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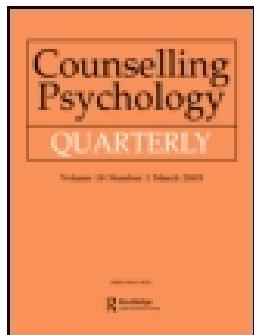
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ARTICLE



Validation of the Integrative Hope Scale in a Chinese college student population

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ABSTRACT

Recently, the Integrative Hope Scale (IHS) was developed and validated in several Western cultures. Because of its multidimensional structure and its relational components, we wondered if IHS could be a useful instrument for assessing hope in non-Western cultures. The current study translated and validated the IHS in a large sample of Chinese college students. Validity and reliability evidence for the IHS in Chinese culture was obtained by conducting Item Factor Analysis (IFA) across four different measurement models (e.g. a single factor model, a four-factor oblique model, a higher order factor model and a bi-factor model). Evidence of convergent and divergent validity was also gathered through correlation with measures of psychological well-being. Results indicate that the IHS is a valid measure of hope in Chinese college students. Discussions of specific aspects of the IHS and their applicability in the Chinese culture are provided. Implications for research and interpretation with the IHS are discussed.

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Hope; measurement; item factor analysis; psychological well-being; cross culture

Hope relates to numerous psychological constructs associated with well-being and positive self-growth. Individuals with higher hope are likely to have more self-esteem (Rand & Cheavens, 2009), better resiliency and coping (Snyder, 1996; Snyder et al., 2002), greater satisfaction with their lives, better physical and mental health (Alacron, Bowling, & Khazon, 2013), and less negative affect and experienced distress (Weis & Speridakos, 2011). In short, hope plays an important role in psychotherapy treatment and those with high hope have consistently better treatment and well-being outcomes (e.g. Marques, Lopez, & Mitchell, 2013; O'Keefe & Wingate, 2013; Valle, Huebner, & Suldo, 2006). Accordingly, hope is often considered a central component in positive psychology (Seligman & Csikzentimihalyi, 2000) and has even been proposed as a critical component of help-seeking (McDermott et al., 2017), therapy outcomes (Berg, Rapoff, Snyder, & Belmont, 2007), and the broader change process (Gilman, Schumm, & Chard, 2012; Larsen & Stege, 2010; Snyder, 1995).

The most widely accepted operationalization of hope is Snyder et al.'s (2002) Hope theory. Snyder's theory posits that hope is a character strength defined by two complementary, and equally necessary, components: (1) the development of goals as well as planful methods to achieve those goals and (2) the accompanying motivational capacity

to engage in intentional change (Snyder, Lopez, Shorey, Rand, & Feldman, 2003). This model of hope is dominant within psychology (See Owen, Magyar-Moe, & Lopez, 2015), and research has generally supported the applicability of the theory to other cultures (Lian, 2004; Ling, Huebner, Fu, Zeng, & He, 2016; Rand & Cheavens, 2009; Shi & Tian, 2009), where it has served as a protective factor against suicide (Luo, Wang, Wang, & Cai, 2010), bereavement (Chow, 2010), and has demonstrated its relationship with vocational outcomes (Luthans, Avolio, Walumbwa, & Li, 2005).

However, Snyder's theory is also not without criticism (e.g. Sung, Turner, & Kaewchinda, 2013). Researchers have raised concerns about the inadequate attention paid to cross-cultural factors within this cognitive theory of hope. Specifically, the exclusive focus on cognitive and emotional goal-directed processes omit key aspects of hope relevant to collective populations. Du and King (2013), for instance, argue that relationships are a salient and significant component of hope. Indeed, an individual's level of hope is closely related to the shared level of hope held by peers in supportive social relationships (Du, King, & Chu, 2015; Parker et al., 2015; Redlich-Amirav, Ansell, Harrison, Norrena, & Amijo-Olivo, 2018; Tennen & Affleck, 2002).

Consistent with broader omissions of hope content relevant to collective cultures, there is a lack of a systematic understanding about hope in the Chinese culture (Han, Yan, & Zheng, 2010; Zhang & Zheng, 2002). This is problematic because greater emphasis is placed on finding the agency from within in Western culture (Liu & Huang, 2013). While having the self-motivation might be an important component of agency in Chinese culture, individuals in this culture are also used to getting motivation (i.e. agency) from their parents and that this method of actualizing agency is different from Snyder's original conceptualization of the construct. As a result, the translation of instruments based on Snyder's theory of dispositional hope sometimes raises concerns about the accuracy of the non-contextual hypothesis (and thus, cross-cultural nature) for his model (Sun, Ng, & Wang, 2012). Accordingly, a more multi-dimensional and inclusive understanding is necessary for cross-culturally definitions of hope (e.g. Farran, Herth, & Popovich, 1995; Redlich-Amirav et al., 2018; Scigli, Ricci, Nyugen, & Scigli, 2011).

As an alternative to a purely cognitive model of hope, Schrank, Woppman, Sibitz, and Lauber (2011) developed the integrated hope scale (IHS) to capture broader areas relevant to hope. They used 60 items drawn from three common measures of hope: the Miller Hope Scale (Miller & Powers, 1988), the Herth Hope Index (Herth, 1992), and the Snyder Hope Scale (Snyder, 1995). Using the data collected from a community sample of 489 participants recruited in Austria to match the national census, a series of exploratory factor analyses (EFA) were utilized to determine the structure and nature of hope. After contrasting results of the different EFAs using a mixture of theoretical and empirical considerations, Schrank and colleagues presented a four-factor EFA model based on principal axis factoring and an oblique rotation (direct oblimin). This 23-item scale had high coefficient alphas (IHS Total $\alpha = .92$; *Trust and Confidence* subscale $\alpha = .85$, *Lack of Perspective* subscale $\alpha = .95$, *Future Orientation* subscale $\alpha = .80$, and *Social Relations* subscale $\alpha = .85$), evidence of good convergent and divergent validity, and high correlations with each parent hope scale.

