nonfactorial scale of "sense of community/cohesion," which contained 9 items originally designed to tap SOC, 5 for neighboring, and 3 for attraction-to-neighborhood. Many of the criticisms of Chavis et al.'s (1986) index may be applied to Buckner's scale: Neighboring is a behavior rather than a cognitive-perceptual construct; attraction-to-neighborhood is more similar to place attachment and/or community satisfaction than SOC; and some of the SOC items even appear to tap constructs other than SOC (e.g., community confidence, collective efficacy, communitarianism).

Due to the criticisms specific to Chavis et al.'s index and Buckner's scale, as well as the length and/or complexity deterrent factors in their use, we recommend a reasoned and concise process moving forward, rather than Chipuer and Pretty's (1999) recommendation of reverting back to earlier stages of scale development for arriving at a concise, reliable, valid measure of SOC.

If indeed SOC has multiple dimensions, then they should be empirically verifiable, and different communities should vary predictably with regard to members' cognitive-perceptual consensus of "community." To test these assumptions, we will return to the original Block Booster Project data used to create Perkins et al.'s (1990) SCI. In introducing the SCI, Perkins et al. reported cross-sectional analyses with the Time-1 data set only; there reporting an internal reliability score alpha = .80 with $N =$ 720, which is the highest alpha coefficient we have seen published for the SCI. This was evidently based on pair-wise deletion of missing data. Using the same data and list-wise deletion of missing values, we found alpha = .69 with $N = 575$ at Time 1, and alpha = .75 with $N = 335$ at Time 2, for the 12-item SCI.

METHODS

This study employs the original SCI and other resident survey data from the 1985–1986 Block Booster Project (Perkins et al., 1990). The dual purposes of the Project were to study the role of residential block associations in community development and crime control and to develop an intervention process and set of training materials to assist the viability and effectiveness of voluntary associations. Clustered, resident survey data from 47 street blocks (the homes fronting on the same street between two cross streets or a cross street and dead end) in five neighborhoods in Brooklyn and Queens, New York, were collected at two points in time (T 1 $N = 1{,}081$, T 2 $N = 638$, household panel = 438). The present study uses not only the first wave of data, but both waves. One major limitation of this dual time point data set, however, is that respondent panel verification was limited. Within-household replacement of respondents occurred in an unspecified number of cases and many of the demographic variables were collected at T 1 or T 2, but not both time points. Thus, a confident determination of respondent panel based on matched demographics was not possible. Analyses are thus of two semi-independent, cross-sectional data sets.

For a complete description of Perkins et al.'s study purposes, site selection, telephone survey, and objective data collection methodology, please see Perkins et al. (1990). A description of the instruments used in this study (including *N*s and alphas) to assess the construct validity of our brief measure of SOC is provided in the Appendix (but see Table 3 for Place Attachment). Note that these variables were calculated similarly to Perkins et al. in some cases and differently in others, and have all shown predictive utility elsewhere (Perkins & Long, 2002).

Analyses

Confirmatory factor analyses. When theoretical and empirical evidence exists for a multidimensional construct, CFA is the appropriate analysis for (dis)confirming the fit of the theoretical structure to empirical data. Because empirical evidence exists for the SCI as a viable single-factor index and a theoretical precedence exists for a four-factor solution (McMillan & Chavis, 1986; Perkins et al., 1990), CFA is the logical starting point (using the structural equation modelling program Amos 4.01; Arbuckle & Wothke, 1999). Amos allows the user to estimate means and intercepts when one has missing data. In doing so, however, several key goodness-of-fit indexes cannot be calculated and, depending on the degree of missing data, final results may be poorly representative of reality. Thus, CFAs here used only cases with complete data.

The restricted factor analysis method (see Arbuckle & Wothke, 1999, p. 372) was used in multifactor models: Latent factors were allowed to correlate (because theory and research has confirmed such interrelations exist), item-to-factor loadings were not constrained, and errors among individual items were not allowed to correlate. In Amos, no modification indices are displayed if none exceed the specified threshold. In all CFAs performed here, none were displayed, which means no empirical modification to the model specification could be offered by Amos to improve model fit.

