Incremental validity of the comprehensive inventory of thriving in predicting self-reporting mental and physical health among community populations

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Abstract

This study examined psychometric properties and 1-year predictive validity of the Comprehensive Inventory of Thriving in China. In total, 556 participants in Chinese communities completed the Comprehensive Inventory of Thriving for confirmatory factor analysis. The other 533 individuals further completed the Flourishing Scale and Satisfaction With Life Scale and reported their physical and mental health 1 year later. The 18-factor correlated model showed a better goodness-of-fit than the seven-factor second-order related model. Thriving had higher correlation coefficients with depression, anxiety, stress, and doctor visits. The Comprehensive Inventory of Thriving is an efficient screening tool to differentiate the risk group from other groups and can predict health outcomes among community populations for active interventions.

Introduction

Previous studies in medicine health field often focused on ill-being (Duan et al., 2016; Su et al., 2014). The importance of wellbeing has recently been increasingly emphasized. Various aspects of wellbeing are associated with a complete understanding of mental and physical health (Shaffer-Hudkins et al., 2010). The positive wellbeing of individuals contributes to optimal human functioning (Pressman and Cohen, 2005), which, in turn, improves health and increases longevity. Sufficient evidence showed that wellbeing is a significant component of health and can influence the physical and mental health of individuals directly and indirectly (Su et al., 2014); this finding makes wellbeing an intriguing research area.

Research on wellbeing falls into two general traditions, namely, hedonia and eudaimonia. Hedonic wellbeing, frequently referred to as subjective wellbeing (SWB), emphasizes positive feelings and the extent to which one feels

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satisfied with his or her life (Richard and Diener, 2009). The Satisfaction With Life Scale (SWLS) is proposed as a widely used instrument of SWB (Duan and Xie, 2016). Whereas, the SWLS is unidimensional and focuses on self-consciousness and subjective feelings that are typically individualistic cultures (Ho et al., 2014; Tang et al., 2016). To enrich the existing measures of wellbeing, the Flourishing Scale (FS) is designed to measure eudaimonic wellbeing (i.e. psychological wellbeing (PWB)) and describe the functioning and potential of individuals (Tang et al., 2016). However, this scale merely presents a single PWB score regarding the fulfillment of human potential emphasized in traditional non-western context (Diener et al., 2010; Duan and Xie, 2016).

In recent years, the framework of hedonia versus eudaimonia triggered considerable debate. A number of empirical findings indicated high correlation coefficients ($r = .76$–$.96$) between hedonic wellbeing and eudaimonic wellbeing (e.g. Disabato et al., 2016; Fredrickson et al., 2013).

Feeney and Collins (2015) conceptualized a comprehensive construct of wellbeing as "thriving," which connotes growth, development, and prosperity. Based on prominent wellbeing theories, such as SWB (Diener, 1994), PWB (Ryff and Keyes, 1995), the positive emotion, engagement, relationship, meaning, and accomplishment (PERMA) model (Seligman, 2011), and self-determination theory (Ryan and Deci, 2000), Su et al. (2014) identified wellbeing as a combination of seven key dimensions, namely, "SWB, supportive and enriching relationships, interest and engagement, meaning and purpose, a sense of mastery and accomplishment, feelings of control and autonomy, and optimism" (p. 252). They developed a 54-item Comprehensive Inventory of Thriving (CIT) to measure multi-dimensional wellbeing (Su et al., 2014). The CIT assesses 18 facets of positive functioning and human flourishing; three (i.e. loneliness, lack of control, and negative feelings) of these facets are negatively phrased and the rest is positively phrased (Su et al., 2014). Only a few

studies presented evidence for limited psychometric characteristics of the CIT.

The CIT is expected to give users integrated feedback regarding one' overall functioning, flourishing and predict health outcomes. Su et al. (2014) suggested that the CIT can serve as a screening tool to distinguish the strengths of individuals from potential risks. However, only a few studies met these expectations.

Thus, this study evaluated psychometric properties and predictive validity of the CIT among 1089 community participants in China. Additional psychometric evaluations of the CIT contribute to a well-established theoretical system and facilitate a comprehensive reflection of human wellbeing.