Attempting to replicate their initial factor structure using confirmatory factor analyses (CFA), Schrank and colleagues (2012) examined the IHS in a sample of 176 individuals with psychosis. They reported a four-factor IHS model that had "moderate fit", a conclusion drawn based on the report of a limited number of fit indices (i.e. CFI = 0.866, RMSEA = 0.079).

To improve it, Schrank and colleagues deleted one item due to conceptual overlap and content ambiguity (Item 22 "I intend to make the most of life") and two items were reassigned to different subscales (Item 9 "I believed that each day has potential" from *Trust and Confidence to Positive Future Orientation* and Item 15 "I feel my life has value and worth" from *Trust and Confidence to Social Relations and Personal Values*). After these data-based modifications, Schrank and colleagues reported a substantially improved model with acceptable fit but did not report the new fit statistics for their model.

Subsequently, two other studies have examined the structural validity of IHS and offered similar, but slightly different, interpretative findings. Sharpe, McElheran, and Whelton (2017) also evaluated the factor structure of the IHS using a community sample of 489 citizens from Canada. They reported the coefficient alpha for items in the one-factor model was 0.916 and McDonald's Omega was 0.928. Consistent with Ingram, Warlick, Ternes, and Krieshok (2018), the single factor solution demonstrated poor fit while the four-factor oblique structure substantially improved factor structure. However, Sharpe and colleagues found only marginal fit for the oblique structure. Because of this less than ideal fit, Sharpe and colleagues had to constrain the variance of the *Trust and Confidence* factor in their oblique model to allow for a comparison to a higher-order model, where they found similar fit across the model. A similarity in fit between the four-factor and higher-order models is also consistent with the work of Ingram and colleagues. Finally, they conducted a bi-factor analysis. Items on the *Trust and Confidence*, *Social Relations*, and *Positive Future Orientation* subscales frequently fell below recognized cut-off scores for a salient factor loading and the general factor of the higher-order model accounted for most of the variance (76.2%) in that model. Results from their bi-factor modelling were consistent with evidence of a strong general factor (and not subscales) as the best way to interpret the IHS. While a general factor explained most of the variances, Sharpe and colleagues drew attention to the *Lack of Perspective* subscale as a distinct construct, noting that it may be unique because of either the content it measures or the measurement-method confound contained within it (all items are negatively keyed).

Ingram et al. (2018) used four CFAs (i.e. single factor, four factor, higher-order model, and bi-factor) and a latent class analysis (LCA) to examine the feasibility of the IHS in 389 college students recruited from the U.S. They found that a single factor solution poorly fit the data but the four-factor and higher-order models had excellent fit, concluding that a multidimensional approach seemed a well-suited interpretive model for the IHS. The bi-factor model and LCA also supported the utility of domain scores as offering incremental utility beyond IHS total score with one exception. Based on decreased item loadings during the bi-factor analysis and the same pattern of elevations as the total score within the LCA across groups, Ingram and colleagues concluded that *Trust and Confidence* may function better as an abbreviated measure of the IHS than a unique aspect of hope.

Unfortunately, to our knowledge, there is no existing dominant theory of hope in China derived chiefly from the non-western beliefs of its populations. Instead, we propose that the four-factor model of hope found within the IHS will fit well to the observed data, demonstrating its structure as an applicable model of hope in the Chinese cultural context. The IHS's operational definition centers on a construct definition of hope that "reflects a reference to past experience, individual characteristics, spirituality and trust, as well as to motivational aspects of goal striving", a lack of "not dealing with situations" (Schrank et al., 2011, p. 422–423), a positive future orientation, and valuing social relationships.

The relational aspect of the IHS scale specifically taps into the Chinese cultural value on the interconnectivity between people. For the *social relations and personal values* sub-scale, item "I am needed by others" demonstrates a sense of the importance for one to be able to offer help to others. This is consistent with findings indicating that there is an intention for one to build relationship among Chinese students when they consider their helping behaviors (Li, 1997). As such, we explore the appropriateness of IHS as a multidimensional scale in the current study. Our hypothesized fit for the IHS's model of hope is based on several factors, including a paucity of extant theory on the nature of hope derived initially from Chinese populations as well as problems and inconsistencies with the translation of existing dispositional measures of hope. Additionally, these models are frequently criticized for lacking components of goal-setting and achievement that are important for non-western cultures (Du et al., 2015). Because the IHS includes a relational aspect of hope, it is inherently more attuned to this important aspect of the Chinese culture, as well as collectivistic cultures more broadly.

Therefore, study of the psychometric properties for the IHS is appropriate and warranted among the Chinese population. To accomplish this goal, this study investigated, translated and validated the IHS in a sample of students recruited from several universities across China. We chose the college student population for this study because they are at critical stages of making personal decisions and setting life goals that will affect not only their personal lives but also the future of the country. As an important index of psychological well-being, it is essential that we have a valid and accurate measure of hope for this population.