In determining goodness of fit of our CFAs, a number of indexes were used: discrepancy chi-square, discrepancy/*df* ratio, GFI, AGFI, TLI, CFI, RMSEA, ECVI, BIC, and AIC, each described briefly below. The discrepancy chi-square goodness-of-fit statistic is reported here despite the fact that it is considered by many to be an unrealistic standard (e.g., Fabrigar et al., 1999; Millis, Malina, Bowers, & Ricker, 1999), wherein the null hypothesis is perfect fit and any statistically significant value is considered poor fit. The ratio of discrepancy-to-*df* is a less stringent test wherein a value less than 2 is considered acceptable fit (Arbuckle & Wothke, 1999). The goodness-of-fit index (GFI) and adjusted goodness-of-fit index (AGFI; see Joreskog & Sorbom, 1989) statistics range from 0 to 1 and have been likened to the chi-square statistic in multiple regression. Values greater than .90 are desired on the GFI (Kelloway, 1998), but .80 or above are acceptable with the AGFI because it corrects for the number of parameters in the model. The Tucker-Lewis Index (TLI, or non-normed fit index) is based on the central chi-square distribution while the Comparative Fit Index (CFI) is based on the non-central chi-square distribution. As with the GFI, the TLI and CFI have ranges of 0 to 1 and scores .90 and above are desirable. Root mean square of error approximation (RMSEA) bases goodness-of-fit on the "discrepancy between the model and the data per degree of freedom for the model" (Fabrigar et al., 1999, p. 280) and has even more specific guidelines for goodness-of-fit: $< .05$ = good fit; .05 to .08 = acceptable fit; .08 to .10 = marginal fit; $> .10$ = poor fit (see Browne & Cudeck, 1992). The Bayes information criterion (BIC) is useful for comparing models, but not as an absolute standard. The BIC can help gauge whether (in this case) a multifactorial model is better fitting than a single factor model. Criterion provided by Raftery (1993) indicate that a nested model BIC difference of less than 4.6 indicates weak evidence of better fit of the lower-valued model; a difference between 4.6 and 9.2 indicates strong evidence in favor of the lower-valued model; and a difference of more than 9.2 is conclusive evidence in favor of the lower-valued model. Finally, Aikake's information criterion (AIC) is "an information theoretic estimate of model fit corrected for model complexity" (Loewenstein et al., 2001, p. 279) where, like the BIC, its value is in determining which nested model is better fitting; in this case, the closer the value of the model AIC to the saturated model AIC, the better the fit.

Exploratory factor analyses. An oblique rotation procedure (Promax) was used in EFAs because, as components of an overarching construct (SOC), factors should be correlated.

Multilevel bivariate and partial correlations. Construct validity of the new brief SOC index and its three components was assessed via respondent-level and aggregated street block-level bivariate and partial correlation coefficients with other psychological and behavioral variables collected at both time points. The Appendix provides information about these scales and their calculation (except Place Attachment, which is displayed in Table 3).

Intraclass correlations. As noted by others (e.g., Buckner, 1988), SOC has physical and psychological boundaries (McMillan & Chavis, 1986) related to the category of group/community, which should allow one to observe differences across groups in level of SOC. Because the current data were collected through clustered sampling by street blocks, it was possible to test for intercommunity discrimination (i.e., small within-group variance) in the brief SOC index and its subscales using intraclass correlation coefficients (ICC). Intraclass correlation coefficients were calculated from results of unconditional models using Hierarchical Linear Modeling (HLM; Raudenbush, Bryk, & Congdon, 2001) using the formula $r = \text{varU0}/(\text{varU0} + \text{varR})$.

RESULTS

Confirmatory Factor Analyses of the SCI at Time 1

In Table 1 we report the fit indexes of two CFA models (single- vs. four-factor) run on the Time-1 SCI data ($N = 575$) and assigning items to factors based on Perkins et al.'s (1990) specification relative to McMillan and Chavis' (1986) theoretical structure. The discrepancy χ^2 tests indicate poor fit of the models, but as noted above, this criterion may be too stringent. However, even the less prohibitive discrepancy-to-*df* ratio values indicate poor fit (>2.0). Similarly, the TLI and CFI show poor to, at best, marginal fit. The RMSEA values indicate marginal to acceptable fit, but the GFI and AGFI are the most complimentary of the fit of these models. The change in discrepancy (χ^2 (6) = 55.29, $p < .001$) suggests an improvement in fit for the four-factor solution, but the change in BIC (2.25) does not. Like the BIC, the vast differences between the model

Table 1. Model Fit Statistics for Confirmatory Factor Analyses Comparing One-Factor and Four-Factor Solutions to the SCI at Time 1 (N = 575)*

	Models	
Measures of Fit	*One-factor SCI*	*Four-factor SCI*
Discrepancy χ^2	250.215	194.925
df	54	48
p-value	<.001	<.001
Discrepancy/*df*	4.630	4.061
GFI	.929	.944
AGFI	.898	.909
TLI	.704	.750
CFI	.757	.818
RMSEA	.080	.073
BIC	462.358	460.104
AICmodel	298.215	254.925
AICsaturated	156.000	156.000

**Note.* *N* for CFAs are based on the Time-1 data set trimmed of all cases with missing data on any of the 12 items.

Table 2. Standardized Regression Weights for One-Factor and Four-Factor Confirmatory Factor Analyses of the Sense of Community Index (McMillan & Chavis, 1986; Time 1;* N *= 575)

One-Factor Solution		*Four-Factor Solution*			
Scale Item[a]		*NF*	*GM*	*INF*	*EC*
SCI 1	.573	.696			
SCI 2	.333	.371			
SCI 3	.270	.265			
SCI 4	.351		.339		
SCI 5	.555		.580		
SCI 6	.379		.390		
SCI 7	.343			.340	
SCI 8	.314			.337	
SCI 9	.482			.506	
SCI 10	.500				.656
SCI 11	.244				.161
SCI 12	.530				.694

Note. NF = Needs Fulfillment; GM = Group Membership; EC = Emotional Connection; INF = Influence.
[a]Items correspond to those displayed in Table 3.

and saturated AIC statistics (for both models) suggest no notable improvement in fit from the one-factor solution to the four-factor solution. Table 2 shows standardized regression weights for both the one-factor and four-factor solutions. In only a few cases did item regression weights improve when using the four-factor solution, again suggesting little improvement between the models.

