Validation of the Chinese version of the Sense of Self (SOS) Scale

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Abstract This study explored the cross-cultural applicability of the Sense of Self (SOS) Scale in the Hong Kong Chinese cultural context. The SOS Scale is a 26-item questionnaire designed to measure students' sense of purpose, self-reliance, and self-concept in school. Six hundred ninety-seven Hong Kong Chinese high school students participated in the study. Both within-network and between-network approaches to construct validation were adopted. Responses to this questionnaire are shown to have good internal consistency reliability, and support is provided for its construct validity in terms of its factorial structure and correlations with other educational outcomes such as learning strategies. In addition, multigroup confirmatory factor analysis also indicated invariance of the instrument across males and females, across students of different year levels, and across students from different types of school. Implications for cross-cultural research are discussed.

Keywords Sense of self · Validation · Personal investment theory · Hong Kong Chinese students

"Everyone needs a strong sense of self. It is our base of operations for everything that we do in life."—Julia Alvarez

A positive sense of self has been related to a variety to optimal outcomes. For example, people who have a healthy sense of self are more likely to be happy, mentally adjusted, socially accepted, and attain higher levels of achievement among others (see Baldwin and Sinclair 1996; Marsh et al. 2003; Valentine et al. 2004; Taylor and Brown 1988 for reviews). The associations of sense of self with a range of positive psychological states and outcomes have been observed in a variety of settings and have been documented in various subareas of psychological study including social behavior and relations, personality, education, child development, mental and physical health, social services, organizations, work, and sports (Harter 1998; Marsh and Craven 2006; Marsh and Hau 2004).

In the field of education, students' sense of self is found to be related to school performance and other educational outcomes (see Bong and Skaalvik 2003; Valentine et al. 2004 for reviews). A healthy sense of self serves as catalyst that brings about positive results including school adjustment, satisfaction, achievement, and future aspirations (Dowson et al. 2004; Goyette and Xie 1999; Graham 1991; Marsh and Craven 1997; McInerney 2008) among others. Specifically, students' positive sense of self is a significant predictor of their intention for further education, positive affect for schooling, and valuing of schooling. On the other side of the pole, negative sense of self is a significant negative predictor of intention for further education, and even academic achievement (McInerney 2008).

Maehr (1984) used the term "sense of self" to refer to the relatively organized collections of perceptions, beliefs, and feelings related to who one is. It can be understood better within the lens of personal investment theory (Maehr and Braskamp 1986; Maehr and McInerney 2004; McInerney and Liem 2009; McInerney et al. 2005), which proposes sense of self as one of the three definitive facets of meaning (the other two are achievement goals and facilitating conditions) that serves as an antecedent in determining the

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investment, that is, engagement and involvement of students in their academic tasks. Personal investment theory is a social-cognitive theory that explains the factors as to why students become engaged/motivated or disengaged/unmotivated in school-related activities (see Maehr and McInerney 2004; McInerney and Liem 2009; McInerney et al. 2004 for reviews). It is multifaceted theory of motivation in which three key components of meaning such as achievement goals (mastery, performance, social, extrinsic), facilitating conditions (parent support, teacher support, peer support), and sense of self (sense of purpose, self-reliance, self-concept) interact to engage students in the process of learning (Maehr and Braskamp 1986). Three different instruments have been designed to measure each of these three facets of meaning. More specifically, the Inventory of School Motivation (ISM, McInerney and Ali 2006) was developed to capture the achievement goal construct, Facilitating Conditions Questionnaire (FCQ, McInerney et al. 2005) was constructed to measure the perceived facilitating conditions accorded to the students by their social network including their teachers, parents, and peers, while the Sense of Self Scale (SOS, McInerney et al. 2001) was developed to assess the sense of self of the students. Our interest is in this last instrument.

