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Validity and reliability of Chinese version of 28-item Substance Use Risk Profile Scale in Chinese adolescents and young adults

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Abstract
The present study aimed to explore the validity and reliability of the Chinese version of the 28-item Substance Use Risk Profile Scale (SURPS) and provide an effective assessment tool for personalities related to substance use by which to predict and intervene in substance use cases. A total of 2114 Chinese adolescents and young adults (age 19.44 ± 1.63 years old) were enrolled. The results showed that the modified SURPS-SL_r model fit well ($\chi 2/df = 5.15$, $p < 0.01$, CFI = 0.851, TLI = 0.835, RMSEA = 0.037, SRMR = 0.063), indicating that the structure of the SURPS was suitable for Chinese adolescents and young adults. The SURPS significantly correlated with the Satisfaction with Life Scale, Subjective Health Complaints Index, Beck Depression Inventory, Zuckerman-Kuhlman Personality Questionnaire, and Neuroticism Extraversion Openness Five-Factor Inventory ($r = 0.22 \sim 0.60$, all $ps < 0.01$), indicating that the criterion validity of the SURPS was good. The Cronbach's α of SURPS and its dimensions were 0.74~0.83, which suggested the SURPS has good reliability. Therefore, the Chinese version of the 28-item SURPS is an effective and reliable measure of personalities linked to substance use in Chinese adolescents and young adults.

Keywords SURPS · Validity · Reliability · Adolescents · Young adults

Introduction

Substance use has become an important factor in individual physical and mental health, particularly for adolescents and young adults (Clark et al. 2015). Researchers have found that 36.1% of adolescents and young adults in China have tried smoking, 57.8% have tried drinking, and 6.8% have used substances (Sun and Song 2001). Substance use not only affects individual physical and mental health, but also irreparably harms academic performance and cognitive ability (Bao et al. 2010). Therefore, it is critical to assess those personalities related to high risk for substance use among adolescents and young adults, and then implement interventions based on the results of that assessment.

Woicik et al. (2009) developed the Substance Use Risk Profile Scale (SURPS), which is a standardized scale to measure personalities related to high risk of substance use. The SURPS consists of 28 items and has four personality dimensions, as follows: hopelessness, anxiety sensitivity, impulsivity, and sensory seeking. The SURPS has been demonstrated to be a valid tool for assessing personalities linked to substance use in both adolescents (Castonguay-Jolin et al. 2013) and adults (Saliba et al. 2014). In addition, the 28-item version of the SURPS has been translated into Portuguese (Canfield et al. 2015), Spanish (Robles-García et al. 2014), Japanese (Omiya et al. 2015), Irish, French, German (Jurk et al. 2015) and so on. Woicik et al. (2009) further revised the SURPS and developed the simplified version of the 23-item SURPS, which still maintains the structure using the four dimensions. Although the 23-item version of SURPS is more concise, economical, and convenient, its internal consistency coefficient and structural validity are much lower than those of the 28-item version (Krank et al. 2011).

The 23-item version has been translated into Chinese, and Hong Kong researchers have investigated its reliability and validity (Siu 2011). However, mainland China and Hong

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Kong are quite different in social and cultural environments (Berndt et al. 1993; Lau 1992), and personality has a close relationship with social environment (Church 2000; Markus and Kitayama 1998). Therefore, the application and testing of SURPS in mainland Chinese adolescents and young adults should make use of its own version of the test. Because the reliability and validity of the 28-item version of SURPS are much better than those of the 23-item version, the present study combined the 28-item English version of SURPS with the 23-item Chinese version of SURPS, and then re-translated this combination into a Chinese version of the 28-item SURPS. The present study aimed to examine the validity and reliability of this new Chinese version of the 28-item SURPS among Chinese adolescents and young adults.