Exploratory Factor Analyses at Time 1

Because the CFAs on the Time-1 SCI produced unconvincing evidence for either a one-factor or four-factor solution to the SCI, we "went back to the drawing board" to see if a better-fitting, more parsimonious sense of community index could be found. We first looked anew at the original SCI items. Doing so suggested to us one or two factors cutting across dimensions, which we argue constitutes a separate Place Attachment (PA) construct (SCI items #1, 5, 10, 12; see Table 3). As PA has traditionally been studied and thought of as a construct separate from SOC, we removed these four items and added three face-valid SOC items (see Table 3). This new 11-item subset was subjected to exploratory factor analysis (EFA) with oblique rotation using the Time-1 data set ($N = 713$). After trimming three poorly loading items and subjecting this eight-item subset to EFA, a three-factor solution emerged that we have here named the Brief Sense of Community Index (BSCI) with factor labels: Social connections, mutual concerns, and community values.

Table 3 displays items per these three factors as well as respective coefficient alphas. Internal consistencies, particularly for factors, are poor to modest, which is somewhat understandable for two- and three-item subscales, many of whose items have dichotomous response options. (We strongly recommend using 5-point Likert-type response options in future applications of the BSCI; see below for further argument on this point.)

Table 3. Items and Factors Relevant to the Present Analyses

Items[a]	*Item Wording*[b]	*BSCI*[c]	*SCI*[d]	*Other*[e]
SCI 4	I can recognize most of the people who live on my block.	SC	GM	
SCI 6	Very few of my neighbors know me.	SC	GM	
SCI 8	I have almost no influence over what this block is like.	SC	INF	
SCI 3	My neighbors and I want the same things from the block.	MC	NF	
SCI 9	If there is a problem on this block people who live here can get it solved.	MC	INF	
FV 1	In general, would you say that people on your block watch after each other and help out when they can, or do they pretty much go their own way?	MC		
FV 2	Would you say that it is very important, somewhat important or not important to you to feel a sense of community with the people on your block?	CV		
FV 3	Would you say that you feel a strong sense of community with others on your block, very little sense of community or something in between?	CV		
SCI 1	I think my block is a good place for me to live.		NF	PA
SCI 2	People on this block do not share the same values.		NF	PA
SCI 10	It is very important to me to live on this particular block.		EC	PA
SCI 12	I expect to live on this block a long time.		EC	PA
SCI 5	I feel at home on this block.		GM	X
SCI 7	I care about what my neighbors think of my actions.		INF	X
SCI 11	People on this block generally don't get along with each other.		EC	X

[a]*Items*: SCI = Sense of Community Index: original items (Perkins et al., 1990) designed to tap McMillan and Chavis' (1986) four-component theoretical structure; FV = Face Valid items added to exploratory analyses.
[b]*Item Response Options*: SCI 1–12 = T/F (respondents were instructed to indicate whether the statement is mostly true or mostly false about their street block); FV 1 = (1) "go own way," (2) "a little of both," (3) "watch after"; FV 2 = (1) "not important," (2) "somewhat important," (3) "very important"; FV 3 = (1) "very little sense of community," (2) "something in between," (3) "strong sense of community."
[c]*BSCI*: Brief Sense of Community Index: Coefficient $\alpha = .65$ (Time 1; $N = 713$), .73 (Time 2; $N = 422$). BSCI Factors: MC = Mutual Concerns [coefficient $\alpha = .50$ (Time 1; $N = 820$), .64 (Time 2; $N = 485$)]; SC = Social Connections [coefficient $\alpha =$ .55 (Time 1; $N = 917$), .50 (Time 2; $N = 544$)]; CV = Community Values [coefficient $\alpha = .51$ (Time 1; $N = 1040$), .61 (Time 2; $N = 621$)].
[d]*SCI Factors*: NF = Needs Fulfillment; GM = Group Membership; INF = Influence; EC = Emotional Connection.
[e]*Other*: PA = Place Attachment: items removed from sense of community measurement to form a separate PA scale [coefficient $\alpha = .65$ (Time 1; $N = 903$), .63 (Time 2; $N = 480$)]; X = items omitted from BSCI for poor loading.