The current research study is guided by the following research questions: (1) among the possible factor structures (single-factor model, higher-order factor model, four-correlated factor model, and bi-factor model) of the IHS scale, does the bi-factor model provide the best fit for Chinese college students and (2) is there convergent and divergent validity for the IHS scale in the current Chinese college student sample, such that the IHSs would be positively correlated with the scales that measure life satisfaction, self-esteem, and self-efficacy, and negatively correlated with the scale that measures psychological symptoms. Specifically, we perform multiple item factor analyses (IFA), calculate descriptive statistics for the translated IHS, and provide evidence of concurrent validity through correlations with the psychological well-being variables.

Methods

Participants and procedures

Through professional connection with people who work at some institutions in China, we collected data from five local universities in these five regions (Shaanxi, Hubei, Inner Mongolia, Beijing, and Xinjiang Uygur). Each person submitted request to the department, then the college, in order to administer the survey to the students, online and in person. After obtaining permission from the department and the college, the persons then collected data through online distribution and through paper and pencil format.

A sample of 2,307 college student participants were recruited online from five different metropolitan areas in China. Of these, 704 valid surveys were retained after screening out the rest for failing to pass the two validity check items in the survey. The two validity check items are a repetition of two items from two scales used in the current study. Specifically,

the repetition occurred at a later point of the survey. If the participant's endorsement of these two items and their repetition was the same, then they passed the validity check. Another 503 valid surveys were collected through paper-pencil format from one large comprehensive university in Central China.

The authors applied an independent sample t-test to the 704 participants and the 503 participants recruited through paper-pencil format to compare the mean difference of all items. The results showed that 47 out of the 134 items were different in mean comparison. Therefore, we concluded that the paper-pencil format and the online format did not significantly differ between item means, and they could be utilized as a combined sample. In total, we have 1207 participants' valid data. Missing data were replaced with 9999 in order to perform statistical procedures in Mplus. Because of participants' low endorsement on category 6, we decided to combine categories 5 and 6 into 5 in order to conduct data analyses.

Among the 1,207 valid student participants, a majority were female (64.4% female; $n = 763$) and the ages of the sample ranged from 17 to 45 years ($M = 20.1$, $SD = 3.1$). Participants were more likely to be in their first 2 years of education and very few were in their fifth year of school. Specifically, 457 (37.9%) students identified as freshman, 314 (26%) sophomore, 260 (21.5%) were junior, 126 (10.4%) were senior, and the remaining 45 (3.7%) were in their 5th year. Most participants were single (71.1%), and some of them were in one or more relationships (28.2%). A majority did not work (86.9%) and the remainder had either a part-time job (10.6%) or a full-time (2.4%) job. It is important to note that in China, it is a normal practice that college student do not work. Their tuition and fee are usually covered by their parents. That is the reason why a large percentage of the current sample did not work. Most of the participants (91.8%) reported that they did not have any religious beliefs.

Measures and translation

The integrative hope scale

The Integrative hope scale (IHS; Schrank et al., 2011) is a 23-item self-report instrument with items rated on a six-point Likert-type scale (1 = *strongly disagree* to 6 = *strongly agree*). In addition to an overall score, there are four-factor scores, which are obtained by summing the individual items (*Trust and Confidence* is 9 items, *Social Relations* is 4 items, *Positive Future Orientation* is 4 items, and *Lack of Perspective* is 6 items). "The factor *trust and confidence* reflects a reference to past experience, individual characteristics, spirituality and trust, as well as to motivational aspects of goal striving. The factor *lack of perspective* reflects the absence of hope and its constituent aspects, i.e. not dealing with situations, as well as lack of inner strength, future orientation and support. *Positive future orientation* may be specifically related to goal setting and individual agency. *Social relations and personal value* may warrant relationship oriented work to foster hope." (Schrank et al., 2011, pp. 422–423, p. 426). The six items of the *Lack of Perspective* domain are all reverse scored. IHS total score ranges from 23 to 138 with higher scores representing higher hopefulness. The score ranges for the factors vary according to the number of items. Since we conducted item factor analysis, test information was utilized to generate reliability indication for each item. Based on the factor score range for each item, reliability of *trust and confidence* is .75-.90, *social relations and personal values* is .63-.82, *positive future orientation* is .60-.81, and *lack of perspective* is .79-.80.

The IHS was translated for this study. The translation and back-translation process (Brislin, 1980) was used to ensure the accuracy of the scales. Specifically, the English version was translated into Chinese by the first author, who is Chinese native and fluent in English. The resulting Chinese version was translated back into English by a staff member working at the BLINDED FOR REVIEW, who is fluent in Chinese and has English as the first language. Then, the two English versions were compared and discrepancies identified by a group of Chinese-English bilingual doctoral students and faculty, who later made needed minor changes with the wording of the Chinese version through consensus.

The satisfaction with life scale

The Satisfaction with Life scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985) is a five-item scale measuring global cognitive judgments about one's life satisfaction. Individuals indicate their agreement/disagreement with each item on a 7-point scale (1 = strongly disagree to 7 = strongly agree). A higher score indicates a higher level of life satisfaction. The internal consistency estimate of .87 was reported in the original study. The SWLS has been translated into Chinese and the internal reliability of it among a Chinese high school and college student sample was .90 (Wang, Hu, & Xu, 2017). The Chinese version of SWLS was used in the current study. Using test information, the internal reliability of the current sample ranges from .74 to .94.