The criterion validity of the Chinese version of the 28-item SURPS was also tested. We first included personality related scales to test criterion validity. Previous studies revealed that the four dimensions of the SURPS (hopelessness, anxiety sensitivity, impulsivity, and sensory seeking) were highly related with personality characteristics (Caspi et al. 1998; Krank et al. 2011; Robles-García et al. 2014; Stewart and Kushner 2001). For example, hopelessness in the SURPS was positively correlated with Beck Hopelessness Scale scores ($r = 0.59$), and anxiety sensitivity was positively correlated with Beck Anxiety Inventory scores ($r = 0.26$) (Robles-García et al. 2014). Therefore, the present study used personality related scales (Beck Depression Inventory 13-item, the Zuckerman-Kuhlman Personality Questionnaire Cross-Cultural 50 Items, and the Neuroticism Extraversion Openness Five-Factor Inventory) to test the validity of the Chinese version of SURPS. In addition, substance use is likely to result in negative health outcomes and lower levels of life satisfaction (Rohde et al. 2007; Substance Use and Mental Health Services Administration 2003; Trim et al. 2007). For this reason, the Satisfaction with Life Scale (SWLS) and Subjective Health Complaints Index (SHCI) were also included as measures of criterion validity.

Therefore, the present study aims to examine the validity and reliability of the Chinese version of the 28-item SURPS among Chinese adolescents and young adults. The more specific aims were as follows: (1) to explore the structural validity of the Chinese version of the 28-item SURPS; (2) to determine the criterion validity of the Chinese version of the 28-item SURPS by using personality, life satisfaction, and health related scales; (3) to examine the reliability of the Chinese version of the 28-item SURPS.

Method

Participants and Procedure

The survey was conducted between March and April in 2017. Participants came from three high schools and two universities in Anhui and Beijing, China. One class was selected randomly at each grade level by using the cluster random sampling method. Four questions were asked to assess the participants' surrounding environments and their psychological feelings when answering questions. These questions were, "Do you currently have an urgent task demanding your attention?", "What is your current emotional state?" "Are there any noises or sounds around you?", and "Does the noise affect your answer?" These four questions have been shown to be a reliable basis for network test quality control (Wang and Liu 2018). The participants who answered these questions in extreme situations (such as noise interference when answering questions) were excluded. Finally, 2114 adolescents and young adults (896 female; mean age: 19.44 years; SD: 1.63) entered the analysis. Written consent was obtained from each participant after a full explanation of the study. Parents/guardians of participants under 18 years old were informed, and their consent was obtained. All participants were paid for their participation. The institutional review board at Anhui Normal University approved the study procedures.

Questionnaire

The Substance Use Risk Profile Scale (SURPS)

The Chinese version of the 28-item SURPS combined the English version of the 28-item SURPS (Woicik et al. 2009) and the Chinese version of 23-item of the SURPS (Siu 2011). A Chinese graduate student who majored in English translated this combination into Chinese. Fidelity was ensured through back translation with a native English speaker. Discrepancies were discussed until an agreement was reached between the authors, English major graduate student and native English speaker. The English version of the 28-item SURPS has four dimensions, as follows: hopelessness, anxiety sensitivity, impulsivity, and sensory seeking. Responses were made on a 4-point Likert-type scale (completely agree/agree/disagree/completely disagree).

Beck Depression Inventory 13-Item (BDI)

The BDI was developed by Wang et al. (1999) to assess the severity of depressive symptoms. This inventory is a simplified version of the 21-item Beck Depression Inventory (Beck and Beck 1972). Responses were made on a 3-point Likert-type scale. The Cronbach's α of the Chinese version of the BDI was 0.88 (Wu et al. 2010; Zhang et al. 2015). The Cronbach's α of the BDI in the present study was 0.85.

Zuckerman-Kuhlman Personality Questionnaire Cross-Cultural 50 Items (ZKPQ-50-CC)

The ZKPQ-50-CC is the simplified version of the ZKPQ-III-R (Zuckerman-Kuhlman Personality Questionnaire, form III

Revised), and it includes five dimensions: Impulsive Sensation Seeking, Neuroticism-Anxiety, Aggression-Hostility, Activity, and Sociability (Wu et al. 2000). Each item is scored with either 0 or 1, and there are 50 items in total. The Cronbach's α of each dimension in the original English version was 0.72–0.86 (Zuckerman et al. 1993), and the Cronbach's α of ZKPQ-50-CC in the present study was 0.63–0.84.