Confirmatory Factor Analyses of the BSCI at Time 2

Following the same methodology as that used with the SCI, CFAs were calculated with Time-2 data ($N = 422$) for both one-factor and three-factor solutions to the BSCI. Fit indexes for the CFAs are displayed in Table 4. The one-factor solution shows generally mixed results: the GFI and AGFI indicate acceptable fit, but the TLI, CFI and RMSEA show marginal fit (at best), and the discrepancy chi-square, discrepancy-to-*df* ratio, and model-to-saturated AIC differences show poor fit. The three-factor solution, however, shows generally good fit. The discrepancy chi-square statistic was significant and the discrepancy-to-*df* ratio exceeded 2.0, but the GFI, AGFI, TLI, CFI, RMSEA, and model-to-saturated AIC all show acceptable to good fit of the model. Time-2 data also showed significant improvement from the one-factor to the three-factor solution for both model improvement indexes (χ^2 (3) = 51.94, $p < .001$; BIC change = 27.56). Table 5 shows standardized regression weights for CFAs with the BSCI. Note that in each case there is an increase in regression weight from the one-factor to the three-factor solution, sometimes marginal, sometimes substantial, which also supports improvement from the single to multifactor solution. Table 6 shows intercorrelations among the three (latent) factors of the BSCI, ranging from $r = .56$ to .68.

Table 4. Model Fit Statistics for Confirmatory Factor Analyses Comparing One-Factor and Three-Factor Solutions With the BSCI at Time 2 (N = 422)

	Models	
Measures of Fit	*One-Factor BSCI*	*Three-Factor BSCI*
Discrepancy χ^2	94.498	42.562
df	20	17
p-value	<.001	=.001
Discrepancy/*df*	4.725	2.504
GFI	.943	.973
AGFI	.898	.943
TLI	.826	.930
CFI	.876	.957
RMSEA	.094	.060
BIC	224.489	196.926
AICmodel	126.498	80.562
AICsaturated	72.000	72.000

Note. N for CFAs are cases with complete data for all included items.

Multilevel Autocorrelations and Construct Validity of the BSCI and Its Factors

Table 7 displays individual and street block-level bivariate correlation coefficients at both time points between the BSCI (and its subscales) and demographics and theoretically positively related psychological and behavioral variables. Table 8 shows partial correlation coefficients of the same data, controlling for all demographics used in the bivariate analyses. Included in these tables are also multilevel autocorrelations for the BSCI and its subscales. (Note that individual-level correlations among BSCI factors at

Table 5. Standardized Regression Weights for the One-Factor and Three-Factor Confirmatory Factor Analyses of the Brief Sense of Community Index at Time 2 (N = 422)

	Models			
	One-Factor	*Three-Factor*		
Scale Item[a]		*SC*	*MC*	*CV*
SCI 4	.419	.517		
SCI 6	.379	.523		
SCI 8	.397	.463		
SCI 3	.545		.596	
SCI 9	.552		.599	
FV 1	.665		.695	
FV 2	.736			.974
FV 3	.424			.454

Note: SC = Social Connections; MC = Mutual Concerns; CV = Community Values.
[a]Items correspond to those displayed in Table 3.

Table 6. Interfactor Correlations From the Confirmatory Factor Analyses of the Three-Factor Brief Sense of Community Index at Time 2 (*N* = 422)

Factor	*1*	*2*	*3*
1. Social Connections	–		
2. Mutual Concerns	.67	–	
3. Community Values	.56	.68	–

Note. These are inter-*factor* correlation coefficients (i.e., correlation of latent variables), not inter-*component* correlations, which are displayed in Tables 7 and 8.

Time 2 will differ in Table 7 from those in Table 6 because the latter are correlations of the *latent* constructs rendered in the CFA while the former are correlations of *determinate* constructs.)

The multilevel correlations between the BSCI (and its subscales) and the theoretically related psychological and behavioral constructs, 407 of which were significant and positive out of a possible 512 (or 79.5%), suggest multilevel construct validity for the BSCI. Although individual-level correlations (88.7%) were *significant* more often than block-level correlations (70.3%), largely due to low *n* at the block level (26 to 47), effect sizes were almost uniformly greater at the block level.

One might expect the BSCI and its subscales to correlate more highly with place attachment than with other criterion variables because its items derived directly from the original SCI. The correlations with place attachment are indeed more consistently strong across all subscales, yet they are not much higher on average than correlations with neighboring, informal social control, and participation in block organizations.

The multilevel relationship of SOC to neighboring and participation behaviors is more fully explored elsewhere (Brodsky, O'Campo, & Aronson, 1999; Chavis & Wandersman, 1990; Perkins, Brown, & Taylor, 1996; Perkins & Long, 2002). The links between SOC and informal social control, community satisfaction, communitarianism (Perkins et al., 1990), and community confidence are less well established, but are expected based on general theories of community cohesion, organization, and social capital (Perkins & Long, 2002). The relation, especially strong at Time 2, between the BSCI and collective efficacy (which is our closest criterion to the concept of empowerment) is particularly noteworthy. There have been surprisingly few direct empirical links (e.g., Itzhaky & York, 2000; Perkins et al., 1990; Speer, 2000) between SOC and empowerment (or collective efficacy), two of the most central concepts in the field of community psychology. In Table 8, the partial correlations between BSCI and collective efficacy are difficult to interpret. The relationship is strongest at the block level at Time 1 and at the individual level at Time 2. The cross-lagged partial correlations suggest that SOC leads to collective efficacy at the individual level but at the block level, the trend is for collective efficacy to lead to greater SOC. A fuller, multivariate, multilevel, and longitudinal analysis of this relationship appears in Perkins and Long (2002).

