Reliability and Validity of the Personal Social Capital Scale 16 and Personal Social Capital Scale 8: Two Short Instruments for Survey Studies

Peigang Wang · Xinguang Chen · Jie Gong · Angela J. Jacques-Tiura

Abstract Rapid developments in social capital and health research require short instruments for large-scale survey studies. The Personal Social Capital Scale (PSCS) is a theory-based and empirically tested instrument with reliability and validity established in the US and China, but it is too long for large-scale survey research. In this study, we described two short versions of the instrument: the PSCS-16 and PSCS-8. The two short scales were evaluated with survey data collected among an adult sample ($N = 259$) in China. The sample consisted of rural-to-urban migrants and non-migrant rural and urban residents. Cronbach's alpha coefficients were .90 for the PSCS-18 and .83 for the PSCS-8. Both short instruments satisfactorily fit a two-factor model comprising the bonding capital and bridging capital subscales. The two short scales were highly correlated with the original PSCS ($r = .95$ for the PSCS-18 and .93 for the PSCS-8 respectively, $p < .001$ for both); significantly distinguished the migrant subsample from the two non-migrant subsamples; and significantly predicted social capital investment and stress level. In conclusion, the two short instruments PSCS-16 and PSCS-8 were reliable and valid, and can be used in large-scale survey studies to assess personally owned social capital. Further research is needed to replicate their reliability and validity in different cultural settings and to establish the test–retest reliability.

Keywords Personal Social Capital Scale · Reliability · Validity · Psychometric assessment

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1 Introduction

Rapid development in social capital and health research requires efficient instruments to assess social capital, particularly social capital at the personal level (Chen et al. 2009; De Silva et al. 2005; Harpham et al. 2002; Moore et al. 2011; Spellerberg 1997; Van Der Gaag and Webber 2010). After decades of debating, consensus has emerged in recent years that social capital can be assessed by a person's network connections, including size, trustworthiness, resources ownership and reciprocity (Chen et al. 2009; De Silva et al. 2006; Lin and Fu 2001; Van Der Gaag and Webber 2010). Modern analytical techniques make it possible to develop social capital measurement tools through systematic psychometric evaluation. Social capital related research often involves large-scale sampling surveys, ranging from a community, to a city, a county, a nation or multiple nations and across the globe. Conducting such research requires short measurement tools, but such tools are not currently available.

1.1 Current and Past Social Capital Measures

To facilitate social capital research, several researchers have developed instruments for assessing social capital at the personal level. Commonly used instruments include, but are not limited to, the following measures in chronological order: the Name Generator (McCallister and Fischer 1978; Van Sonderen et al. 1990), the Position Generator (Bian 2004; Lin and Dumin 1986; Lin and Fu. 2001; Van Der Gaag and Webber 2010; Wang 2006), the Resource Generator (Bian 2004; Snijders 1999; Van Der Gaag and Snijders 2005; Wang 2006; Webber and Huxley 2007), the Adapted Social Capital Assessment Tool (A-SCAT) (Harpham et al. 2002; Putnam 2000), and the Personal Social Capital Scale (PSCS) (Chen et al. 2009). However, an assessment of these instruments revealed that none of them is adequate for large-scale survey studies because of the extra burden for data collection.

A further review of these scales indicated that the Name Generator was no longer in use for research because it measures only one part of the social capital construct, the number of network members (Snijders 1999; Van Der Gaag and Snijders 2005). Compared to the Name Generator, the Position Generator and the Resource Generator provide much broader measurement of social capital because they considered resources possessed by a person's network members and access to these resources (Bian 2004; Lin 2001; Van Der Gaag and Webber 2010). However, these two scales used a listing approach to quantify the amount of social capital, which is problematic for data collection. First, social capital is broadly rooted in the society, and it is incredibly difficult, if not impossible, to exhaust all positions and resources in a survey. Second, the listing approach requires open-ended responses, which make it difficult to produce measurement scores. Third, the approach does not consider the small world theory, which suggests that a person can find any person he or she wants in no more than six steps (Kleinberg 2000; Watts and Strogatz 1998). Lastly, the same position (e.g., an officer) and resource (e.g., a person who can fix cars) may contribute differently to different persons in different cultural settings (e.g., eastern and western cultures), limiting its cross-cultural utility.

