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Psychometric Properties of the Chinese Bermond–Vorst Alexithymia Questionnaire: An Exploratory Structural Equation Modeling Study

Zhihao Wang[1,2,*], Ting Wang[3,*], Katharina S. Goerlich[2], Riddhi J. Pitliya[4], Bob Bermond[5], André Aleman[1,2], Pengfei Xu[1,3,6,7] and Yuejia Luo[1,3,6,8,9]

Abstract

The Toronto Alexithymia Scale-20 (TAS-20) has been widely used to assess alexithymia. The Bermond–Vorst Alexithymia Questionnaire (BVAQ) assesses two additional features of alexithymia—the affective factors of emotionalizing and fantasizing, which are not included in the TAS-20. However, there is currently no Chinese version of the BVAQ. Here, the authors collected data from 439 college students (293 females, aged 17–27, mean $\pm$ SD $=$ 20.25 $\pm$ 1.88) to evaluate the psychometric properties for a Chinese BVAQ translation. Exploratory structural equation modeling and confirmatory factor analysis provided satisfactory validity and acceptable reliability for a six-factor first-order solution of a 35-item Chinese BVAQ. This adaptation retained the five original BVAQ factors (identifying, analyzing, verbalizing, emotionalizing, and fantasizing) and further specified the factor of identifying (successful identifying and unsuccessful identifying feelings). The authors also found a two-factor second-order model of cognitive and affective components for alexithymia in the Chinese population. Higher correlations with the TAS-20 were observed for identifying, analyzing, and verbalizing feelings (0.34 $\sim$ 0.61) relative to fantasizing and emotionalizing (0.02 $\sim -$0.05). These results support the construct validity of the adaptation. This work provides a reliable and valid Chinese adaptation of the BVAQ.

Keywords

alexithymia, Bermond–Vorst Alexithymia Questionnaire (BVAQ), exploratory structural equation modeling (ESEM), Toronto Alexithymia Scale-20 (TAS-20), confirmatory factor analysis (CFA)

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Introduction

Alexithymia ("no words for feelings") is characterized as an impaired ability to identify, describe, and regulate one's emotions (Luminet et al., 2018). Individuals with high levels of alexithymia have difficulty in interpreting emotions and experiencing emotional arousal (Sifneos,

[1]Center for Brain Disorders and Cognitive Science, Shenzhen Key Laboratory of Affective and Social Neuroscience, Shenzhen University, Shenzhen, China
[2]Department of Biomedical Sciences of Cells and Systems, University of Groningen, Groningen, the Netherlands
[3]School of Psychology, Shenzhen University, Shenzhen, China
[4]Department of Psychology, The University of Hong Kong, Hong Kong, China
[5]Department of Psychology, University of Amsterdam, Amsterdam, the Netherlands
[6]Center for Neuroimaging, Shenzhen Institute of Neuroscience, Shenzhen, China
[7]Guangdong-Hong Kong-Macao Greater Bay Area Research Institute for Neuroscience and Neurotechnologies, Kwun Tong, Hong Kong, China
[8]College of Teacher Education, Qilu Normal University, Jining, China
[9]The Research Center of Brain Science and Visual Cognition, Kunming University of Science and Technology, Kunming, China

*These authors contributed equally to this work.

Corresponding authors:
Pengfei Xu, Shenzhen Key Laboratory of Affective and Social Neuroscience, Shenzhen University, 3688 Nanhai Ave., Nanshan District, Shenzhen 518060, China.
Email: xupf@szu.edu.cn

Yuejia Luo, Shenzhen Key Laboratory of Affective and Social Neuroscience, Shenzhen University, 3688 Nanhai Ave., Nanshan District, Shenzhen 518060, China.
Email: luoyj@szu.edu.cn

1973), which results in cold and distant behaviors in social life (Spitzer et al., 2005). Accounting for 10% of the general population (Honkalampi et al., 2001), this subclinical personality trait is thought to be a transdiagnostic risk factor for various psychiatric diseases (with a high co-morbidity with depression, anxiety, and autism; Cook et al., 2013; Li et al., 2015; Velde et al., 2013). For example, at least 50% of individuals with autism are alexithymic (Cook et al., 2013). In addition, individuals with high levels of alexithymia report less satisfaction with life (Mattila et al., 2007) and suffer more from suicidal ideation (Hintikka et al., 2004). Therefore, it is of great importance to develop a suitable questionnaire to measure alexithymia.