The SOS Scale has been validated in Western settings (McInerney and Ali 2006; McInerney et al. 2001, 2003, 2005). However, in spite of the popularity of SOS Scale, the construct validity of this measure remains underexplored in the Asian setting. The SOS is a 26-item questionnaire that measures three components of the sense of self: self-concept, self-reliance, and sense of purpose. Self-concept refers to the extent to which students hold a positive view of themselves in school. Self-reliance refers to the degree to which the student is self-reliant and independent in the school setting, while sense of purpose refers to the degree to which the student values school for the future. Much research has shown the effects associated with each of these factors in the SOS. For example, a positive academic self-concept has been associated with the ability to take on more academic challenges, a higher level of persistence when difficulties are encountered, and higher academic achievement in different domains (Marsh et al. 1999, 2002; Marsh and Craven 2006; Marsh and O'Mara 2008). Having a sense of purpose or valuing the school for the future has also been related to a variety of positive outcomes such as deep learning, effort exertion, and a focus on the task at hand (see McInerney 2004 for a review). Self-reliance or the capacity to be independent in the school setting is also considered an important outcome as schools want to socialize students into becoming autonomous and independent individuals. Experiencing a sense of autonomy in school has been shown to influence various outcomes such as intrinsic motivation, academic engagement, overall adjustment to the school context, and satisfying learning experiences (Deci and Ryan 2000; Jang et al. 2009).

Research in cross-cultural psychology has alerted us to the need to be more sensitive to the cultural context especially when using tests that are derived from other cultural contexts (van de Vijver and Hambleton 1996; Hambleton 2001; Fischer 2004; Hambleton et al. 2005; Maneesriwongul and Dixon 2004). In fact, a number of studies have shown in the Asian context, some Western constructs (e.g., achievement motivation, learning approaches among others) may not operate in the same way or generate similar pattern of effects as in Western contexts due to variations in cultural environment (see for example Bernardo 2008; Bernardo et al. 2008; Bond 1996; McInerney and Van Etten 2002; Murphy-Berman and Berman 2003; Salili et al. 2001; Tao and Hong 2000; Watkins and Biggs 1996, 2001; Watkins et al. 1991). These observations speak well of the need to look into the validity of instruments developed from the West when applied to other cultural contexts (Maneesriwongul and Dixon 2004). As noted by Dimitrov (2010, p. 121), "when the validation process involves comparisons among groups on an underlying construct (e.g., anxiety, depression, self-efficacy, verbal ability, etc.), it is important to ensure that the assessment instrument is operating in the same way and that the underlying construct has the same theoretical structure for each group." It is probably not unreasonable to assume that some instruments developed in the West might not work in the expected direction when used in non-Western settings; thus, it is imperative to test the construct reliability and validity of any instrument developed in the West before they are used in a new cultural context.

In keeping with the aforementioned argument, in this study, we wanted to test the cross-cultural validity of the SOS among a sample of Hong Kong Chinese high school students by utilizing both within-network and between-network construct validation approaches. Within-network construct validation, also called internal construct validation, refers to the examination of the factor structure and factor correlation matrix. It typically involves statistical techniques such as confirmatory factor analysis (CFA) and reliability analysis. On the other hand, between-network or external construct validation approach entails examining patterns of relationships between the scales and other theoretically related constructs utilizing statistical techniques such as correlational analysis (Marsh 1997). Few studies adopt this dual approach to validity, thus providing relatively limited input into understanding the constructs being investigated.

To test for within-network validity, we looked at the results of the confirmatory factor analysis and the Cronbach's alphas of the different subscales of SOS. It is also

useful to look at whether different kinds of students respond to SOS in a similar manner. It is a common practice in educational research to pool together data from different kinds of students (e.g., different genders, year level, and types of school). However, combining datasets together would only be warranted if invariance in terms of factor structure can be shown. Previous studies have given inadequate attention to the investigation of the equivalence of educational constructs to students of different genders, year levels, and school types; thus, we wanted to investigate whether SOS has invariant factor structure across different kinds of students. In terms of year level, research has shown that there seems to be a motivational decline during the high school years which includes a drop in school grades, interest, intrinsic motivation, and self-concept (e.g., Gottfried et al. 2001; Ratelle et al. 2004). This is accompanied by a concomitant decline in student's self-beliefs (e.g., Blackwell et al. 2007). With regard to gender differences, results appear to be more ambiguous with some studies highlighting differences in self-conceptions (e.g., Cross and Madson 1997; Cross et al. 2002), while other studies indicate that gender differences are relatively minor (e.g., Martin 2003, 2004). There have also been suggestions in the literature that students from different types of school have different levels of self-conceptions (Marsh et al. 2008; Wong and Watkins 2001). As such, we wanted to investigate whether students of different genders, year levels, and school types in our study varied with regard to their responses to the SOS.