Different from the three generator measures described above, the A-SCAT (Harpham et al. 2002; Putnam 2000) was developed following the modern psychometric approach (Grootaert et al. 2004). Testing questions for this tool were conceived and selected empirically based on the assumption that social capital is a latent structure that cannot be directly observed. Descriptive statistics, correlation, regression, and exploratory factor

analysis (EFA) were used to determine the psychometric characteristics of the tool, including item responses, internal consistency, reliability and validity. A short version of the A-SCAT, referred to as SASCAT with only 12 items, was developed and used in a multi-country large-scale survey study (De Silva et al. 2006). However, research participants in different countries reported difficulties in answering culture-specific questions (e.g., credit unions, funeral associations, etc.) (De Silva et al. 2006). Conceptually, this tool, including its short version, has not distinguished what social capital *is* (i.e., an asset embedded in network) from what social capital *does* (i.e., provide support to network members) (Chen et al. 2009).

1.2 The Personal Social Capital Scale (PSCS)

Inspired by the success of the A-SCAT, the PSCS was developed to overcome the A-SCAT's limitations by clearly distinguishing what social capital is from what social capital does (Chen et al. 2009). Based on a conceptual framework that social capital is the part of a person's network connections that are trustworthy, reciprocal, and resource-rich (Bourdieu 1986; Coleman 1988; De Silva et al. 2005; Harpham et al. 2002; Putnam 1995), the Chinese version of the scale consisted of 42 items measuring 10 sub constructs. Five sub constructs measured bonding social capital and five measured bridging social capital (see Appendix for the scale). Bonding social capital refers to how well a person is embedded within their various networks of different types of people (e.g., family members, friends, former colleagues), and bridging social capital refers to how well a person is embedded within different types of social organizations. Strict psychometric assessment, including confirmatory factor analysis (CFA), indicated that the PSCS had excellent reliability, clear structure validity, and adequate predictive validity (Chen et al. 2009).

The English version of the PSCS was developed and tested among college students in the United States (Archuleta and Miller 2011). Archuleta and Miller replicated the excellent item response scores, reliability, and validity, and they also cross-tested the English version against the Brief Sense of Community Scale (BSCS) (Peterson et al. 2008) and the Irrational Values Scale (IVS) (MacDonald and Games 1972). The English version of the PSCS was significantly associated with BSCS scores and IVS scores. Furthermore, PSCS scores were predicted by constructs related to social capital (e.g., inter-personal skills) and activities for social capital investment (Archuleta and Teasley 2013; Chen et al. 2009). PSCS scores significantly predicted acculturative stress; marital relationship; informational, instrumental, and emotional support; social inclusion; and collective efficacy (Archuleta 2010; Archuleta and Miller 2011; Chen et al. 2009).

1.3 Purpose of the Current Study

Despite the strengths of the well-validated Chinese and English versions of the PSCS, the 42-item instrument is too long for large-scale survey studies. The purpose of this study is to derive two short versions of the instrument, one with 16 items (PSCS-16) and another with 8 items (PSCS-8). Short versions must retain the theoretical structure and psychometric characteristics of the original scale, while substantially reducing the time needed to complete the scale. We developed the short versions in two steps. We first selected relevant items from the original 42 items through careful review and detailed psychometric assessment with the data originally used to establish the PSCS instrument. We then verified the derived PSCS-16 and PSCS-8 with newly collected data.

2 Method

2.1 Participants and Data

Data used for this analysis were collected through a cross-sectional survey conducted in Wuhan, China in 2010. Participants, aged 18–50, were classified into three subgroups based on their residential status: rural-to-urban migrants and non-migrant rural and urban residents. Non-migrant rural residents were recruited and interviewed in one rural suburban village of Wuhan; non-migrant urban residents and rural-to-urban migrants were recruited and interviewed in one urban district of Wuhan. One participant per household was recruited and interviewed. For households with more than one eligible participant, random digits were used to determine whom to include.

Data were collected using audio computer-assisted self-interviewing. Trained data collectors (public health graduate students and Wuhan CDC senior staff members) recruited participants and delivered the survey. The survey questionnaire used for this study was derived from the survey used for the development of the original PSCS (Chen et al. 2009). Participants completed their questionnaire in a private room in their home or in another location of their preference. Most participants completed the survey in approximately 45 min. Among the eligible participants we approached, 90–95 % agreed to sign the informed consent. The study protocol was approved by the Institutional Review Boards at Wuhan CDC in Wuhan, China and Wayne State University in Detroit, Michigan, USA.