Intraclass Correlations

In Table 9, intraclass correlations of the BSCI and its subscales at both time points indicate the proportion of total variance at the group level and show that there is

Table 7. Individual and Block-Level Bivariate Correlations with the Brief Sense of Community Index (BSCI), Its Three Factors (Social Connections, Mutual Concerns, Community Values) and Other Theoretically Positively Related Psychological and Behavioral Variables at Two Different Time Points

	T1 BSCI	*T2 BSCI*	*T1 SC*	*T2 SC*	*T1 MC*	*T2 MC*	*T1 CV*	*T2 CV*
BSCI T2	**.59/.77**	–						
SocConn T1	**.76/.88**	**.44/.67**	–					
SocConn T2	**.49/.66**	**.77/.86**	**.44/.59**	–				
MutCon T1	**.75/.82**	**.39/.58**	**.31/.55**	**.28/.46**	–			
MutCon T2	**.45/.65**	**.79/.80**	**.29/.51**	**.37/.50**	**.39/.56**	–		
CommVal T1	**.68/.72**	**.47/.61**	**.29/.47**	**.36/.57**	**.31/.53**	**.34/.47**	–	
CommVal T2	**.44/.61**	**.74/.78**	**.33/.54**	**.37/.51**	**.26/.44**	**.41/.55**	**.40/.48**	–
Demographic Variables								
Income	**.08**/.19	.04/.17	**.12**/.22	.07/.17	.02/**.26**	.04/.16	.00/−.11	−.02/.06
Education	−.04/−.10	−.06/−.07	−.01/−.04	.00/−.04	−.03/.01	−.05/−.06	−.09/**−.34**	−.07/−.09
White	−.01/.03	**−.09**/−.00	−.01/.01	−.04/.03	**.07**/.24	−.07/−.02	**−.08/−.26**	−.07/−.06
Age	**.13**/.19	**.18**/.14	**.07**/.11	.08/.07	**.08**/.23	**.14**/.03	**.13**/.14	**.21**/.22
Female	.04/.01	**.09**/−.05	.02/−.06	.02/−.05	.03/.07	.07/.05	.02/.09	**.13**/−.13
Children	.04/−.09	.00/−.08	**.09**/−.16	.03/−.06	−.05/−.19	−.03/−.02	.02/.15	.00/−.06
Tenure T1	**.24/.52**	**.11/.44**	**.29/.60**	**.15/.30**	**.06/.38**	.07/**.33**	**.15/.27**	.10/**.42**
Tenure T2	**.12**/.22	**.16**/.21	**.19/.43**	**.19/.31**	.02/.03	.02/−.13	.05/.03	**.16/.29**
Homeown T1	**.23/.36**	**.14**/.25	**.26/.44**	**.17**/.17	**.07**/.16	.09/**.27**	**.18/.28**	.09/.23
Homeown T2	**.14/.27**	**.22**/.21	**.21/.41**	**.22**/.23	.01/.05	**.09**/.13	**.10**/.14	**.21**/.22
Theoretically Positively Related Constructs								
PlcAttach T1	**.44/.73**	**.33/.52**	**.29/.62**	**.27/.50**	**.41/.70**	**.26/.45**	**.26/.46**	**.24/.34**
PlcAttach T2	**.39/.48**	**.55/.62**	**.23/.28**	**.33/.39**	**.34/.57**	**.54/.56**	**.31/.32**	**.40/.63**
Commun T1	**.28**/.24	**.26/.29**	**.20**/.16	**.23/.31**	**.12**/.02	**.13**/.19	**.30/.49**	**.25/.32**
Commun T2	**.32/.38**	**.40/.38**	**.27/.27**	**.21/.25**	**.11**/.20	**.25/.28**	**.30/.54**	**.48/.53**
Efficacy T1	**.26/.34**	**.23**/.21	**.17**/.18	**.13**/.21	**.20/.26**	**.17**/.16	**.21/.46**	**.23/.30**
Efficacy T2	**.22/.32**	**.46/.39**	**.17**/.19	**.23**/.10	.10/**.31**	**.39/.56**	**.20**/.12	**.40/.44**
BlkSatis T1	**.17/.37**	.10/.15	**.11/.26**	**.14**/.03	**.21/.47**	**.11**/.18	**.07**/.22	−.03/**.25**
BlkSatis T2	**.20/.42**	**.29/.40**	**.13/.33**	**.20/.26**	**.20/.42**	**.35/.39**	**.15/.35**	**.12/.38**
BlkConf T1	**.26/.29**	**.19**/.20	**.22/.26**	**.13/.29**	**.25/.34**	**.20**/.14	**.11**/.17	**.12**/.04
BlkConf T2	**.12**/.08	**.24**/.11	**.10**/.01	**.13**/.13	**.13**/.13	**.26**/.02	.05/.17	**.17**/.09
ISC T1	**.33/.57**	**.28/.58**	**.19/.46**	**.22/.51**	**.35/.49**	**.31/.49**	**.18/.37**	.09/**.40**
ISC T2	**.17/.32**	**.29/.42**	**.13/.29**	**.18**/.20	**.14/.29**	**.30/.56**	**.12**/.23	**.16/.25**
Neighbor T1	**.36/.47**	**.25/.59**	**.30/.45**	**.27/.57**	**.20/.34**	**.11/.40**	**.29/.43**	**.19/.40**
Neighbor T2	**.35/.54**	**.33/.63**	**.30/.52**	**.28/.65**	**.22/.38**	**.21/.33**	**.24/.44**	**.26/.49**
Particip T1	**.33/.54**	**.28/.36**	**.29/.49**	**.26/.42**	**.18/.40**	**.18**/.22	**.26/.47**	**.24**/.13
Particip T2	**.30/.56**	**.32/.50**	**.25/.48**	**.27/.59**	**.19/.36**	**.21/.30**	**.28/.54**	**.27**/.22