Neuroticism Extraversion Openness Five-Factor Inventory (NEO –FFI)

The NEO-FFI includes five dimensions: Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness (Dai et al. 2004). Responses were made on a 5-point Likert-type scale, and totaled 60 items. The Cronbach's α of each dimension in the Chinese version was 0.77–0.92 (Dai et al. 2004). The Cronbach's α of the NEO - FFI in the present study was 0.72–0.82.

Satisfaction with Life Scale (SWLS)

The SWLS was developed by Xiong and Xu (2009) to assess individual satisfaction with life. Responses were made on a 7-point Likert-type scale and included five items. The Cronbach's α of the SWLS was 0.78, and the split-half reliability was 0.70 among Hong Kong college students (Wang et al. 2009). The Cronbach's α of the SWLS in the present study was 0.90.

Subjective Health Complaints Index (SHCI)

The SHCI was developed by Haugland and Wold (2001). The SHCI assesses individual subjective health status, and includes components like headache, stomach pain, back pain, depression, irritability or temper, nervousness, and dizziness. The frequency is divided into five grades (daily, more than once a week, once a week, once a month, rarely or never). The higher the score, the better the individual subjective health satisfaction will be. Studies have shown that the test-retest reliability of the SHCI was 0.76 (Haugland and Wold 2001). The Cronbach's α of the SHCI in the present study was 0.81.

Analysis

The data were analyzed using SPSS22.0 and Mplus7.0. The project analysis, internal consistency reliability analysis, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and correlation analysis were used. The maximum likelihood estimation was used for missing data in CFA (Gold et al. 2003; Graham et al. 1996). In order to perform EFA and CFA, participants were randomly divided into two subsamples (Sample 1 and Sample 2) using cross-validation analysis (Browne 2000; Cabrera-Nguyen 2010). EFA was performed for Sample 1 (n = 1036; female 42.4%; age, 19.39 ± 1.70), and CFA was performed for Sample 2 (n = 1078; female 42.4%; age, 19.50 ± 1.55).

The following parameters were used to identify the model fit: $\chi 2/df$, root mean square error of approximation (RMSEA), standardized root mean square residual, comparative fit index (CFI) and Tucker-Lewis index (TLI). The p value is significant when less than 0.05 (Schermelleh-Engel et al. 2003). The comparison between the models used $\Delta\chi 2$, ΔCFI, ΔTFI as indicators. When |ΔCFI| or |ΔTFI| > 0.01, or $\Delta\chi 2$ ($p < 0.05$), the difference between the two models is statistically significant (Hu 2010).

Results

Descriptive Statistics

The results of the Kurtosis-Skewness test and t test of the SURPS are shown in Table 1. According to Curran et al. (1996), the data can be considered to be following a normal distribution if the absolute value of kurtosis is between 0 and 2 and the absolute value of skewness is between 0 and 7. Thus, the data in the present study were in a normal distribution and can be further analyzed.

Project analysis used critical ratio (high and low group decision values) to test the degree of discrimination of each item. The first 27% of the score in the SURPS was the high group, and the latter 27% was the low group, then the score difference of each item on the high and low group was compared. The results showed that, except for item 17 ($t = 0.71$, $p > 0.05$), the other items in the high and low groups were statistically significant ($t = 4.74$–29.60, all $ps < 0.01$, $d = 0.292$–1.766). No significant differences were found in background variables such as gender, age, and parental years of education between the two groups (t = 0.06–1.39, all $ps > 0.05$).