2.2 The Original PSCS

The original version of the PSCS consisted of 42 items (Chen et al. 2009; see Appendix for the scale). Briefly, 32 items measured *bonding capital*, the extent to which a person is embedded in their groups of family members, relatives, neighbors, friends, co-workers/fellows, and old classmates/country fellows). The measurement focused on (a) perceived network size, (b) frequency of contact with network members, (c) the number of network members who are perceived as trustful, (d) the number of network members possessing resources (education, professional job, position, social influence, and political power), and (e) the number of network members who are reciprocal.

The remaining 10 items assessed *bridging social capital*, the extent to which a person is embedded in two types of organizations: governmental, political, economic, and social groups/organizations; and cultural, recreational, and leisure groups/organizations. Likewise, five attributes were assessed for each of the two groups: (a) perceived group size, (b) participation in group activities, (c) if the groups represent personal rights and interests, (c) resources possessed by these groups, and (e) the likelihood to receive help from the groups upon request.

The PSCS used two 5-point Likert-type scales for item scoring. The response scale for questions assessing participants' rating of their "network size" was: 1 (*a few*), 2 (*less than average*), 3 (*average*), 4 (*more than average*), and 5 (*a lot*). The response scale for questions assessing participants' perception of "how many network members" was: 1 (*none*), 2 (*a few*), 3 (*some*), 4 (*most*), and 5 (*all*). Mean scores were calculated.

2.3 Item Selection for PSCS-16 and PSCS-8

To ensure both reliability and validity, we employed a multi-step approach in item selection. We started by dropping the seven items from the original scale that were

considered to be assessing social capital investment rather than social capital itself. Thus, we excluded the five bonding items assessing "frequency of contacts" with network members and two bridging items assessing "social group participation and social group involvements." We then selected eight items from the 27 remaining bonding capital items, and kept the eight remaining bridging capital items.

The selection of the eight bonding capital items was completed in two more steps. First, we conducted a correlation analysis using the 27 items and the original data ($N = 128$) used to develop the original PSCS (Chen et al. 2009). Applying the criteria of higher Cronbach's alpha and higher item-total correlations, we selected eight from the 27 items to cover the four remaining social capital components (i.e., network size, trustworthiness, resource ownership, and reciprocity), with two items per component. However this step resulted in three of the four components being related to friends and old classmates/country fellows. To enhance the coverage of different network members, we (a) substituted "coworkers/fellows" for "friends" in assessing trustworthiness and (b) substituted "coworkers/fellows" for "old classmates/country fellows" in assessing reciprocity. The two modified items had the highest item-total correlations among the remaining items. The final 16 items are listed in Table 2. From the established PSCS-16, we selected half of the items to form the PSCS-8, using the same methodology, considering both content validity and reliability.

2.4 Stress and Investment in Social Capital

To assess the convergent validity of the two short scales, stress and investment in social capital were also measured. Investment in social capital was assessed using a checklist we developed and used in previous research (Chen et al. 2009). The checklist contains eight items, assessing frequency of daily activities a person commonly engages in to associate with others (e.g., calling on the phone, gift giving/exchanging, working together, playing together, visiting the other's home) (Cronbach's alpha = .81). Sum scores were calculated such that higher scores indicated more investment in social capital. Stress was assessed using the Perceived Stress Scale (Cohen et al. 1983), which we previously translated and tested among a sample of participants in China (Chen et al. 2013). Cronbach's alpha was .86, and sum scores were calculated such that higher scores indicated greater perceived general stress.

2.5 Other Variables

Demographic variables were age (in years), gender (men and women), residential status (rural-to-urban migrant, rural resident, and urban resident), marital status (married and non-married), and educational attainment (middle school or less, high school, college or more). These variables were used to describe the study sample and for validity analyses. Past research suggests that social capital may vary by age (Chen et al. 2009), gender (Skrabski et al. 2004; Lindstrom 2005), residential locations (Putnam 1995), and migration status (Soskolne and Shtarkshall 2002).