Method

Participants and procedures

A total of 1089 community participants were recruited to participate in the "Health & Wellbeing Investigation" from March 2015 to June 2016. Advertisements of participant recruitment were distributed by nonprofit organizations in the community. Interested participants can contact the first author of this article through an email or social software (i.e. *WeChat*) indicated in the advertisement. A brief interview was conducted by the authors to exclude participants aged 17 years old and below and/or with physical and mental illnesses. A URL was provided to qualified individuals for answering few demographic questions and the CIT. The participants were asked to click the "Agree" button and provide a written informed consent before completing the questionnaire. At the end of the questionnaire, participants were requested to indicate their willingness to fill out another questionnaire a year later to report their physical and mental health in the past year. Clicking "Yes" required them to further complete another two measurements of wellbeing (i.e. PWB and SWB). One year later, participants who clicked "Yes" were invited to complete inventories to measure

physical and mental health. Thus, two independent samples were formed.

The first community sample ($N_1 = 556$; 393 females and 163 males) comprises participants who completed the CIT and those who aim to evaluate the factor structure of the CIT among Mainland Chinese population. Mean age was 39.56 years ($SD = 7.29$, range = 21–46). Among them, 16 individuals completed 6 years of primary education; 287 completed 9 years of education (i.e. junior high school); 214 completed 12 years of education (i.e. high school); and 39 have bachelor's degrees. Most of them were married ($n = 489$) and 31 individuals were single, 24 were in a relationship, and 12 were divorced or widowed. The second community sample ($N_2 = 533$) comprises participants who agreed to fill out another questionnaire a year later and those who aim to further test its incremental validity through comparison with other widely used wellbeing assessments, such as SWLS (i.e. SWB) and FS (i.e. PWB), in predicting self-reported mental and physical health. In this sample, 267 females and 266 males have a mean age of 38.71 years ($SD = 6.29$). The Institutional Review Board of the Department of Sociology of Wuhan University approved this study.

Measurements

CIT. The CIT measures self-reported comprehensive wellbeing using 54 items. The CIT contains 18 facets or subscales (three items each) of positive functioning, including support, community, respect, self-worth, trust, loneliness, belonging, engagement, skills, learning, accomplishment, self-efficacy, control, meaning and purpose, optimism, life satisfaction, positive feelings, and negative feelings (Su et al., 2014). Control and negative feelings were reverse coded. Participants were required to respond to each item from 1 (strongly disagree) to 5 (strongly agree). The authors of CIT indicated that the CIT shows excellent psychometric properties, such as high internal consistency coefficient, clear and solid factor structure, and

good convergent validity and discriminant validity (Su et al., 2014). The Chinese version of CIT was translated by the developers (Su et al., 2014).

FS. PWB was measured by an eight-item FS (Diener et al., 2010). The FS asked participants to rate each item related to human positive functioning on a 7-point Likert scale (1 = strongly disagree and 7 = strongly agree). Some studies found sound psychometric characteristic of PWB in different countries (e.g. Ramírez-Maestre et al., 2017; Tong and Wang, 2017). The Chinese version of FS was validated in both community and adolescent (Duan and Xie, 2016; Tang et al., 2016) populations.

SWLS. The SWLS is a widely used five-item self-reported scale that measures the SWB of individuals (Diener et al., 1985). A 7-point Likert scale was used (i.e. 1 = strongly disagree and 7 = strongly agree). Many studies found stable psychometric properties in various contexts (Pavot and Diener, 1993).

Mental health. Mental health was evaluated on a 21-item Depression Anxiety Stress Scale (DASS), which contained three subscales (seven items each) to assess depression, anxiety, and stress over the past week (Lovibond and Lovibond, 1995). A 4-point Likert scale was used to enable participants to rate their mental status from 0 (did not apply to me at all) to 3 (applied to me very much, or most of the time). Wang et al. (2016) conducted a cross-cultural study to demonstrate the good internal consistency and factor structure of the Chinese version of DASS.

Physical health. To assess physical health, participants were asked to answer a single-item question: "Number of times seeing a doctor in the past year _____." This question was used in the work of Su et al. (2014) to reflect the status of physical health. In the current study, 341 participants did not see a doctor in the last year. Doctor visits ranged from 0 to 7 with an average time of 0.707 ($SD = 1.165$).