Structural Validity

The results of EFA showed that the KMO (Kaiser-Meyer-Olkin) was 0.904. The Bartlett's sphericity test value was 18,813.65 ($p < 0.001$), so it was suitable for further analysis. After principal component analysis and maximum variance orthogonal rotation analysis, the results showed that there were four factors of eigenvalue greater than 1 (7.82, 3.44, 1.89, 1.34, and the corresponding mutation interpretation rates were 27.92%, 12.27%, 6.74%, and 4.80%, respectively). The total explanatory rate of variation was 51.74%.

CFA models were compared with the four-factor model in the 28-item English version of SURPS with regard to (a) the original items for each factor (SURPS model), (b) the secondary loadings (> 0.30) of SURPS (SURPS-SL model), and (c)

Table 1 The results of Kurtosis-Skewness test and t test of SURPS($N = 2114$)

Dimension	Item	$\bar{x}$	S	Kurtosis-Skewness test	Skewness	Kurtosis	t	Cohen's d
Hopelessness	1	2.51	0.71	12.51**	0.11	−0.25	4.74**	0.292
	5	2.48	0.71	12.30**	0.04	−0.24	5.48**	0.319
	9	2.00	0.66	14.98**	0.45	0.67	6.11**	0.375
	13	2.47	0.75	12.41**	−0.18	−0.35	27.12**	1.619
	17	2.44	0.70	12.29**	−0.02	−0.26	0.71	–
	21	2.21	0.73	14.29**	0.34	0.05	29.60**	1.766
	25	2.17	0.63	16.76**	0.53	0.84	8.09**	0.481
	28	2.07	0.69	14.78**	0.40	0.36	10.43**	0.635
Anxiety Sensitivity	2	2.46	0.73	11.99**	−0.10	−0.31	14.40**	0.872
	6	2.75	0.67	15.57**	−0.40	0.30	18.49**	1.105
	10	2.40	0.72	12.95**	0.12	−0.22	23.94**	1.428
	14	2.31	0.70	13.65**	0.15	−0.16	25.42**	1.531
	18	2.62	0.67	14.74**	−0.30	−0.03	19.94**	1.197
	22	2.56	0.68	14.51**	−0.35	−0.10	20.30**	1.217
	26	2.51	0.69	13.26**	−0.19	−0.22	21.29**	1.275
Impulsivity	3	2.36	0.72	13.42**	0.19	−0.18	21.23**	1.281
	7	2.59	0.70	13.03**	−0.08	−0.21	23.91**	1.438
	11	1.90	0.74	12.95**	0.65	0.40	25.38**	1.513
	15	2.32	0.70	13.66**	0.15	−0.15	23.09**	1.385
	19	2.53	0.72	12.66**	−0.13	−0.26	22.21**	1.317
	23	2.04	0.69	15.01**	0.51	0.63	23.79**	1.419
	27	2.04	0.70	14.12**	0.37	0.19	23.06**	1.389
Sensory seeking	4	2.47	0.92	10.66**	−0.08	−0.85	14.33**	0.853
	8	2.57	0.72	12.64**	−0.07	−0.24	17.07**	1.031
	12	2.29	0.70	13.95**	0.17	−0.11	20.08**	1.201
	16	2.74	0.77	13.66**	−0.34	−0.14	7.78**	0.458
	20	2.08	0.79	12.29**	0.35	−0.32	25.37**	1.508
	24	2.42	0.78	11.62**	0.07	−0.41	16.60**	0.985
Hopelessness	–	18.36	3.30	4.20**	0.16	0.89	–	–
Anxiety Sensitivity	–	17.61	3.22	3.59**	−0.08	1.34	–	–
Impulsivity	–	15.77	3.31	4.15**	0.47	1.52	–	–
Sensory seeking	–	14.56	3.01	3.78**	0.18	0.82	–	–