2.6 Statistical Analysis

The standard psychometric assessment approach was followed to evaluate the PSCS-16 and PSCS-8. Item responses were examined using descriptive statistical parameters (e.g.,

mean, standard deviation, skewness, and kurtosis). Correlation analyses were used to compute Cronbach's alpha and item-total correlations for reliability assessment, and relationships between the parent PSCS and two short forms. EFA and CFA were used to assess structural validity. Construct validity was assessed by examining the relationship between the two short versions of PSCS and residential and educational statuses using analysis of variance (ANOVA). Regression analysis was used to assess concurrent validity, by examining how well the two short scales predicted outcome variables.

When assessing the reliability of the scale, the following criteria were used with Cronbach's alpha: $\geq$.75 indicating acceptable, $\geq$.80 indicating very good and $\geq$ .90 indicating excellent. In evaluating the fit indices of the CFA, good data-model fit was evidenced by four types of indicators: comparative fit index (CFI) >.9, goodness-of-fit index (GFI) >.9, root mean square of error approximation (RMSEA) <.5, and Chi square/ degrees of freedom ratio (χ^2/df) <2.0. As routine, type I error was set at $p < .05$. Statistical analyses were conducted with SAS 9.23 (SAS Institute, Inc., Cary, NC).

3 Results

3.1 Sample Characteristic

Table 1 summarizes the characteristics of the study sample. Women accounted for approximately two-thirds of the sample, and over half of participants were less than 30 years old. There were approximately equal-sized groups of rural-to-urban migrants, rural residents, and urban residents. There were similar proportions of participants with middle school or less schooling, high school, and college or more education.

3.2 The PSCS-16 and PSCS-8

The derived items for the PSCS-16 and PSCS-8 are listed in Table 2. When analyzed with the original data used to develop the parent PSCS, the estimated Cronbach's alpha coefficients were .87 (overall), .81 (bonding), and .85 (bridging) for the PSCS-16. Likewise, the same coefficients for the corresponding PSCS-8 scale were .78 (overall), .70 (bonding), and .73 (bridging) respectively for the PSCS-8.

3.3 Item Responses and Reliability

The derived PSCS-16 and PSCS-8 were further assessed using the new data collected for this study. All items met the assumptions of normality regarding skewness and kurtosis. Results in Table 2 indicate that the item mean scores varied from 2.14 to 3.60, close to the theoretical mean of 3.00. The item-total correlation coefficients were all positive, and statistically significant.

Table 3 presents the estimated Cronbach's alpha coefficients for both PSCS-16 and PSCS-8, overall and by bonding and bridging capital. As a simplified short version of the original 42-item PSCS, the alpha coefficients were .90 and .83 for the PSCS-16 and the PSCS-8 respectively for the overall sample. The coefficients slightly varied across subgroups of the study sample.

Table 1 Characteristics of the study sample

Characteristic	Men	Women	Total
Sample, *n* (%)	88 (33.98)	171 (66.02)	259 (100.00)
Residential status, *n* (%)			
Rural-to-urban migrants	31 (35.23)	59 (34.50)	90 (34.75)
Rural residents	28 (31.82)	61 (35.67)	89 (34.36)
Urban residents	29 (32.95)	51 (29.82)	80 (30.89)
Age in years, *n* (%)			
<30 years	53 (60.23)	96 (56.14)	149 (57.53)
≥30 years	35 (39.77)	75 (43.86)	110 (42.47)
M (*SD*)	28.83 (7.03)	29.64 (8.08)	29.36 (7.73)
Education, *n* (%)			
Middle school or less	27 (30.48)	59 (34.50)	82 (33.30)
High school	27 (30.68)	58 (33.92)	85 (32.82)
College or more	34 (38.64)	54 (31.58)	88 (33.98)

3.4 Correlation and Measurement Modeling Analysis

The 16 items for PSCS-16 were grouped (see Table 2 for grouping) into eight components for measurement modeling analysis with four assessing bonding capital and four assessing bridging capital. The four bonding capital components include BOC1 for *network size*, BOC2 for *trustworthiness*, BOC3 for *resource ownership* and BOC4 for *reciprocity*. Likewise, the four bridging capital components include BRC1 for *network size*, BRC2 for *resource ownership*, BRC3 for *trustworthiness*, and BRC4 for *reciprocity*. The eight items (the odd numbered items in Table 2) in the PSCS-8 each correspond to the four components for bonding capital and bridging capital, respectively. The correlation coefficients among all the components for both PSCS-16 and PSCS-8 are presented in Table 4. CFA demonstrated that the two-factor model used in the original PSCS instrument fit the new data well for both the PSCS-16 (Fig. 1a) and PSCS-8 (Fig. 1b).