Data analysis plan

This study has a twofold objective. First, we validated the factor structure of the CIT in China and examined the incremental validity, discriminant validity, and predict ability. Confirmatory factor analysis (CFA) was employed on the first community sample. Comparative fit index (CFI) > .90, standardized root mean square residual (SRMR) < .08, and root mean square error of approximation (RMSEA) < .05 were used as criteria to evaluate model fit (Hu and Bentler, 1998). As described in the introduction section, the CIT contained 18 subscales attributed to seven categories (i.e. relationship, engagement, mastery, autonomy, meaning, optimism, and SWB). Two comparable models were constructed, which included an 18-factor correlated model and a 7-factor second-order correlated model. We expected the first model to show goodness of fit. The internal correlations between these subscales and their internal consistency coefficients were then calculated. Positive correlations and high internal consistency coefficients were expected. Third, the second community sample was used to examine incremental validity and discriminant validity. Pearson's correlations between CIT and other measures were conducted. The CIT, FS, and SWLS were expected to have positive associations, whereas negative associations were expected between CIT and depression, anxiety, stress, and doctor visits. Fourth, according to the screening criteria of the CIT proposed by Su et al. (2014) and demonstrated by Duan et al. (2016), the total score of CIT above the 75th percentile signifies individuals as thriving, whereas score below the 25th percentile indicates that individuals need improvement. Thus, the second community sample was divided into a strength group (i.e. thriving individuals), a risk group (i.e. individuals who need improvement), and a common group. Group differences of the mental health and physical health were tested. The strength group was expected to possess superior mental and physical health. Finally, the incrementally predictive ability of the CIT on mental and physical health

compared with traditional subjective (i.e. SWLS) and psychological (i.e. FS) wellbeing assessments was examined. Hierarchical multiple regressions were constructed among three different groups. The total score of DASS was calculated to reflect mental health and scores of doctor visits were used to reflect physical health. Both scores were set as dependent variables in the three independent sets of regressions. The SWLS scores were entered in the first step, FS scores in the second step, and CIT scores in the final step. Significant changes of R^2 were expected. Additionally, the analysis of incremental validity of the CIT beyond Life Satisfaction and Flourishing on the entire sample was performed. It examined if the CIT was useful across the entire Chinese sample and what the incremental validity is as a whole. Data were analyzed using JASP Version 0.8.1.2 (JASP Team, 2017).

Result

CFA

CFA used Mean-adjusted Maximum Likelihood (MLM) parameter estimates with standard errors to evaluate the comparable models. Two models were constructed. Results indicate that the 18-factor correlated model (χ^2/df = 8.586, CFI = .902, SRMR = .046, RMSEA = .040, 90% CI = (.037–.042)) shows a better goodness of fit than the seven-factor, second-order–related model (χ^2/df = 8.586, CFI = .855, SRMR = .057, RMSEA = .046, 90% CI = (.044–.049)). The standardized factor loadings are all significant at .001 levels, which ranged from .414 to .792.

Internal correlations and internal consistency coefficients

The results are summarized in Table S1 in Supplementary Material. As expected, the 18 subscales of CIT have positive correlations that ranged from .151 to .737 ($p < .001$). After a careful inspection, the control (autonomy) subscale shows low to modest but significant associations with other subscales ($r = .151$–.469,

Table 1. Correlations between thriving and other criteria variables in the second community sample (*N* = 533).

	1	2	3	4	5	6	7
1 Life satisfaction	–						
2 Flourishing	0.544*						
3 Thriving	0.568*	0.677*	–				
4 Depression	−0.343*	−0.448*	−0.460*	–			
5 Anxiety	−0.271*	−0.289*	−0.338*	0.788*	–		
6 Stress	−0.325*	−0.335*	−0.354*	0.795*	0.827*	–	
7 Doctor visits	−0.373*	−0.485*	−0.634*	0.706*	0.536*	0.501*	–
McDonald's ω	.933	.844	.880	.879	.832	.948	–

Flourishing emphasizes the fulfillment of human potential and supportive relationships and was measured by the Flourishing Scale (FS) (Diener et al., 2010; Duan and Xie, 2016; Tang et al., 2016). Thriving connotes growth, development, and prosperity and was measured by the Comprehensive Inventory of Thriving (CIT) (Su et al., 2014).
*p < .001.

p < .001). McDonald's ω internal consistency coefficients of all subscales are higher than .606.