The brief symptom inventory—18

(BSI-18; Derogatis, 1993). The BSI-18 is a brief version of the Symptoms Checklist 90-R, using a self-report method to measure psychological symptoms. There are 18 items that are rated on a 5-point scale (0 = *not at all* to 4 = *extremely*) to reflect the level of distress an individual has experienced each of the symptoms during the previous week. It measures three primary symptom dimensions (Depression, Anxiety, and Somatization) as well as global severity and is designed to provide an overview of a patient's symptoms and their intensity at a specific point in time. Dimension and global scores from the BSI-18 test correlate highly (i.e. >.90) with analogous scores from the SCL-90-R test based in a large community population. The BSI-18 has been translated into Chinese and has shown good internal consistency (.88) in a Chinese international student sample (Wang & Mallinckrodt, 2006). Likewise, the Kuder Richardson coefficient of reliability has also been good in Chinese community samples (General Psychological Distress = .91, Depression = .77, Anxiety = .83, and Somatization = .76; Wang, Kelly, Liu., Zhang, & Hao, 2013). Using test information, the internal reliability of the current sample ranges from .52 to .97.

The self-esteem scale

(TSES; Rosenberg, 1965). It is a 10-item scale that is answered on a four-point Likert-type scale format (1 = strongly disagree to 4 = strongly agree). The SES measures global self-worth by measuring both positive and negative feelings about the self. The scale is unidimensional and higher scores indicated a higher level of self-esteem. A higher score would indicate a higher level of self-esteem. The SES was translated into Chinese and demonstrated good internal consistency in a Taiwanese college student sample ($\alpha = .82$; Wang, Slaney, & Rice, 2007). The Chinese version of TSES was used in the current study. Using test information, the internal reliability of the current sample ranges from .80 to .91.

The self-efficacy scale

(SES; Schwarzer, 1993). It is a 10-item scale that is designed to assess optimistic self-beliefs to cope with a variety of difficult demands in life. All items are answered using a 4-point Likert scale format ranging from “not at all true” to “exactly true”. A higher score indicated a higher level of self-efficacy. Internal consistency ranges from .76 to .90, with the majority in the high .80s. The self-efficacy scale has been translated into Chinese and the internal consistency of the scale in a Chinese college student sample was .91. (Schwarzer, Bäßler, Kwiatek, Schröder, & Zhang, 1997). The Chinese version of SES was used in the current study. Using test information, the internal reliability of the current sample ranges from .80 to .95.

Data analysis

The purpose of the current data analysis process is to find the optimal factor structure of IHS scale in the Chinese college student sample. Item factor analyses were conducted using Mplus 7.4 (Murthen & Murthen, 2012) to test the fit of four separate measurement models (i.e. single-factor model, four-correlated factor model, a higher-order factor model, and a bi-factor model). The single factor model includes all items of the IHS loading on one latent construct. Next, the four-correlated factor model is the one recommended by Schrank and colleagues (2011). A model assessing a higher-order factor general hope along with the four secondary factors IHS factors was also tested. Finally, a bi-factor analysis was conducted. Bi-factor analysis evaluates a primary, a total scale score, as well as secondary domain traits, which function as residuals of the primary score (DeMars, 2013). Chi-square test of difference was used to compare model fit difference between three pairs of nested models (Cagli, 1984). Specifically, we tested the model comparison between the higher-order factor model and the single-factor model, between the four-correlated factor model and the higher-order factor model, and between the bi-factor model and the higher-order factor model.

Item responses (which are categorical and not normally distributed) did not meet the requirements of performing confirmatory factor analysis. A weighted least square parameter estimates use a diagonal weight matrix and a mean- and variance-adjusted χ^2 test (WLSMV) probit model and parameterization as Theta function was utilized during the analysis. Model fit was determined by examining the χ^2 (a non-significant p value is desirable for good fit and indicates the proposed model does not differ from the observed model structure), the Comparative Fit Index (CFI), the Tucker Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA). To indicate excellent fit, Hu and Bentler (1999) recommended an RMSEA of close to .06 or below as well as a CFI and TLI of .95 or greater. However, a “mediocre” model fit is also described as .08 for RMSEA (MacCallum, Browne, & Sugawara, 1996, p. 134). The parameters that are estimated are item factor loadings, item thresholds, factor covariance (if applicable), factor mean is fixed to 0 and factor variance is set to 1. The comparison between 2-PL model and 1-PL is conducted through “DIFFTEST” function. This process is to identify if a more parsimonious model (1-PL) with loadings held equal for all items would fit worse than the less parsimonious model (2-PL) with loadings being free to vary. Lastly, correlations between the IHS scale and other psychological well-being variables were conducted in order to provide convergent and divergent validity evidence for the IHS scale.

Results

For *trust and confidence*, a reduced model in which all loadings were constrained equal across items fit significantly worse, DIFFTEST (8) = 344.295, $p < .001$, indicating differences in item discrimination. For *lack of perspective*, a reduced model in which all loadings were constrained equal across items fit significantly worse, DIFFTEST (5) = 304.679, $p < .001$, indicating differences in item discrimination. For *positive future orientation*, a reduced model in which all loadings were constrained equal across items fit significantly worse, DIFFTEST (3) = 40.654, $p < .001$, indicating differences in item discrimination. For *social relations and personal values*, a reduced model in which all loadings were constrained equal across items fit significantly worse, DIFFTEST (3) = 60.409, $p < .001$, indicating differences in item discrimination. The results indicate the importance of keeping loadings free to vary among all items of each subscale.

Correlations between measures are provided in [Table 1](#). As expected, the IHS had large positive correlations with self-esteem, self-efficacy, and life satisfaction and moderate negative correlation with psychological symptoms. Correlations between the four hope factors and other measures are provided in [Table 1](#). As expected, all four hope factors have medium to high positive effect sizes with self-esteem, self-efficacy, and life satisfaction as well as medium to high negative effect sizes with psychological symptoms, which demonstrate its convergent and divergent validity: SWLS ($r = .64 p < .001$), SES ($r = .66 p < .001$), TSES ($r = .70 p < .001$), and BSI-18 ($r = -.45 p < .001$).