As a test of between-network validity, we looked at how the constructs in SOS (sense of purpose, self-reliance, and self-concept) are related to deep and surface learning strategies. Deep learning strategies emphasize understanding of the material and cognitive engagement in the classroom, while surface learning strategies refer to those strategies that focus on rote learning and the regurgitation of lessons without striving for real understanding (Biggs 1992; Biggs et al. 2001). Research has shown that students with a more positive sense of self are more likely to utilize deep approaches to learning (Lau et al. 2008). On the other hand, students who have a negative view of themselves in school are more likely to utilize surface learning strategies. (Watkins et al. 2002a, b, 2003). Thus, we expect that the scores in the SOS would be positively related to deep learning strategies and negatively related to surface learning strategies.

The present study

The aim of the present study is to (a) assess the within-network construct validity of the Chinese translation of the SOS, (b) test its equivalence across students of different genders, year levels, and school types through multigroup confirmatory factor analysis, and (c) examine its between-network construct validity through its correlations with other theoretically relevant constructs such as deep and surface learning strategies.

Methods

Participants

A total of 697 high school students from Hong Kong participated in the study. The mean age was 13.43 years (SD = 1.37 years). Of these, 356 were males (51.1%) and 341(48.9%) were females; 354 students were in Form 1 and 343 were in Form 3. Participants were drawn from three different schools: 241 from a high ability school, 230 from a medium ability school, and 226 from a low ability school. Students were required to complete the inventory as part of the class requirement; however, they were assured that their responses would remain confidential and would not, in any way, influence their course grade.

Measure

This study utilized the Chinese (Watkins et al. 2003) version of the Sense of Self (SOS) Scale. This scale has previously been translated to Chinese as part of a larger study on academic motivation among Hong Kong high school students, but a stringent examination of its psychometric properties has not yet been conducted. The SOS has three factors:

> Factor 1. *Sense of Purpose*. The degree to which a student values school for the future (e.g., "I try hard to do well at school so I can get a good job when I leave.");
> Factor 2. *Self-Reliance*. The degree to which a student is self-reliant and confident within academic settings (e.g., "I often try new things on my own.");
> Factor 3. *Self-Concept*. This is the degree to which a student holds positive feelings about his/her general intellectual ability in school (e.g., "I think I am as good as everybody else at school.").

The SOS adopted a 5-point Likert scale format where respondents just selected their response from the response scale ranging from 1 (strongly disagree) to 5 (strongly agree). On each of the four factors, a higher score indicates greater endorsement of the underlying construct.

In order to assess between-network construct validity, we also administered the Deep Strategies subscale and Surface Strategies subscale of the Chinese translation of the Learning Process Questionnaire (LPQ, Biggs 1992), which has previously been shown to be valid with Hong Kong Chinese students.

Statistical analysis

To examine the within-network validity of SOS, we first computed for the descriptive statistics and Cronbach's alpha coefficients using the whole sample. Next, we conducted confirmatory factor analysis to test the factor structure of the SOS. For the CFA analysis, we randomly divided the data into two sets: an exploratory sample ($N = 347$) and a cross-validation sample ($N = 350$). We tested the hypothesized models on the exploratory sample first and then tested the relevant models with the cross-validation sample. Third, we retested the model with the entire sample. We allowed the factor correlations of the three latent factors in the CFA to be freely estimated. All analyses were conducted using Amos 12 (Arbuckle 2007), and all parameters were estimated using maximum likelihood procedure.