Note. Cells are arranged by level: individual / block. Bivariate correlations use pairwise deletion by default: N varied from 245 to 1068 at the individual level, and 44 to 47 (but 38 with Efficacy T2) at the block level. (Severely low Ns were always with Efficacy T2, which had more missing data than any other variable.) Bold-faced coefficients are significant at $p < .05$ individual level, and $p < .10$ block level. Even with the lowest Ns, individual-level correlations $r \geq .17$ were significant at $p \leq .007$; block-level correlations with $N = 44$ and $r \geq .38$ were significant at $p \leq .01$.

significant within-block agreement on these measures and that they can discriminate, at a statistically significant level, between different community groups. The proportion of respondent-level variation in the BSCI (7%) and its subscales (3–7%) due to differences between street blocks is stable across time. Remember, however, these results should be conservatively interpreted as cross-sectional because the data are partly panel, partly cross-sectional with some household/block additions at Time-2 to increase degrees of freedom. Yet despite such sample differences between time points within-block agreement in resident sense of community was quite reliable.

Table 8. Individual and Block-Level Partial Correlations (Controlling for Income, Education, White, Age, Sex, Children, T1 & T2 Tenure, T1 & T2 Homeowner) with the Brief Sense of Community Index (BSCI), Its Three Factors (Social Connections, Mutual Concerns, Community Values) and Other Theoretically Positively Related Psychological and Behavioral Variables at Two Different Time Points

	T1 BSCI	*T2 BSCI*	*T1 SC*	*T2 SC*	*T1 MC*	*T2 MC*	*T1 CV*	*T2 CV*
BSCI T2	**.61/.69**	–						
SocConn T1	**.78/.88**	**.53/.57**	–					
SocConn T2	**.50/.70**	**.77/.89**	**.46/.55**	–				
MutCon T1	**.78/.81**	**.41/.51**	**.39/.54**	**.30/.52**	–			
MutCon T2	**.49/.52**	**.80/.86**	**.38/.46**	**.40/.66**	**.42/.41**	–		
CommVal T1	**.68/.77**	**.43/.63**	**.32/.55**	**.35/.71**	**.33/.57**	**.31/.38**	–	
CommVal T2	**.43/.53**	**.76/.74**	**.40/.44**	**.37/.44**	**.22/.40**	**.46/.60**	**.36/.46**	–
Theoretically Positively Related Constructs								
PlcAttach T1	**.37/.69**	**.22/.44**	**.31/.53**	**.16/.53**	**.34/.66**	**.16/.41**	**.17/.50**	**.17**/.19
PlcAttach T2	**.44/.38**	**.50/.66**	**.35**/.23	**.34/.45**	**.32/.42**	**.42/.61**	**.29/.31**	**.36/.70**
Commun T1	**.21/.37**	.12/**.34**	**.18**/.24	.04/**.35**	**.14**/.23	.08/**.33**	**.17/.49**	**.14/.30**
Commun T2	**.26/.33**	**.38/.37**	**.26**/.23	**.17**/.27	.11/.23	**.24**/.24	**.21/.47**	**.50/.55**
Efficacy T1	**.25/.49**	**.14**/.28	**.29/.36**	.06/.27	.13/**.47**	.10/.25	**.15/.43**	**.18/.33**
Efficacy T2	**.27**/.13	**.50**/.27	**.27**/.07	**.25**/.08	.13/.20	**.38/.43**	**.18**/−.13	**.46/.38**
BlkSatis T1	**.24/.35**	.07/.07	**.17/.31**	.12/.01	**.27/.36**	.06/−.01	.04/.27	−.03/.28
BlkSatis T2	**.17/.36**	**.29/.37**	.09/.21	**.21/.29**	**.17/.35**	**.30/.37**	.10/**.42**	**.14/.39**
BlkConf T1	**.29/.47**	**.19/.30**	**.23/.48**	**.14/.35**	**.26/.43**	**.19**/.27	.10/**.35**	**.13**/.10
BlkConf T2	**.15**/.17	**.26**/.14	**.13**/.13	**.15**/.14	**.20**/.20	**.26**/.08	−.01/.23	**.18**/.10
ISC T1	**.32/.54**	**.25/.48**	**.20/.36**	**.20/.49**	**.34/.44**	**.25/.38**	**.17/.48**	.11/**.32**
ISC T2	.12/.15	**.21/.37**	**.15**/.18	.09/.25	.09/.04	**.27/.47**	.01/.22	.10/.23
Neighbor T1	**.25/.45**	**.22/.52**	**.22/.37**	**.21/.53**	**.15/.37**	.08/**.38**	**.22/.44**	**.22**/.26
Neighbor T2	**.30/.55**	**.26/.63**	**.25/.44**	**.22/.61**	**.24/.47**	**.18/.44**	**.18/.49**	**.19/.44**
Particip T1	**.33/.63**	**.30/.35**	**.30/.59**	**.26/.44**	**.21/.48**	**.21**/.17	**.24/.46**	**.23**/.10
Particip T2	**.30/.63**	**.37/.51**	**.24/.53**	**.30/.61**	**.21/.48**	**.25/.34**	**.26/.56**	**.31**/.18