Since we conducted item factor analysis, test information was utilized to generate reliability indication for each item. Based on the factor score range for each item, reliability of *trust and confidence* is .75-.90, *social relations and personal values* is .63-.82, *positive future orientation* is .60-.81, and *lack of perspective* is .79-.80. These ranges are calculated using the formula Reliability = Test information/(Test information + 1), where IRT reliability is a ratio of the variance explained in the response patterns to the uncertainty (or error) in the response patterns (Dapaoli, Tiemensma, & Felt, [2018](#)). Lance, Butts, and Michels ([2006](#)) had indicated that a reliability of .80 would be sufficient for a reliable measurement, and the current hope measure meets this criterion at certain traits, albeit not for all traits. Test information is demonstrated in [Figure 1](#).

Table 1. Correlation among all variables.

	IHS	TC	LP	PFO	SRPV	SWLS	SES	TSES	BSI-18
IHS	–								
TC	–	–							
LP	–	.33***	–						
PFO	–	.95***	.30***	–					
SRPV	–	.88***	.38***	.82***	–				
SWLS	.64***	.66***	.31***	.47***	.54***	–			
SES	.66***	.70***	.23***	.56***	.50***	.51***	–		
TSES	.70***	.63***	.53***	.56***	.64***	.46***	.51***	–	
BSI-18	-.45***	-.37***	-.53***	-.30***	-.38***	-.42***	-.24***	-.46***	–

IHS = Integrative Hope Scale. SWLS = Satisfaction with Life Scale. SES = Self-Efficacy Scale. TSES = The Self-Esteem Scale. BSI-18 = Brief Symptom Inventory-18

TC = Trust and Confidence, LP = Lack of Perspective, PFO = Positive Future Orientation, and RPV = Relationships and Personal Value. SWLS = Satisfaction with Life Scale. SES = Self-Efficacy Scale. TSES = The Self-Esteem Scale. BSI-18 = Brief Symptom Inventory-18

Correlations in the table were obtained through Mplus using latent variables factor scores. $N = 1207$, *** $p < .001$

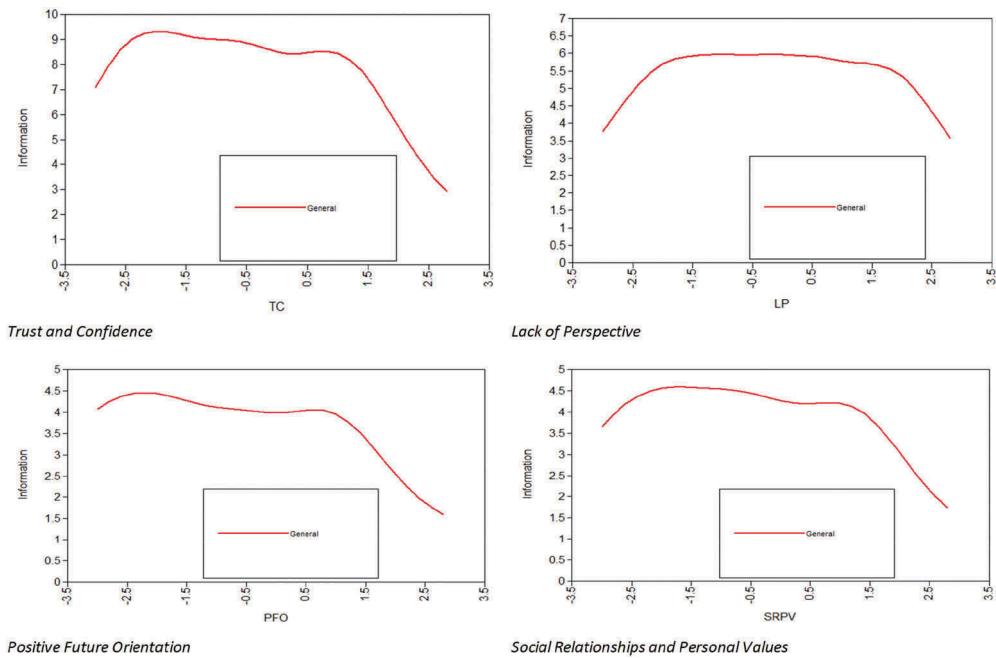


Figure 1. Test information Curve for TC = Trust and Confidence, LP = Lack of Perspective, PFO = Positive Future Orientation, and RPV = Relationships and Personal Value.