We also conducted multigroup confirmatory factor analysis to assess the factorial invariance of SOS. Invariance analysis is done to provide information about the equivalence of the data across multiple groups (Marsh 1993, 1994). In the present study, we did three invariance tests related to testing the equivalence of SOS (1) across genders (male and female), (2) across year levels (Form 1 and Form 3), and (3) across academic institutions (high ability, medium ability, and low ability schools).To test for the measurement invariance of the SOS Scale, we followed a stepwise procedure. For the first model, we tested for configural invariance which indicates whether the number of factors and pattern of indicator-factor loadings is identical. The second model holds the factor loadings invariant, and the third model holds both factor loadings and factor variances and covariances invariant. We followed this stepwise procedure in testing for invariance across genders, year levels, and school types. Lastly, in order to test for between-network validity, we assessed the relationship of the various SOS subscales to deep and surface learning strategies measured through the LPQ (Biggs 1992).

Results

Within-network test

Preliminary analyses

The means, standard deviations, and Cronbach's alpha coefficients of SOS and the between-network measures are shown in Table 1. Internal consistency of the SOS was satisfactory with Cronbach's alpha coefficients for each subscale ranging from .57 to .75 although the Cronbach's alpha was somewhat low for the Self-Reliance subscale.

The correlations among the different factors of the SOS Scale are shown in Table 2. Results indicate that the

Table 1 Descriptive statistics and internal consistency coefficients of the SOS

Factors	Cronbach's alpha	Mean	SD
Sense of self scale (SoS)			
Sense of purpose	.74	3.68	.61
Self-reliance	.57	3.26	.46
Self-concept	.75	3.11	.49
Between-network measures			
Deep learning strategies	.75	3.32	.62
Surface learning strategies	.62	2.88	.62

Table 2 Zero-order correlations among sense of self factors

	1	2	3
Sense of purpose	–	.372***	.162***
Self-reliance		–	.472***
Self-concept			–

*** $p < .001$

dimensions in SOS were positively correlated with each other.

Confirmatory factor analysis (CFA)

We first tested the hypothesized model with three latent factors (sense of purpose, self-reliance, and self-concept) on the exploratory sample ($N = 347$). Each of the 26 items in the SOS was allowed to load on only one designated latent factor. This model (Model 1) did not fit the data well (See Table 3). Closer inspection of the factor loadings and standardized residuals associated with the hypothesized model indicated that several items on the hypothesized model fit the data poorly. These items displayed factor loadings less than .34 (Stevens 2002) and standardized residuals greater than 2.58 (Byrne 1998). We decided to remove these items from their respective scales.

Once the 16 poorly fitting items were removed, the new model (Model 2) was evaluated using the exploratory sample again. This revised model fit the data well. Results indicated that the CFA had a good fit to the data as evidenced by the values of greater than .90 for TLI, and CFI and values of less than .08 for the RMSEA and SRMR (Hu and Bentler 1995, 1999). Only the chi-square statistic was not satisfactory. A statistically non-significant chi-square value indicates that the model is a reasonably satisfactory representation of the data. However, as noted by Anderson and Gerbing (1988), the value of the chi-square statistic is dependent on sample size. As such, data that involve a large sample size will likely have a chi-square statistic that is significant although there are only minor

Table 3 Goodness-of-fit indices for the exploratory sample

Model	χ^2	df	χ^2/df	p	RMSEA (90% CI)	SRMR	TLI	CFI
Model 1	1,212.469	296	4.096	$p < .001$	.095 (.089–.100)	.109	.545	.585
Model 2	74.256	32	2.32	$p < .001$	.062 (.043–.080)	.049	.901	.931

Model 1 refers to the original hypothesized model. Model 2 refers to the model after deleting the items with poor fit

RMSEA, root mean square error of approximation; *SRMR,* standardized root mean square residual; *TLI,* Tucker-Lewis index; *CFI,* comparative fit index

Table 4 Goodness-of-fit indices for the cross-validation and the entire sample

Model	χ^2	df	χ^2/df	p	RMSEA (90% CI)	SRMR	TLI	CFI
Cross-validation sample	62.828	32	1.963	$p < .01$	.053 (.033–.072)	.044	.917	.941
Entire sample	102.258	32	3.196	$p < .001$	.056 (.044–.069)	.042	.912	.937

discrepancies between the model and the data. Because of this, we decided to focus on the other goodness-of-fit indices, which all indicate a good fit. A chi-square difference test showed that there was a significant improvement in fit as a result of deleting the items with poor fit (χ^2 difference = 1,138.213, change in df = 264, $p < .001$).