Results in Table 5 indicate that scores of the two short social capital scales were highly correlated with the scores of the original PSCS for the overall scale (both $rs > .9$, $ps < .001$). The bonding and bridging capital subscales also correlated well with the total scores ($rs > .8$, $ps < .001$). As evidence of construct validity, there were significant differences in PSCS-16 and PSCS-8 scores based on residential status, $F(2, 256) = 21.11$, $p < .001$ for the PSCS-16 and $F(2, 256) = 16.93$, $p < .001$ for the PSCS-8. The rural-to-urban migrants reported significantly lower social capital on the PSCS-16 scale than both the rural residents and the urban residents. Rural migrants also reported significantly lower social capital on the PSCS-8 than rural residents. Surprisingly, there was not a significant relationship between educational attainment and PSCS-16 or PSCS-8 scores. As evidence of concurrent validity, regression results in the bottom panel of Table 5 indicate that both PSCS-16 and PSCS-8 significantly predicted social capital investment and perceived stress.

4 Discussion

In this study, we reported two short personal social capital scales, the PSCS-16 and the PSCS-8. They were derived from the original 42-item Personal Social Capital Scale

Table 2 The Personal Social Capital Scale 16 (PSCS-16) (alpha = .90) and Personal Social Capital Scale 8 (PSCS-8) (alpha = .83) (N = 259)

Items by Subscale	M (SD)	r with total	Alpha if deleted
Bonding capital subscale (Cronbach's alpha = .90)			
1. How do you rate the number of your friends?	3.04 (0.88)	.42	.90
2. How do you rate the number of your country fellows/old classmates?	2.89 (1.05)	.39	.90
3. Among your coworkers/fellows, how many you can trust?	3.07 (0.93)	.49	.89
4. Among your relatives, how many you can trust?	3.60 (0.98)	.32	.90
5. Among all your relatives, neighbors, friends, co-workers, and classmates, how many have broad connections with others?	2.41 (0.92)	.55	.89
6. Among all your family members, relatives, neighbors, friends, co-workers, and old classmates, how many are with a professional job?	2.58 (0.95)	.48	.89
7. How many of your coworkers/fellows will definitely help you upon your request?	3.09 (0.90)	.46	.89
8. How many of your friends will definitely help you upon your request?	3.44 (0.87)	.36	.90
Bridging capital subscale (Cronbach's alpha = .92)			
9. How do you rate the number of cultural, recreational and leisure groups/organizations in your community?	2.53 (1.09)	.70	.89
10. How do you rate the number of governmental, political, economic and social groups/organizations in your community?	2.88 (1.14)	.56	.89
11. How many of these groups and organizations possess broad social connections?	2.34 (0.92)	.68	.89
12. How many of these groups and organizations possess great social influence?	2.45 (0.94)	.70	.89
13. How many of the cultural, recreational and leisure groups/organizations represent your interests?	2.14 (0.90)	.77	.88
14. How many of the governmental, political, economic and social groups/organizations represent your interests?	2.18 (0.94)	.72	.89
15. How many of the governmental, political, economic and social groups/organizations will help you upon your request?	2.37 (0.97)	.70	.89
16. How many of the cultural, recreational and leisure groups/organizations will help you upon your request?	2.25 (0.90)	.75	.88

r = Pearson correlation coefficient between the item and the total PSCS score. The PSCS-16 contains all the 16 items listed in the table and the PSCS-8 contains the odd-numbered items. Two consecutive items of the 16 were grouped to form 8 constructs, with four measuring bonding capital and four measuring bridging capital. For example, the mean score of item 1 and item 2 is computed to assess *network size* for bonding capital, and the mean scores of item 15 and item 16 is computed to assess the *reciprocity* of the bridging social capital

Table 3 PSCS-16 and PSCS-8 reliability estimates by gender, age, and residential type