* $p < 0.05$, ** $p < 0.01$

the correlated error (error variances with MIs > 100) terms of SURPS (SURPS-SL_r model) (Table 2). The results of CFA showed that the model fit was not ideal in the SURPS model ($\chi 2/df = 8.37$, $p < 0.01$, CFI = 0.733, TLI = 0.707, RMSEA = 0.083, SRMR = 0.110). According to the Modification Indices (MI) given by the original English version of the SURPS model, and then combining the specific items, two modified models were obtained: SURPS-SL and SURPS-SL_r. According to the MI, item 13 (Hopelessness, "Sometimes I think I can't do anything") was recommended for cross-loading into anxiety sensitivity dimension (item 13: MI = 278.08); Item 21 (Hopelessness, "I feel that I am a loser") was recommended for cross-loading into the impulsivity dimension (item 21: MI = 365.91). The recommendations were accepted and the verification analysis of the SURPS-SL model was carried out. Although the fitting index of the SURPS-SL model was much better than the SURPS model, some items were too relevant (the MI > 100). The MI of item 1 (I am satisfied with the status quo) and item 5 (I am happy with my status quo), item 9 (I believe I have great potential) and item 28 (I am passionate about my future) were more than 100 (item 1 and item 5, MI = 252.53, $r = 0.70$; item 9 and item 28, MI = 155.97, $r = 0.44$). The recommendation was accepted and the verification analysis of the SURPS-SL_r model was carried out. The figure of the SURPS-SL_r model is shown in Fig. 1. CFA was also performed by gender (male and female) and age (adolescents and adults) in Sample 2. The results for CFA by gender (male and female) and age (adolescents and adults) in Sample 2 were

Table 2 Results of CFA analysis of SURPS

CFA modal	χ^2	*df*	χ^2/df	$\Delta\chi^2$	CFI	TLI	ΔCFI	ΔTLI	RMSEA	SRMR
Sample 2 N = 1078										
SURPS	2878.48	344	8.37	–	0.733	0.707	–	–	0.083	0.110
SURPS-SL	2074.60	342	6.07	803.88***	0.818	0.798	0.085	0.081	0.069	0.060
SURPS-SL_r	1750.69	340	5.15	323.91***	0.851	0.835	0.033	0.037	0.063	0.058
Male *n* = 621										
SURPS	3443.53	344	10.01	–	0.745	0.720	–	–	0.086	0.116
SURPS-SL	2353.47	342	7.47	1090.06***	0.834	0.817	0.089	0.097	0.069	0.060
SURPS-SL_r	2006.36	340	5.90	347.11***	0.863	0.848	0.029	0.031	0.063	0.058
Female *n* = 457										
SURPS	2423.02	344	7.04	–	0.680	0.648	–	–	0.082	0.089
SURPS-SL	2091.78	342	6.12	331.24***	0.731	0.701	0.051	0.053	0.076	0.070
SURPS-SL_r	1791.40	340	5.27	300.38***	0.776	0.752	0.045	0.051	0.069	0.068
Age < 18 years *n* = 301										
SURPS	2409.71	344	7.01	–	0.692	0.662	–	–	0.092	0.118
SURPS-SL	1812.56	342	5.30	597.15***	0.781	0.758	0.089	0.096	0.078	0.067
SURPS-SL_r	1551.11	340	4.56	261.45***	0.820	0.800	0.039	0.042	0.071	0.065
Age ≧ 18 years *n* = 777										
SURPS	3732.43	344	10.85	–	0.716	0.688	–	–	0.084	0.110
SURPS-SL	2721.35	342	7.96	1011.08***	0.810	0.780	0.094	0.092	0.063	0.060
SURPS-SL_r	2348.81	340	6.91	372.54***	0.832	0.813	0.022	0.033	0.065	0.061

SURPS = Original items for each factor

SURPS-SL = Adding secondary loadings >0.30

SURPS-SL_r = Error terms were correlated when the MIs were > 100

similar to the general results for Sample 2. The specific fitting index of each model is shown in Table 2.

A significant difference was found between the SURPS-SL and the SURPS ($\Delta\chi 2 < 0.05$, ΔCFI = 0.085 > 0.01, ΔTLI = 0.081 > 0.01); A significant difference was also found between the SURPS-SL_r and SURPS-SL ($\Delta\chi 2 < 0.05$, ΔCFI = 0.033 > 0.01, ΔTLI = 0.037 > 0.01), indicating that the modified model is much better.