Translated items are shown in [Table 2](#) and item-level loadings of the higher-order factor model and the bi-factor model are presented in [Figure 2](#). Fit indices for the single factor model indicated poor fit that was clearly uninterpretable, $\chi^2 (230, n = 1203) = 6634.79$; CFI = .71, TLI = .68, RMSEA = .15 (.15-.16). In the single factor model, item 2 and item 6 (which are both reversed coded items) had loadings (.05 and 0.29) that fell below thresholds for what is considered acceptable. Specifically, for a sample of 350, the acceptable loading is .30 (Hair, Tatham, Anderson, & Black, 1998, p. 112). However, each item was also significant and so we opted not to remove them from the model. Fit for the four-correlated-factor, $\chi^2 (224, n = 1203) = 2281.21$; CFI = .91, TLI = .90, RMSEA = .09 (.08-.09), was marginally acceptable. Similarly, fit for the higher-order factor model fell within the acceptable range, $\chi^2 (226, n = 1203) = 2278.54$; CFI = .91, TLI = .90, RMSEA = .09 (.08-.09). Across both the correlated factor and higher-order models, items 2 and 6 continued to demonstrate loadings that fell significantly below traditional interpretive guidelines. The average loadings for the other items in the four-factor and higher-order models were both .67. Of the models tested, the bi-factor model had the best global fit $\chi^2 (207, n = 1203) = 1915.38$; CFI = .92, TLI = .91, RMSEA = .083 (.079-.086). Items for the general factor ranged from -.02 to .85 while the *Trust and Confidence* and *Positive Future Orientation* domains demonstrated substantially lower loadings: *Trust and Confidence* (-.23 to .45), *Positive Future Orientation* (-.15 to .62), and *Social Relations* (.08 to .41). Loading patterns for the *Lack of Perspective* domain are distinct from the other three domains, with loadings range from .42 to .73.

Table 2. Item specific information.

Item	Content	Translated Item	IHS Correlation					
			M	SD	Total	TC	LP	PFO
1	I have deep inner strength.	我有深深的内在力量。	3.37	.96	.49	.60		
5	Even when others get discouraged, I know I can find a way to solve the problem.	即使别人感觉气馁,我知道我可以找到解决问题的方法。	3.60	.91	.60	.65		
7	I have a sense of direction.	我有方向感。	3.27	1.13	.46	.49		
9	I believe that each day has potential.	我相信每一天都有潜力。	3.78	.96	.59	.62		
12	I can see possibilities in the midst of difficulties.	我在困难当中看到可能性。	3.68	.90	.62	.64		
15	I feel my life has value and worth.	我覺得我的生命有价值。	3.94	.90	.65	.56		
18	I've been pretty successful in life.	我的生活已经很成功了。	2.04	1.05	.27	.35		
21	My past experiences have prepared me well for my future.	我过去的经历使我对未来做好准备。	3.40	1.10	.58	.61		
23	I have a faith that gives me comfort.	我有能力给我带来安慰的信仰。	3.21	1.26	.47	.58		
2	It is hard for me to keep up my interest in activities I used to enjoy.	我很难对我过去很喜欢的活动保持兴趣。	3.71	1.24	.09	.32		
6	It seems as though all my support has been withdrawn.	感觉好像给予我的支持都被收回了。	4.06	1.21	.28	.52		
10	I am bothered by troubles that prevent my planning for the future.	我被困难所困扰,使我无法计划未来的事情。	3.76	1.30	.40	.57		
13	I am hopeless about some parts of my life.	我对我的生活的一些部分感到绝望。	3.49	1.37	.38	.54		
16	I feel trapped, pinned down.	我觉得被困住和限制住了。	3.69	1.32	.44	.62		
19	I find myself becoming uninvolved with most things in life.	我发现我自己和生活中大多数事情变得没有参与感。	3.68	1.26	.40	.52		
3	There are things I want to do in life.	生活中有我想做的事情。	4.11	.74	.48	.50		
8	I look forward to doing things I enjoy.	我期待做我喜欢做的事情。	4.23	.76	.42	.44		
17	I make plans for my own future.	我对自己的未来有计划。	3.36	1.03	.51	.42		
22	I intend to make the most of life.	我打算充分利用我的生活。	.80	.94	.58	.54		
4	I feel loved.	我感到被爱。	3.88	.96	.52	.55		
11	I have someone who shares my concerns.	我有帮我分担我的忧虑的人。	3.46	1.18	.47	.48		
14	I am needed by others.	我被他人需要。	3.68	.93	.53	.56		
20	I am valued for what I am.	因为我是我,所以被珍视。	3.35	1.15	.49	.42		

TC = Trust and Confidence, LP = Lack of Perspective, PFO = Positive Future Orientation, and RPV = Relationships and Personal Value. Item factor correlations in the table were obtained through SPSS using observed variables.

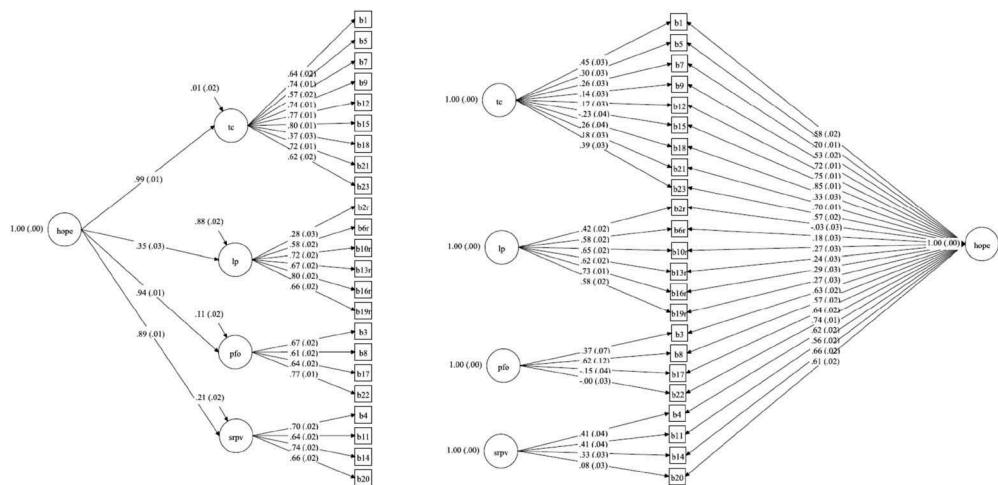


Figure 2. Higher-order factor model vs. bi-factor model.