Category	PSCS-16			PSCS-8		
	Total	Bonding	Bridging	Total	Bonding	Bridging
Total sample ($N = 259$)	.90	.75	.92	.83	.64	.85
By gender						
Men ($n = 88$)	.88	.70	.92	.81	.58	.86
Women ($n = 171$)	.90	.77	.92	.84	.67	.85
By age (years)						
<30 ($n = 149$)	.88	.71	.92	.81	.56	.86
≥30 ($n = 110$)	.91	.78	.92	.85	.69	.84
By residential type						
Rural-to-urban migrants ($n = 90$)	.91	.77	.94	.84	.64	.90
Rural residents ($n = 89$)	.89	.77	.90	.82	.62	.83
Urban residents ($n = 80$)	.85	.63	.89	.76	.56	.77

Table 4 Pearson correlations among measurement components in PSCS-16 and PSCS-8 ($N = 259$)

	Bonding social capital				Bridging social capital			
	BOC1	BOC2	BOC3	BOC4	BRC1	BRC2	BRC3	BRC4
PSCS-16								
BOC1	1.00	.22**	.34**	.26**	.40**	.33**	.39**	.36***
BOC2		1.00	.31**	.64**	.31**	.29**	.29**	.35**
BOC3			1.00	.31**	.45**	.45**	.49**	.45**
BOC4				1.00	.32**	.22**	.27**	.30**
BRC1					1.00	.62**	.60**	.57**
BRC2						1.00	.75**	.78**
BRC3							1.00	.85**
BRC4								1.00
PSCS-8								
BOC1	1.00	.15*	.25**	.11	.30**	.24**	.33**	.34**
BOC2		1.00	.25**	.83**	.31**	.24**	.32**	.32**
BOC3			1.00	.25**	.45**	.39**	.45**	.39**
BOC4				1.00	.32**	.21**	.27**	.29**
BRC1					1.00	.54**	.61**	.51**
BRC2						1.00	.68**	.59**
BRC3							1.00	.70**
BRC4								1.00

BOC: bonding capital, *BRC:* bridging capital

* $p < .05$, ** $p < .01$

(PSCS) in Chinese (Chen et al. 2009) and its English version (Archuleta and Miller 2011). The original scale is a theory-based, reliable and valid two-factor instrument. The PSCS assesses total personal social capital and its two subcomponents, bonding capital and bridging capital. It taps information related to the four key theory-based social capital
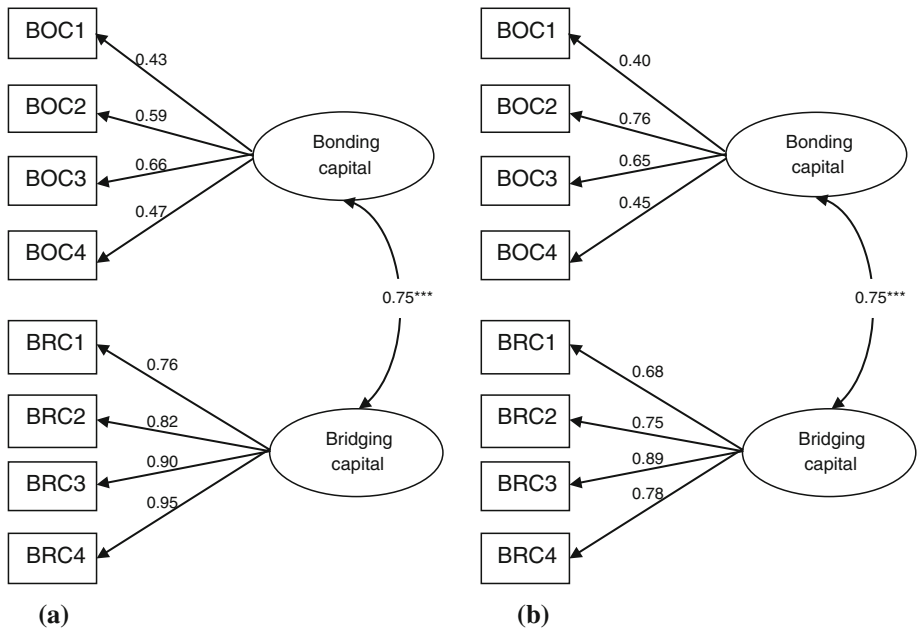
Fig. 1 Measurement modeling of PSCS-16 and PSCS-8. **a** Measurement modeling of PSCS-16. Data-model fit: GFI = .980, CFI = .993, RMSEA = .045, χ^2/df = 1.519. ***p < .001. **b** Measurement modeling of PSCS-8. Data-model fit: GFI = .989, CFI = .999, RMSEA = .007, χ^2/df = 1.012. ***p < .001

components: (a) size of a person's network connections, (b) trustworthiness of his or her network members, (c) resource-ownership of the network members, and (d) reciprocity with network members. The PSCS has since been used in a variety of research programs to measure social capital and examine its relationship with a number of health related issues, including depression, stress (including acculturative stress), and social inclusion (Archuleta 2010; Archuleta and Teasley 2013; Chen et al. 2009; Chen et al. 2013; Wang and Chen 2013).