We then tested Model 2 on the cross-validation sample and the entire sample. Results showed a good fit for both the cross-validation sample and the entire sample (See Table 4). Factor inter-correlations and factor loadings were all significant at the $p < .01$ level.

Multigroup tests of invariance

We then conducted three sets of multigroup confirmatory factor analysis using the entire sample to determine the equivalence of the responses to SOS across (1) males and females, (2) Form 1 and Form 3 students, and (3) students from the high ability, medium ability, and low ability school using the whole sample. The classical approach in arguing for evidence of invariance is based on χ^2 difference (Bentler and Chou 1987; Bollen 1989); however, from a more practical perspective, Cheung and Rensvold (2002) claimed that it is more reasonable to base invariance decisions on a difference in CFI. They proposed that evidence of invariance be based on a difference in CFI values indicating a probability of < 0.01. Applied researchers have also argued that the classical approach is too stringent. In line with this, we followed Cheung and Rensvold's criteria. The results show that there is relative invariance across all models (See Table 5). This shows that the factor structure, factor loadings, and factor variances and covariances are parallel for males and females, for junior and senior high school students, and for students from private and public schools.

Using Cheung and Rensvold's (2002) criteria, results indicated that there was relative invariance of factor loadings and invariance of variances and covariances.

Between-network test

In terms of the between-network measures, we found that sense of purpose, self-reliance, and self-concept were all positively related to deep learning strategies. On the other hand, self-reliance and self-concept were negatively related to surface learning strategies although sense of purpose was not significantly related to surface learning (See Table 6).

Discussion

The aim of this study was to test the cross-cultural applicability of the SOS in Hong Kong using within- and between-network approaches.

In terms of within-network validity, the applicability of SOS in the Chinese setting was supported. The internal consistency reliability of the instrument was acceptable. The results of the CFA showed good fit indices providing further support for the applicability of the SOS in the Hong Kong Chinese setting. All the CFA factor loadings were also highly significant. The results provided psychometric evidence that different dimensions of sense of self are distinct from each other; thus, an omnibus measure of sense of self does not seem to be appropriate. Previous research has sometimes aggregated different types of sense of self into one unitary measure such as aggregating everything into one global measure of self-concept. The current study suggests that such methods might not be appropriate and may lead to potential confounding given that different elements of sense of self are distinct from each other. Focusing exclusively on a global sense of self construct such as self-esteem may not be appropriate because of the concomitant loss of predictive validity (Baumeister et al. 2003; Crocker and Park 2004; Scheff and Fearon 2004). A measure of the sense of self that is multidimensional and takes into account different components of this complex

Table 5 Invariance tests across students of different genders, year levels, and school types

Model	χ^2	df	χ^2/df	p	RMSEA (90% CI)	TLI	CFI	Change in CFI	Change in chi-square	Significance
Invariance across males and females										
Baseline model (no invariance imposed)	127.432	64	1.991	$p < .001$	.038 (.028-.047)	.921	.943	–	–	
Invariant factor loadings	138.284	71	1.948	$p < .001$	.037 (.028-.046)	.924	.940	.003	10.852	$p = 0.15$
Invariant factor variances and covariances	148.454	77	1.928	$p < .001$	.037 (.028-.045)	.926	.936	.004	10.17	$p = 0.12$
Invariance across Form 1 and Form 3 students										
Baseline model (no invariance imposed)	111.743	64	1.746	$p < .001$	.033 (.022-.043)	.941	.958	–	–	
Invariant factor loadings	129.901	71	1.830	$p < .001$	.035 (.025-.044)	.934	.948	.01	18.158	$p = 0.01$
Invariant factor variances and covariances	138.465	77	1.798	$p < .001$	.034 (.025-.043)	.937	.946	.02	8.564	$p = 0.20$
Invariance across students from high ability, medium ability, and low ability schools										
Baseline model (no invariance imposed)	236.709	119	1.989	$p < .001$	.038 (.031-.045)	.886	.899	–	–	
Invariant factor loadings	243.875	126	1.936	$p < .001$	.037 (.030-.044)	.892	.899	.00	7.166	$p = 0.41$
Invariant factor variances and covariances	246.717	132	1.869	$p < .001$	.035 (.028-.042)	.900	.902	.003	2.842	$p = 0.83$