Criterion Validity

The four dimensions of the SURPS were all significantly related with BDI, SHCI, and SWLS (as shown in Table 3). The correlation coefficient between the hopelessness dimension of the SURPS and BDI, SHCI, SWLS was more than 0.30 (*r* = 0.52, −0.35, −0.55, all *p*s < 0.01). The correlation coefficient between both the anxiety sensitivity and impulsivity

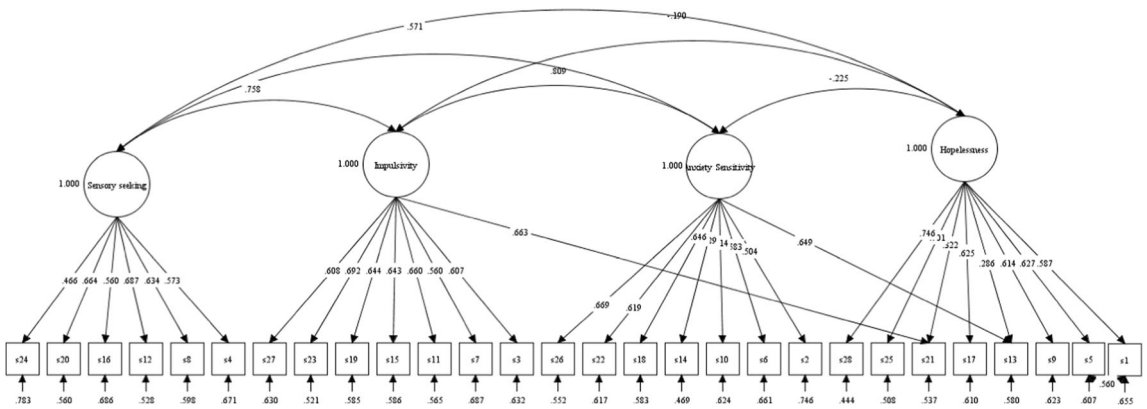

Fig. 1 The figure of the SURPS-SL_r model

Table 3 Correlation and regression results among SURPS, BDI, SHCI, SWLS, ZKPQ, and NEO-FFI

	Hopelessness	Anxiety Sensitivity	Impulsivity	Sensory Seeking
BDI	0.52**	0.22**	0.29**	0.09**
SHCI	−0.35**	−0.14**	−0.15**	0.00
SWLS	−0.55**	0.11**	0.14**	0.15**
R^2	0.43	0.08	0.14	0.04
ZKPQ				
Impulsive Sensation Seeking	0.05	0.05	0.12**	0.21**
Neuroticism-Anxiety	0.37**	0.30**	0.24**	0.04
Aggression-Hostility	0.16**	0.15**	0.29**	0.11**
Activity	−0.17**	0.00	0.02	0.13**
Sociability	−0.25**	−0.12**	−0.11**	−0.07*
R^2	0.20	0.10	0.11	0.06
NEO-FFI				
Neuroticism	0.60**	0.42**	0.40**	0.08*
Extraversion	−0.48**	−0.04	−0.02	0.08*
Openness	−0.19**	0.01	−0.08*	0.20**
Agreeableness	−0.33**	−0.14**	−0.42**	−0.18**
Conscientiousness	−0.43**	−0.08*	−0.28**	−0.02
R^2	0.46	0.21	0.28	0.09

*$p < 0.05$, **$p < 0.01$

dimensions of the SURPS and BDI were more than 0.20 (r = 0.22, 0.29, all ps < 0.01). BDI, SHCI, and SWLS can explain 4% ~ 43% (R^2 = 0.04 ~ 0.43) of the SURPS.