The two new scales with 16 items and 8 items respectively each have adequate reliability. Results from the CFA indicated that the two-factor structure model of the original PSCS (i.e., bonding capital and bridging capital) was preserved in the two short instruments. Furthermore, the two short versions each were highly correlated with the original PSCS, indicating excellent criterion-related validity. Providing evidence of construct and concurrent validity, higher PSCS-16 and PSCS-8 scores were associated with greater social capital investment and lower perceived stress, and rural-to-urban migrants reported the lowest PSCS-16 and PSCS-8 scores.

The PSCS-16 and the PSCS-8 we described in this study provide two new tools to meet the needs of researchers looking to assess social capital in the context of large-scale survey research. As in the original PSCS, two scales are used for item scoring, one assessing network size and another assessing trustworthiness, resource ownership, and reciprocity (Archuleta and Miller 2011; Chen et al. 2009). The time burden to participants is quite low with the 16- and 8-item scales. In practice, we recommend using PSCS-16 if researchers need to assess bonding capital and bridging capital separately. The PSCS-8 is ideally suited when the total length of a survey is a concern and total social capital is the research focus.

Table 5 Criterion-related, construct, and concurrent validity of the PSCS-16 and PSCS-8

Variable/category	PSCS-16		PSCS-8	
	r	95 % CI	r	95 % CI
Criterion-related validity				
Total PSCS	.95	[.94, .96]	.93	[.91, .93]
Bonding PSCS	.91	[.89, .93]	.84	[.80, .89]
Bridging PSCS	.99	[.99, .99]	.97	[.96, .98]
	M	95 % CI	M	95 % CI
Construct validity				
Residential status				
Rural residents	2.91	[2.79, 3.02]	2.87	[2.74, 2.99]
Urban residents	2.73	[2.62, 2.84]	2.61	[2.49, 2.73]
Rural-to-urban migrants	2.48	[2.34, 2.62]	2.40	[2.26, 2.55]
Education				
Middle	2.79	[2.65, 2.93]	2.75	[2.61, 2.90]
High	2.59	[2.45, 2.72]	2.51	[2.37, 2.65]
Post-secondary	2.74	[2.63, 2.84]	2.61	[2.49, 2.73]
	b	95 % CI	b	95 % CI
Concurrent validity				
Social capital investment	0.30	[0.19, 0.41]	0.27	[0.15, 0.38]
Perceived stress	−0.17	[−0.29, −0.05]	−0.20	[−0.31, −0.08]

r, Pearson correlation coefficient; CI, confidence interval; b, unstandardized regression coefficient. No overlap of the 95 % CI of the mean score was used as evidence to support construct validity of the two PSCS scales. A 95 % CI of an r or b not containing zero was used as evidence of statistical significance of the coefficient

The lack of short, reliable and valid tools to assess social capital has been a bottleneck for large-scale survey studies (Chen et al. 2013; Moore et al. 2011; Van Der Gaag and Webber 2010). The provision of these two short version social capital scales will facilitate such research.

4.1 Limitations

There are several limitations to this study. Firstly, data used for this analysis are cross-sectional in nature. Therefore the test–retest reliability of the two short scales cannot be established. Secondly, although the original PSCS has been tested in China and the United States (Archuleta and Miller 2011; Chen et al. 2009), the PSCS-16 and the PSCS-8 were tested only in China. Therefore, efforts are needed to establish the utility of these two instruments in other cultural settings. Third, we do not know if the two short scales are also valid and reliable for people older than 50 years of age who were not included in the study sample. Lastly, the scales scores of both PSCS-16 and PSCS-8 did not differ across educational attainments for the total sample. We speculate that this unexpected result is probably due to the fact that rural residents have relatively lower education but higher

social capital. When they were analyzed together with the rest of the sample, the effect of educational attainment on social capital is confounded.