Number in the parentheses are standard errors estimated parameters. The number in parentheses is standard error of the estimated parameters. TC = Trust and Confidence, LP = Lack of Perspective, PFO = Positive Future Orientation, and RPV = Relationships and Personal Value.

Because of the nested nature between all four models, we tested the model comparison between the higher-order factor model and the single-factor model, between the four-correlated factor model and the higher-order factor model, and between the bi-factor model and the higher-order factor model. Table 3 shows the specific model fit information. Between the higher-order factor model and the single-factor model, the single-factor model fit significantly worse than the higher-order factor model, $\chi^2 (4) = 1186.619$, $p < .001$, indicating the higher-order factor model more accurately capturing the factor structure than the single-factor model. Between the four-correlated factor model and the higher-order factor model, the higher-order factor model fits significantly worse than the four-correlated factor model, $\chi^2 (2) = 22.853$, $p < .001$, indicating the four-correlated factor model more accurately capturing the factor structure than the higher-order factor model. Between the bi-factor model and the higher-order factor model, the higher-order factor model fit significantly worse than the bi-factor model, $\chi^2 (19) = 371.852$, $p < .001$, indicating the bi-factor model more accurately capturing the factor structure than the higher-order factor model. Because the four-correlated factor model is not nested in the bi-factor model, we cannot test the model comparison between these two models. However, the RMSEA

Table 3. Summary results of the four models.

Summary results of the four models							
Model	χ^2	p value	df	Number of parameters	RMSEA	RMSEA 90% CI	CFI/TLI
Single factor model	6634.578	<.001	230	121	.152	.149-.155	.714/.685
Higher-order factor model	2307.783	<.001	226	125	.087	.084-.091	.907/.896
four-correlated factor model	2312.769	<.001	224	127	.088	.085-.091	.907/.895
Bi-factor model	1915.377	<.001	207	144	.083	.079-.086	.924/.907

RMSEA = Root Mean Square Error of Approximation, CFI/TLI = comparative fit index/Tucker-Lewis index

Table 4. Model comparisons between the four models.

Model	Change of χ^2	p value	Change of df	Change of Number of parameters
Higher-order factor model vs. Single factor model	1186.619	<.001	4	4
4 correlated factor model vs. Higher-order factor model	22.853	<.001	2	2
Bi-factor model vs. Higher-order factor model	371.852	<.001	19	19

is still an index of absolute fit frequently used in structural equation modeling (Hermida, Luchman, Nicolaides, & Wilcox, 2015). Table 4 shows all the model comparison summary.

Discussion

Most theories of hope have failed to include important aspects that are salient in non-Western cultures by viewing hope as a singularly cognitive construct (e.g. goal planning/attainment). Using multidimensional structure and including relational components, the Integrative Hope Scale (IHS) provided an opportunity for it to be of use in non-Western cultures. Accordingly, this study expands available information about the structure and function of hope and provides the psychometric validation of the IHS through four different item-factor analytic models in a Chinese college student population. Findings from this study support the IHS as an acceptable instrument for assessing hope in the Chinese culture, though the psychometric evidence is not ideal for the proposed factor models. The multi-dimensionality of hope and the concurrent validity revealed from this study support the following two distinct conclusions: (1) the translated form of the IHS is a validated measure of hope which is applicable to the Chinese samples, specifically college students, and (2) interpretive use of the IHS will benefit from use of the bi-factor model in this culture.

By translating and validating the IHS in a sample of college students drawn from several provinces in China, this study provides researchers who are interested in assessing hope in non-Western cultures an instrument that incorporates a multi-dimensional framework and an important interpersonal relationship dimension (e.g. Du & King, 2013; Du et al., 2015; Redlich-Amirav et al., 2018). Moreover, by using the same measurement models identified in previous studies (Ingram et al., 2018; Sharpe et al., 2017), this study provides the opportunity to compare interpretive structures of the IHS across cultures. In addition to an interpretable scale structure, the IHS performed as expected with extra-test measures of concurrent validity in a manner consistent with other studies. For instance, Sharpe et al. (2017) also found that there was moderate to strong correlations between the IHS and both hedonic and eudaimonic well-being.

The four-factor oblique, higher-order factor, and the bi-factor model have relatively similar global fit and the fit for each was substantially improved from the single-factor model. The improvement in fit from the four-factor oblique and higher-order factor models to the bi-factor model are important to note and include a pattern of changes across item loadings consistent with aspects of previous research (Ingram et al., 2018): *Trust and Confidence* and the *Positive Future Orientation* both have diminished loadings in the bi-factor model. Changes in fit resulting from the inclusion of a general factor, as is

done during bi-factor analysis, also has implications for instrument interpretation. In general, with decreased loadings on domain scores, an interpretation which follows a bi-factor model suggests that use of the total score is appropriate and reflective of a single latent construct. Given the improved fit noted by that model, this study suggests that doing so is appropriate during the use of the Chinese IHS. It should be noted that there is mixed evidence for the bi-factor model being the preferred interpretive structure (see Ingram et al., 2018; Sharpe et al., 2017). Differential preference for a bi-factor solution may reflect some differences in cultural interpretations of the IHS items.