Correlations between the CIT and criteria variables

Thriving is expected to be positively related to co-current life satisfaction (r = .568, p < .001) and flourishing (r = .677, p < .001), but negatively related to depression (r = −.460, p < .001), anxiety (r = −.338, p < .001), stress (r = −.354, p < .001), and doctor visits (r = −.634, p < .001) in the last year (see Table 1). Among the three wellbeing indicators (i.e. life satisfaction, flourishing, and thriving), thriving has the highest correlation coefficients with mental and physical health (r = −.338 to .634, p < .001).

Differences among strength group, common group, and risk group

ANOVAs were performed to reveal the differences among the three groups. Table 2 shows the mean and standard deviation of each group on all variables. The results indicate significant group differences (F > 15.930, p < .001). Specifically, participants in the strength group have high scores on life satisfaction (mean = 5.029, *SD* = 0.882), flourishing (mean = 6.136, *SD* = 0.672), and

thriving (mean = 3.807, *SD* = 0.263), but low scores on depression (mean = 0.430, *SD* = 0.548), anxiety (mean = 0.686, *SD* = 0.625), stress (mean = 0.765, *SD* = 0.678), and doctor visits (mean = 0.208, *SD* = 0.623). By contrast, participants in the risk group generally have low scores on life satisfaction (mean = 3.561, *SD* = 1.006), flourishing (mean = 4.305, *SD* = 1.022), and thriving (mean = 2.823, *SD* = 0.363), but high scores on depression (mean = 1.127, *SD* = 0.730), anxiety (mean = 1.110, *SD* = 0.726), stress (mean = 1.250, *SD* = 0.685), and doctor visits (mean = 1.891, *SD* = 1.459).

Hierarchical regressions analyses

Hierarchical regressions were performed using longitudinal data to test the incrementally predictive ability of thriving. As described in the data analysis plan section, a total of six regressions were constructed in different groups (see Table S2 in Supplementary Material). In the risk group, although life satisfaction and flourishing can significantly predict mental and physical health outcomes in Steps 1 and 2, inserting thriving in Step 3 changed the results. In summary, results indicate that past thriving can independently and significantly predict mental (t = −16.702, p < .001) and physical (t = −12.607, p < .001) health after 1 year among participants in the risk group. This finding additionally contributed 17.2 percent and

Table 2. Correlations between thriving and other criteria variables in the second community sample (*N* = 533).

	Strength group (*n* = 154)		Common group (*n* = 251)		Risk group (*n* = 128)		*F*	η^2
	Mean	SD	Mean	SD	Mean	SD		
1 Life satisfaction	5.029	0.882	4.254	0.886	3.561	1.006	90.800*	0.255
2 Flourishing	6.136	0.672	5.201	0.744	4.305	1.022	183.500*	0.409
3 Thriving	3.807	0.263	3.333	0.138	2.823	0.363	559.200*	0.678
4 Depression	0.430	0.548	0.664	0.625	1.127	0.730	43.700*	0.142
5 Anxiety	0.686	0.625	0.830	0.594	1.110	0.726	15.930*	0.057
6 Stress	0.765	0.678	0.996	0.635	1.250	0.685	18.870*	0.066
7 Doctor visits	0.208	0.623	0.410	0.782	1.891	1.459	131.700*	0.332

Flourishing emphasizes the fulfillment of human potential and supportive relationships and was measured by the Flourishing Scale (FS) (Diener et al., 2010; Duan and Xie, 2016; Tang et al., 2016). Thriving connotes growth, development, and prosperity and was measured by the Comprehensive Inventory of Thriving (CIT) (Su et al., 2014).
*p < .001.

48.3 percent explanations, respectively. However, in the strength group and common group, flourishing was a better predictor in explaining mental (t > –2.738, p < .01) and physical (t > –2.300, p < .05) health compared with thriving. Similarly, past thriving can independently and significantly predict mental (t = –4.28, p < .001), which added 2.80 percent explanations (F = 18.34, p < .001), and physical (t = –11.77, p < .001) health, which added 15.50 percent explanations (F = 138.42, p < .001) after 1 year in the entire sample.