The SURPS was also correlated with ZKPQ and NEO-FFI. The results showed that the correlation coefficient among the hopelessness dimension of the SURPS and both the neuroticism-anxiety dimension of ZKPQ, and the neuroticism and extraversion dimensions of NEO-FFI, were all more than 0.30 (r = 0.37, 0.60, − 0.48, all ps < 0.01). The correlation coefficient between anxiety sensitivity in the SURPS and both the neuroticism-anxiety in ZKPQ and the neuroticism in NEO-FFI were also more than 0.30 (r = 0.30, 0.42, all ps < 0.01). The correlation coefficient between the impulsivity in SURPS and the neuroticism and agreeableness in NEO-FFI were also more than 0.30 (r = 0.40, −0.42, all ps < 0.01). The correlation coefficient between sensory seeking in the SURPS and both the impulsive sensation seeking of ZKPQ and the openness of NEO-FFI were more than 0.20 (r = 0.21, 0.20, all ps < 0.01). The ZKPQ explained 6%~20% (R^2 = 0.06 ~ 0.20) of the SURPS, and NEO-FFI explained 9%~46% (R^2 = 0.09 ~ 0.46) of the SURPS.

Reliability Analysis

The Cronbach's α of the SURPS was 0.83, and the Cronbach's α of each dimension of the SURPS were 0.74 (hopelessness), 0.79 (anxiety sensitivity), 0.79 (impulsivity), and 0.71 (sensory seeking) respectively (as shown in Table 4). The anxiety sensitivity scores of the girls were significantly higher than those of the boys (t = 6.05, $p < 0.01$, d = 0.266); The sensory seeking scores of boys were significantly higher than those of the girls (t = 7.90, $p < 0.01$, d = 0.348).

Table 4 The internal consistency coefficient of SURPS in genders

SURPS	Item	Boys n = 1218		Girls n = 896		α	t	Cohen's d
		$\bar{x} \pm S$	α	$\bar{x} \pm S$	A			
Hopelessness	8	18.33 ± 3.29	0.71	18.39 ± 3.32	0.78	0.74	−0.41	–
Anxiety Sensitivity	7	17.25 ± 3.45	0.81	18.10 ± 2.81	0.73	0.79	−6.05**	0.226
Impulsivity	7	15.86 ± 3.61	0.83	15.65 ± 2.86	0.73	0.79	1.47	–
Sensory Seeking	6	15.00 ± 2.99	0.71	13.97 ± 2.93	0.70	0.71	7.90**	0.348

*$p < 0.05$, **$p < 0.01$

Discussion

The present study first examined the validity and reliability of the Chinese version of the 28-item SURPS among Chinese adolescents and young adults. Project analysis revealed that, except for item 17, the distinction and discrimination of other items were good. EFA showed that there are four factors in the SURPS, which was consistent with the original English version of the SURPS (Woicik et al. 2009). The modified SURPS-SL_r model fit well, which indicated that the SURPS structure was suitable for Chinese adolescents and young adults. In addition, the SURPS was significantly correlated with BDI, SHCI and SWLS, ZKPQ, and NEO-FFI, indicating that the criterion validity of the SURPS was good. The Cronbach's α of SURPS total scores and subscales was acceptable (0.74~0.83), indicating that the SURPS has good reliability. Therefore, the Chinese version of the 28-item SURPS has good validity and internal consistency reliability for use with Chinese adolescents and young adults.

The content of item 17 is "I feel proud of my accomplishments." Given the influence of traditional Chinese culture, Chinese adolescents and young adults are modest, unobtrusive, and moderate (Hu et al. 2016). Therefore, they may choose "agree or disagree" on this item, instead of "completely agree or completely disagree", which indicates that the high and low groups are not highly differentiated.

EFA showed that there are four common factors in the SURPS, and the interpretable cumulative variation reached 51.74%, which was better than the original English version of the SURPS (47.80%) (Woicik et al. 2009). CFA showed that the fitting index of the SURPS was similar to the original English version (Woicik et al. 2009). However, it was lower than the results for the Hong Kong adolescents (Siu 2011). The reason for this disparity may be the difference in background between the participants in the present study and those in Hong Kong. The socioeconomic status of participants in the present study is much lower than that of the Hong Kong participants. Affected by this socioeconomic status difference, the participants' ability to understand the item of the SURPS in the present study may be worse compared to that of the Hong Kong participants. So, the fitting index of the SURPS is lower than that of the Hong Kong study.