Notes. Cells are arranged by level: individual/block. Partial correlations were run in waves to preserve statistical power: *Individual level* (1) $df = 261$ for BSCI and its factors, (2) $df = 210$ for #1 with the theoretically related variables, (3) $df = 148$ for #1 with Efficacy T2 (run separately due to low N); *Block level* (1) $df = 32$ for BSCI, its factors, and the theoretically related variables, (2) $df = 26$ for BSCI and its factors with Efficacy T2 (run separately due to low N). Bold-faced coefficients are significant at $p < .05$ individual level, and $p < .10$ block level. Even with lower Ns, individual-level correlations (with $N = 210$) $r \geq .22$ were significant at $p \leq .001$; block-level correlations with $N = 32$ and $r \geq .44$ were significant at $p < .01$.

DISCUSSION

The differences between the respondent-level intercorrelations of the BSCI subscales in Tables 6–8 are of note. The coefficients are much stronger when correlating the latent constructs (Table 6) than the determinate ones, either as bivariate correlations (Table 7) or when controlling for demographics (Table 8). For example, latent Time-2 Social Connections correlates $r = .67$ with latent Time-2 Mutual Concerns, but the equivalent determinate components correlate at $r = .37$ and partial $r = .38$. Also, latent Time-2 Mutual Concerns correlates $r = .68$ with latent Time-2 Community Values, but the equivalent determinate components correlate at $r = .41$ and partial $r = .46$. When combining these large factor-to-component correlational differences with results indicating relatively poor component internal consistency yet good-fitting CFAs for our multidimensional BSCI, a comprehensible explanation begins to emerge. The culprit for these differences seems to be measurement error or insensitivity. The more sensitive and precise the tool, the more accurate the component should be at

Table 9. Intraclass Correlations by Street Blocks for the Brief Sense of Community Index and Its Subscales

	Time 1				*Time 2*			
		BSCI Subscales				*BSCI Subscales*		
	BSCI	*SC*	*MC*	*CV*	*BSCI*	*SC*	*MC*	*CV*
Intraclass *r*	.07***	.04***	.07***	.03**	.07***	.04**	.06***	.05**
df	46	46	46	46	60	60	60	60

Note. SC = Social Connections; MC = Mutual Concerns; CV = Community Values. Because these analyses are cross-sectional, all available valid cases were used at each time point, even replacement cases/blocks at Time 2. Another way of interpreting the intraclass coefficient is percentage of variance in the dependent variable due to group differences, where percentages are calculated by multiplying the intraclass *r* by 100, e.g., 7% of the variance in Time 1 BSCI is due to differences between street blocks.
Significance levels of the one-way ANOVA (or unconditional HLM model) for the respective outcome across blocks: $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

representing the underlying, unobservable construct. Thus, having allowed respondents, for example, 5-point Likert-type response options for each of the eight items would likely have resulted in greater sensitivity in representing their "true" perceptions of the social connections, mutual concerns, and community values within their respective street block community. With improved measurement sensitivity should come enhanced internal consistency and more representative component-to-factor agreement. We therefore recommend that future use of the BSCI employ an adapted response format to increase measurement sensitivity by applying a 5-point response format. We also agree with Brodsky, Loomis, and Marx (2002) that SOC is likely to be a bivalenced construct, i.e., one may as easily have negative as positive sense of community. Hence, such a 5-point response format probably should range from negative to positive, e.g., "strongly disagree" to "strongly agree."

McMillan and Chavis' (1986) SOC dimensions have not held up in this and other studies. The problem may be that (a) dimensions vary from place to place and/or change over time, (b) measurement may not accurately reflect McMillan and Chavis' aims,[1] (c) crude, dichotomous response options constrained the measure's sensitivity, or (d) the original derivation, while theoretically sound, was confirmed based on items that included other constructs, such as place attachment and length of residence.