Discussion

This study examines psychometric properties and predictive validity of the CIT in China. In the first community sample, the CFA validated the factor structure of the inventory. The 18-factor correlated model presented a higher fitting degree than the seven-factor second-order correlated model. The internal correlations among 18 subscales were positively calculated and McDonald's ω presented high internal consistency coefficients. In the second community sample, the correlations among criteria variables demonstrated that thriving exhibits strong incremental and discriminant validities with higher correlation coefficients with depression, anxiety, stress, and doctor visits than life satisfaction and flourishing. The report of Su et al. (2014)

was validated after screening mental and physical health using the CIT. The CIT independently and significantly predicted health outcomes.

Two comparable models are constructed. Results show that the 18-factor correlated model has the better goodness of fit with higher CFI and smaller SRMR and RMSEA than the seven-factor second-order correlated model. The extraction surplus features and realization of compression of features were conducted twice, but seven dimensions remain less distinguishable. Theoretically, the second-order correlated model is superior to the first-order correlated model only when the second-order model does not show a significantly low degree of fitting with considerably high factor loadings (Hau et al., 2004). The seven-factor correlated model did not meet these conditions. The further measures of wellbeing should cover a wider range of relevant yet specific and distinguishable aspects.

SWLS (Diener et al., 1985), FS (Diener et al., 2010), and CIT are created in this study to measure life satisfaction (i.e. SWB), flourishing (i.e. PWB), and thriving (Su et al., 2014). Empirically, the CIT is positively associated with SWLS and FS, but negatively related to mental and physical health. Thriving has high correlation coefficients with depression, anxiety, stress, and doctor visits. On the construct level, the SWLS

and the FS both ignored several dimensions of PWB (Su et al., 2014). By contrast, thriving is a multi-dimensional (i.e. relationship, engagement, mastery, autonomy, meaning, optimism, and SWB) wellbeing. Therefore, the CIT contains a wider range of aspects related to mental and physical health. SWB, optimism, and relationship have been proven to lessen the possibility of suffering from physical or mental illness (Cummins, 2010; Hobfoll, 1989).

By differentiating the three groups and constructing six regressions, this study supported and enriched existing reports regarding the screening of thriving presented by Su et al. (2014) and demonstrated by Duan et al. (2016). The 75th percentile in the CIT signifies the high scores of participants in the strength group (i.e. at thriving), whereas participants with low scores (i.e. below the 25th percentile) are divided into a risk group who felt depressed, anxious, and stressed resulting to frequent consultation with a doctor. The Brief Inventory of Thriving (BIT) is a simplified scale of the CIT, which comprises 10 items, has a similar screening function (Duan et al., 2016). The Chinese version of Stress Overload Scale-Short (SOS-SC) can also screen mental health status of individuals and distinguish an "at risk" group from the other three groups (Duan and Mu, 2017). Furthermore, the CIT independently and significantly predicted mental and physical health among community populations.

Existing studies evaluated psychometric properties and predictive validity of the SWLS (Diener et al., 1985), FS (Diener et al., 2010), BIT, and CIT (Su et al., 2014) in the Chinese context (e.g. Duan and Xie, 2016; Duan et al., 2016; Tang et al., 2016). All four measures can be used in testing psychological health for further intervention. The only difference is aspect of wellbeing. The SWLS and FS cover one or a few aspects, whereas BIT and CIT are multidimensional and show good predictive validity for criteria variables related to health. For ease of use, we indicate that the BIT is applicable to quick testing and to people with limited cognitive load, such as clinical patients and people with mental health problems, whereas the CIT is suitable for sane individuals in risk groups or in intervention experiments, and can comprehensively reflect human wellbeing.

This study has some limitations. First, as a new measurement, the CIT calls for additional examinations for its psychometric properties, predictive validity, and practical use in different cultural environments worldwide. Second, despite the use of two community samples, most participants are in their middle age and have similar education background, which fails to ensure representativeness. Further studies must recruit a wider class of participants. Third, no considerable significant differences are observed between the results of CFA of the two correlated models. Therefore, one cannot exactly indicate whether the better goodness-of-fit of the 18-factor correlated model is genuine or results from method bias remains. Finally, the CIT presented better ability than other measures (i.e. SWLS and FS) to predict mental and physical health among the risk group. Whereas, this finding is largely theoretical and must be verified in practical use.

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Supplementary Material

Supplementary material is available for this article online.

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