4.2 Conclusions

Despite these limitations, this study provides two very useful short tools for use in large-scale survey studies to quantitatively assess personally owned social capital. It is our anticipation that the dissemination of these two scales will facilitate social capital and health research in the future.

Appendix: Personal Social Capital Scale (full version)

Cap1. How do you rate the number of people in each of the following six categories?	A lot	More than average	Average	Less than average	A few
Your family members	5	4	3	2	1
Your relatives	5	4	3	2	1
People in your neighborhood	5	4	3	2	1
Your friends	5	4	3	2	1
Your coworkers/fellows	5	4	3	2	1
Your country fellows/old classmates	5	4	3	2	1
Cap2. With how many of people in each of the following categories do you keep a routine contact?	All	Most	Some	A few	None
Your family members	5	4	3	2	1
Your relatives	5	4	3	2	1
People in your neighborhood	5	4	3	2	1
Your friends	5	4	3	2	1
Your coworkers/fellows	5	4	3	2	1
Your country fellows/old classmates	5	4	3	2	1
Cap3. Among the people in each of the following six categories, how many can you trust?	All	Most	Some	A few	None
Your family members	5	4	3	2	1
Your relatives	5	4	3	2	1
People in your neighborhood	5	4	3	2	1
Your friends	5	4	3	2	1
Your coworkers/fellows	5	4	3	2	1
Your country fellows/old classmates	5	4	3	2	1

Cap4. Among people in each of the following six categories, how many will definitely help you upon your request?	All	Most	Some	A few	None
Your family members	5	4	3	2	1
Your relatives	5	4	3	2	1
People in your neighborhood	5	4	3	2	1
Your friends	5	4	3	2	1
Your coworkers/fellows	5	4	3	2	1
Your country fellows/old classmates	5	4	3	2	1
Cap5. When people in all the six categories are considered, how many possess the following assets/resources?	All	Most	Some	A few	None
Certain political power	5	4	3	2	1
Wealth or owners of an enterprise or a company	5	4	3	2	1
Broad connections with others	5	4	3	2	1
High reputation/influential	5	4	3	2	1
With high school or more education	5	4	3	2	1
With a professional job	5	4	3	2	1
Cap6. How do you rate the number of the following two types of groups/organizations in your community?	A lot	More than average	Average	Less than average	A few
Governmental, political, economic and social groups/organizations (political parties, women's groups, village committees, trade union, cooperate associations, volunteer groups, etc)	5	4	3	2	1
Cultural, recreational and leisure groups/organizations (religious, country fellows, alumni, sport, music, dances, crafts, games, etc)	5	4	3	2	1
Cap7. Do you participate in activities for how many of each of these two types of groups and organizations?	All	Most	Some	A few	None
Governmental, political, economic and social groups/organizations (political parties, women's groups, village committees, trade union, cooperate associations, volunteer groups, etc)	5	4	3	2	1
Cultural, recreational and leisure groups/organizations (religious, country fellows, alumni, sport, music, dances, crafts, games, etc)	5	4	3	2	1

Cap8. Among each of the two types of groups and organizations, how many represent your rights and interests?	All	Most	Some	A few	None
Governmental, political, economic and social groups/organizations (political parties, women's groups, village committees, trade union, cooperate associations, volunteer groups, etc)	5	4	3	2	1
Cultural, recreational and leisure groups/organizations (religious, country fellows, alumni, sport, music, dances, crafts, games, etc)	5	4	3	2	1

Cap9. Among each of the two types of groups and organizations, how many will help you upon your request?	All	Most	Some	A few	None
Governmental, political, economic and social groups/organizations (political parties, women's groups, village committees, trade union, cooperate associations, volunteer groups, etc)	5	4	3	2	1
Cultural, recreational and leisure groups/organizations (religious, country fellows, alumni, sport, music, dances, crafts, games, etc)	5	4	3	2	1

Cap10. When all groups and organizations in the two categories are considered, how many possess the following assets/resources?	All	Most	Some	A few	None
Significant power for decision making	5	4	3	2	1
Solid financial basis	5	4	3	2	1
Broad social connections	5	4	3	2	1
Great social influence	5	4	3	2	1

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