Table 6 Zero-order correlations of the SOS with the between-network measures

	Deep learning strategies	Surface learning strategies
Sense of purpose	.252***	−.023
Self-reliance	.427***	−.123***
Self-concept	.211***	−.233***

*** $p < .001$

construct could offer psychologists the opportunity to make more accurate predictions (Marsh 1990; Swann et al. 2007). As Swann et al. (2007, p. 92) argued, there is a need for "identifying multiple aspects of self-views in fashioning predictions." SOS seems to be a viable instrument for this purpose because of its capacity to measure distinct aspects of the sense of self-construct.

The multigroup tests of invariance indicated that males and females, Form 1 and Form 3 students, and students from schools of different ability bandings responded to the questionnaire in a similar manner. In other words, in terms of underlying constructs and the composition of and relationships among these constructs, students of different genders, year levels, and school types are not substantially different. This has implications for educational research. Most of the research in educational psychology routinely aggregates males and females and also aggregates students from different year levels and from different schools. An important aspect to take into account in determining

whether students should be pooled or treated separately is the extent to which the factor structure underpinning the dataset is invariant across genders, year levels, and types of schools. The present study showed that the factor structure and other components of the test are in fact invariant, thus providing justification for the common practice of pooling the data from different kinds of students together.

The invariance of factor structure across different kinds of students also has implications for educational interventions. If the differences are related to differences in degree (i.e., mean level differences) and not differences in kind (i.e., variant factor structures), then there is scope for the implementation of interventions that vary more in duration or intensity and not in fundamental program structure. This is not to diminish the importance of taking individual differences into account just that these results can give educators a more empirically based view of how these differences are played out in students' lives (see Martin 2004 for a fuller discussion).

In terms of between-network validity, the correlations of the subscales of SOS with deep strategies and surface strategies confirm our initial hypotheses providing further evidence of the applicability of SOS in the Chinese setting. The positive dimensions of SOS such as self-reliance, sense of purpose, and self-concept were all positively associated with deep learning strategies. These results are consistent with previous research that looked at the relationship of various aspects of sense of self to learning strategies and other outcome measures (McInerney 2008; McInerney and Liem

2009). For example, in a cross-cultural study of how sense of self relates to learning strategies, Watkins et al. (2003)found that self-reliance and sense of purpose were positively related to deep learning strategies in various countries such as Malawi, Nepal, South Africa, Zambia, and China. On the other hand, they found that a positive self-concept is negatively related to surface learning strategies. These results converge with what we found in the current study.

Limitations and directions for future research

A limitation of this study is that only students in Hong Kong were sampled. The extent to which this sample differs from the general Chinese high school population in Mainland China limits the generalizability of the results. Future research needs to explore the reliability and validity of SOS in a more heterogenous group of Chinese students. In addition, future studies could also include more between-network measures to investigate how sense of self is related to other constructs in the nomological network.

Conclusion

Developing a healthy sense of self for students is a primary issue in education. As Combs (1961, p. 17) wrote:

> We cannot rule the self out of the classroom even if we wanted to. A child does not park himself at the door. The self is the dearest thing he owns, and he cannot be induced to part with it for any reason…We simply cannot separate what an individual learns from the nature of the individual himself.

Both educational researchers and practitioners are interested in assessing and improving the sense of self of students in school. As such, the accurate measurement of different facets of this psychological construct is important. However, most of the instruments that are widely circulated in the literature are based on Western research. Their psychometric properties have usually not been tested in non-Western cultures such as those found in Asia. The current study provides initial evidence of the applicability of a Western-developed instrument in the Hong Kong Chinese setting. The results of the current study indicate that SOS has good psychometric properties. Different invariance tests have also shown that responses of the students to the instrument were equivalent across genders, year levels, and school types. This shows that SOS is a suitable instrument that can be used in the Chinese cultural context.

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