The eight-item BSCI derived in the present analyses is much shorter than previous SOC scales (Buckner, 1988; Chavis et al., 1986; Glynn, 1981). Confirmatory factor analyses indicated it has adequate psychometric properties, including the fact that its three subscales were confirmed in a partly panel, partly new sample 1 year later.

Although most of the variance in the BSCI resides at the individual level, there was still a significant amount of total variance at the block level. This confirms that SOC is simultaneously both an individual-level intrapsychic *and* a group-level social climate construct.

[1]In fact, McMillan had nothing to do with the development of the SCI and has criticized it on these grounds (personal communication, June 8, 2001).

Limitations and Recommendations

Scale and subscale reliability coefficients for the BSCI are marginal at best. We believe that this is due primarily to the restricted range of responses available to respondents (dichotomous in most cases). We strongly recommend using a bivalenced, 5-point Likert-type response in future applications to increase variability and sensitivity.

The generalizability of these results beyond working-class sections of Brooklyn and Queens, New York, circa 1985–1986 is unknown. We encourage other investigators to use or adapt the BSCI as needed to test its external validity.

CONCLUSIONS

The current analyses suggest the new Brief Sense of Community Index is a valid measure of the cognitive-perceptual construct popular in the field for well over a decade. Its items do not cross over with behavioral (e.g., participation, neighboring) or other cognitive-affective-perceptual constructs (e.g., community satisfaction, place attachment, collective efficacy) commonly considered separate but related to SOC by community researchers. The BSCI's three-factor structure was found to have generally good fit according to rigorous confirmatory factor analysis standards, despite having marginal internal reliability (apparently due to weak response set sensitivity). Cross-lagged correlations are difficult to interpret with confidence even when considering key factors such as differential autocorrelation and internal consistency. As this was not our main focus, we do not go into this longitudinal relationship in any depth. Yet, from Table 8 we can see an interesting direction for future research: At the individual level, SOC appears to lead to empowerment (collective efficacy) more than the reverse; at the block level, the trend is for empowerment leading to greater SOC. If such causal directions are true, it would imply that community interventions might work at strengthening SOC among those individuals not yet participating and at empowering the group to enhance cohesion.

APPENDIX

Telephone Survey Items

Communitarianism Scale (alpha = .56, N = 1053; .62, N = 624)

1. How important is what your block is like to you?
2. How important is it that people on your block work together rather than alone to improve block conditions?

Perceived Block Association Efficacy Scale (alpha = .82, N = 1030; .82, N = 315)
(If a block association was formed here) how likely is it that the association could accomplish each goal:

1. Improve physical conditions on the block like cleanliness or housing upkeep?
2. Persuade the city to provide better services to people on the block?
3. Get people on the block to help each other more?
4. Reduce crime on the block?
5. Get people who live on the block to know each other better?
6. Get information to residents about where to go for the services they need?

Community (Block) Satisfaction Index (alpha = .36, $N = 946$; .39, $N = 613$)

1. How satisfied are you with this block as a place to live?
2. Comparing your block to other blocks in the area, is your block a better place to live, a worse place to live or about the same?

Block Confidence Index (alpha = .62 $N = 923$; .63, $N = 567$):

1. In the past two years, have the general conditions on your block gotten worse, stayed about the same, or improved?
2. In the next two years, do you feel that general conditions on your block will get worse, stay about the same, or improve?

Informal Social Control Scale (alpha = .59, $N = 1024$; .76, $N = 623$):

1. If someone on the block was letting trash pile up in their yard or on their steps, how likely is it that a neighbor would go to that person and ask that they clean up?
2. If some 10- to 12-year-old kids were spray painting the sidewalk on the block, how likely is it that some of the neighbors would tell them to stop?
3. If a suspicious stranger was hanging around the block, how likely is it that some of the neighbors would notice this and warn others to be on guard?

Neighboring Behavior Scale (alpha = .78, $N = 1071$; .77, $N = 633$)

"The following is a short list of things neighbors might do for each other. Please indicate how many times in the past year, you have been asked to do each one for a neighbor on this block" (coded 0 = "none", 1–7 = "exact number", and 8 = "eight or more").

1. Watch a neighbor's home while they were away.
2. Loan a neighbor some food or a tool.
3. Help a neighbor in an emergency.
4. Offer a neighbor advice on a personal problem.
5. Discuss a problem on the block with a neighbor.

Citizen Participation Index (alpha = .78, $N = 1009$; .80, $N = 563$):

1. Are you currently a member of the block association?
2. Have you ever taken part in an activity sponsored by the block association?
3. Thinking about work you might do for the block association outside of meetings, how many hours would you say you give to the association each month, if any?

"We would like to know what kinds of things people have done in the association. In the past year have you:"

4. Attended a meeting,
5. Spoken up during a meeting,
6. Done work for the organization outside of meetings,

7. Served as a member of a committee,
8. Served as an officer or as a committee chair?

Note. Each item was coded 1 for participation and 0 for no participation (#3 was recoded to match this scale: 1 = "8 or more hours", 0 = "none") and the index score equals the sum of responses.

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