Additionally, the negatively worded items (i.e. those requiring reverse coding) appeared to have significantly lower item loadings than positively worded items. They also differed in how the bi-factor model impacted the *Lack of Perspective* domain. Sharpe et al. (2017) noticed a similar pattern of item performance for the *Lack of Perspective* domain, which is composed of entirely negatively worded items. In their analysis, only the *Lack of Perspective* domain maintained independent interpretive significance in the bi-factor model. Consistent with the conclusions drawn by Sharpe and colleagues, it is possible that this is due to measure effects because of item-wording. However, these patterns for the *Lack of Perspective* may also reflect a distinct interpretive construct (Ingram et al., 2018; Sharpe et al., 2017) in that increased disinterest in things previous enjoyed does not indicate a loss of hope per se. It would be useful as research continues to evolve on multi-dimensional hope measures to evaluate if this is a measure effect or if it exists because of the interpretive uniqueness of the content being measured. This might be answered by including positively worded items into domains assessing *Lack of Perspective*.

In terms of time orientation, a past-focused orientation is more prominent in Chinese and non-Western cultures, while a future orientation is more salient in Western cultures (Kaynak, Kara, & Apil, 2011; Rojas-Mendez & Davies, 2005). The past-focused orientation common to Chinese cultures is one in which that the past is considered important because growth and learning occur through a focus on the past (Kaynak et al., 2011). Since a future orientation is less of a focus in Chinese culture, it is possible that people do not conceptualize hope through this future time orientation lens. Thus, cultural differences might explain the lower loadings of items in this “positive future orientation” factor.

Almost 20 years have passed since researchers have argued for a need to study hope from a systematic perspective (Zhang & Zheng, 2002) to gain a clear understanding of the concept of hope in the Chinese cultural context. The recommendations have been repeatedly made that future studies focus on understanding hope from a culturally appropriate perspective. While some studies pass the threshold of culturally competent studies in the sense of studying hope from a bottom-up approach (such as through scale translation as done here), there remains a clear need to continue work on developing a model of hope that is derived from the Chinese population. Until such a point, the HIS offers a useful tool for the assessment of hope. The IHS emphasizes culturally important components (i.e. relational components) and counteracts the homogeneous influence of cognitive hope models. Perhaps the next step is to not only include this relationship aspect but also to explore inclusion of a time orientation component which is also unique to Chinese (Kaynak et al., 2011; Rojas-Mendez & Davies, 2005) when developing a culturally appropriate measure of hope.

In terms of the concurrent validity, results have shown high direct relation between the IHS and SWLS, SES, and TSES, while high indirect relation between the IHS and the BSI-18. It indicates that the construct of hope, in this case, measured by the IHS is highly positively associated with a number of psychological well-being variables (satisfaction with life, self-esteem, and self-efficacy), while in the meantime, strongly and negatively associated with the psychological symptoms measure. It is clear evidence of concurrent validity for the IHS scale as a measure of hope, which is also a positive indicate of psychological well-being.

The observed fit of a bi-factor IHS model in Chinese students suggests indicates two things critical to clinical use. First, there is an underlying general sense of hope. Second, simply considering hope as a single factor does not sufficiently explain the entirety of its meaning or impact on Chinese individuals. In other words, Chinese students tend to experience life outcomes due to both their general hopefulness and through unique components which make up this approach to life. This means that clinicians conceptualizing hope in Chinese individuals should consider not only their overall sense of the future but also their unique aspects related to social relationships (Social Relationships and Personal Value scale), hopelessness (Lack of Perspective subscale), outcome expectations about the future (Positive Future Orientation), and self-esteem and – efficacy (Trust and Confidence). Accordingly, each of these subscale domains offer unique targets for clinician intervention. For instance, social skills training may be better suited to some individuals whereas cognitive restructuring would offer more benefit to those with deficits in perspective-taking.

Limitations and future directions

While evidence suggests that the IHS is generally a valid measure of hope among Chinese college students, it is important that we acknowledge some measurement incompatibility that we believe is shaped by the larger culture. Specifically, we have found that the *Lack of Perspective* factor and the *Positive Future Orientation* factor did not contribute much as a secondary factor to hope as other domains. Given the distinctive patterns observed in the *Lack of Perspective* domain items (e.g. items demonstrate good loadings in some instances but perform distinctly during the bi-factor analysis) and the uniqueness of time perspectives in non-Western cultures, it may be valuable for future research to gather qualitative data on the meaning of hope among the Chinese population. Additionally, although we made effort in sampling as diverse as possible of student populations across China, we were only able to include participants from five of the 31 Chinese provinces. Likewise, it should be noted that we include a sample composed only of students. However, given the size of the sample, the inclusion of multiple regional provinces, and the consistency of results with those seen in other psychometric studies of the IHS (Ingram et al., 2018; Sharpe et al., 2017), we believe that the translated IHS is a valid measure of hope in the Chinese culture among college students.

Implications and conclusions

The usefulness of the IHS is apparent in the Chinese population as it provides not only a means through which to approximate other theories of hope but also a measure of previously excluded, culturally important, construct. Accordingly, the IHS also has the potential for integration into current counseling practice. Those already using

a cognitively focused measure of hope (e.g. Synder's Dispositional Hope Scale) may utilize the HIS as its Trust and Confidence domain is an effective proxy (see Ingram et al., 2018). The IHS also includes salient components for non-Western cultures, enabling culturally sensitive needs to be better addressed than in instruments excluding those components (e.g. Du & King, 2013). Consequently, we believe that it is important to treat IHS-defined hope as a bi-factor concept in which both its general and domain-specific factors are considered when training counselors working with Chinese students. Researchers and practitioners interested in hope within Chinese populations, and non-Western cultures with shared collectivistic values, are likely to find substantive value in the IHS.

Disclosure statement

No potential conflict of interest was reported by the authors.

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