The original SURPS model of the present study did not meet the model fit index requirement (CFI > 0.90, RMSEA <0.05) (Hu and Bentler 1999). However, the modified SURPS-SL_r model fit index was already close to the ideal model. In addition, CFI is acceptable at 0.80 for the self-reported questionnaire for adolescents and young adults (Wen et al. 2004) and meets the measurement requirements (Hou et al. 2010). This suggests that the reason why the SURPS original model was not good enough may be that there are common factor loads for some items, and the correlation among these items is too high. The modified model has a better fitting index, indicating that the SURPS structure is suitable for Chinese adolescents and young adults (Tables 3 and 4).

The criterion validity results showed that the SURPS was positively correlated with BDI and negatively correlated with SHCI and SWLS, indicating that hopelessness is related with higher depression, and lower health and life satisfaction. Malmberg et al. (2010) found a strong link between hopelessness and substance use in adolescents; specifically, those adolescents with higher levels of hopelessness seem to be at higher risk for substance use. Substance use will result in negative health outcomes and lower levels of life satisfaction (Rohde et al. 2007; Substance Use and Mental Health Services Administration 2003; Trim et al. 2007), so hopelessness is more likely related with greater depression, and lower health and life satisfaction. Besides BDI, SHCI, and SWLS, the SURPS was highly correlated with the neuroticism-anxiety of the ZKPQ and the neuroticism of the NEO-FFI, which is in line with previous studies (Caspi et al. 1998; Stewart and Kushner 2001). The neuroticism-anxiety of the ZKPQ and the neuroticism of the NEO-FFI both test anxiety and sensitivity. The SURPS also measures anxiety and hopelessness (e.g. I feel confused and panicked when I can't concentrate on doing something; I am a loser). So the high correlation between the SURPS and ZKPQ and NEO-FFI further confirms the good criterion validity of the SURPS.

The total internal consistency α coefficient of the SURPS is 0.83, and each dimension is 0.74~0.79, which is consistent with the results for American adolescents ($\alpha = 0.67 \sim 0.80$) (Conrod 2002) and better than the results for Hong Kong adolescents ($\alpha = 0.65 \sim 0.74$) (Siu 2011). These results indicated that the SURPS has good internal consistency and stability when use with Chinese adolescents and young adults. However, the present study has some limitations. First, the present study did not determine test-retest reliability, which can be supplemented in the future to further examine the stability of the results. Second, the criterion validity in the present study mainly focuses on the personality and health related scales. The Substance Use questionnaire can be considered the criterion variable in future studies since the substance use ratio can be used as an important indicator of whether the SURPS has good reliability. Third, the present study only focused on Chinese adolescents and young adults, whereas future studies could further test different ages and groups, such as children, adults and seniors.

Conclusions

The present study developed the Chinese version of the 28-item SURPS based on Woicik et al. (2009) and Siu (2011), and further examined its validity and reliability. The results showed that the Chinese version of the 28-item SURPS has

good validity and reliability, so we have finally developed a suitable version of the SURPS by which to test Chinese adolescents and young adults. It can be used to measure personalities related to high risk of substance use among Chinese adolescents and young adults, so society and parents can provide interventions as early as possible for at-risk personality populations. The present study provides much promise for prevention efforts on substance use among Chinese adolescents and young adults, and so might diminish the negative effects of substance use.

Author Contributions Cuicui Wang and Daoyang Wang designed the study. Cuicui Wang analyzed the data and wrote the manuscript. Daoyang Wang supervised the whole study.

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Compliance with Ethical Standards

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The institutional review board at Anhui Normal University approved the study procedures.

Informed Consent Written consent was obtained from each participant after a full explanation of the study procedure. Parents/guardians of participants under 18 years old were informed, and their consent was obtained.

Conflict of Interest The authors declare that they have no conflict of interest.

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