Several psychometric tools for alexithymia have been developed with acceptable reliability and validity (Preece et al., 2018). Importantly, the construct of these tools was formulated by Nemiah and Sifneos (1970) on the basis of clinical observations, including difficulty in (a) experiencing emotions, (b) verbalizing emotions, (c) fantasizing, and (d) thinking about one's emotions. In light of the theoretical conceptualization of alexithymia (Nemiah & Sifneos, 1970), observer-rated questionnaires, such as the Toronto Structured Interview for Alexithymia, are increasingly employed to assess this subclinical personality construct (Bagby et al., 2006). Although more accurate in the assessment of the meaning of the responses, it is time-consuming (taking approximately 20–35 minutes) and laborious (Sekely et al., 2018). In contrast, self-report questionnaires provide a brief and well-validated standardized measure. The self-report Toronto Alexithymia Scale-20 (TAS-20) has been most widely used over the past decades (Bagby, Parker, & Taylor, 1994). With high stability and reliability in both clinical and nonclinical populations, the three-factor structure of the TAS-20 is theoretically congruent with the cognitive features of alexithymia (Bagby, Parker, & Taylor, 1994).

However, differences in the subjective experience of emotions and the ability to fantasize cannot be measured with the TAS-20 (Vorst & Bermond, 2001), although affective aspects are part of the original definition of the alexithymia construct (Sifneos, 1973). Bermond and Vorst (2001) proposed that alexithymia consists of five features: difficulties in identifying, analyzing, and verbalizing feelings, emotionalizing (the ability to become emotionally aroused by emotion-inducing experiences), and fantasizing (an individual's inclination to imagine and daydream). The Bermond–Vorst Alexithymia Questionnaire (BVAQ) measures two affective features in addition to three cognitive features of alexithymia, based on which two high-order structures of cognitive and affective components can be formed (Vorst & Bermond, 2001). These five factors with a two-factor high-order structure have been replicated across many cultural groups (Bermond et al., 2007).

While a Chinese translation of the TAS-20 has been validated (Yi et al., 2003), there is currently no Chinese version of the BVAQ. It has been suggested that culture plays a crucial role in alexithymia (Le et al., 2002). Indeed, the experience and expression of emotions—defining features of alexithymia—are significantly different between eastern and western cultures (Le et al., 2002). Moreover, higher scores of alexithymia have been observed in Chinese populations compared to western populations (Le et al., 2002; Yi et al., 2003). Given that the five-factor model of alexithymia is based on western culture (Bermond et al., 2007), whether the same five-factor structure applies to the Chinese population remains unknown. The theoretical advantages of the first-order model, as well as the two-factor high-order model, highlight the need to establish a Chinese version of the BVAQ.

In the present study, we examined the factor structure of the BVAQ in the Chinese population by using exploratory structural equation modeling (ESEM). The ESEM method has been widely and successfully used in personality measurements such as the NEO Personality Inventory (Marsh et al., 2013) and the Eysenck Personality Questionnaire (Bowden et al., 2016). Although traditional confirmatory factor analysis (CFA) has also been widely used (DiStefano & Hess, 2005), the strict requirement of zero cross-loading makes it difficult to fit the data, leading to low goodness-of-fit indices and inflated factor correlations (Asparouhov & Muthén, 2009). Fortunately, ESEM, which integrates both CFA and exploratory factor analysis (EFA), is a flexible approach to allowing cross-loading because of the combination of less restrictive aspects of EFA, resulting in a better fit as compared to CFA (Asparouhov & Muthén, 2009).

The aims of the current study were twofold. First, we aimed to identify the alexithymic structure in the framework of the Chinese culture using both the ESEM and CFA methods. Second, given that the BVAQ contains two high-order cognitive and affective dimensions with good reliability and validity in western culture (Bermond et al., 2007), we aimed to examine whether the two-factor high-order structure of the BVAQ would be found in the Chinese population.

Methods and Materials

Participants

Data from 549 students at Shenzhen University was collected through an online composite questionnaire. It consisted of questions regarding basic demographic information (i.e., age and gender), the TAS-20, and the

pre-final Chinese version of the BVAQ. Given that all of the participants needed to complete all items before submitting the questionnaire, we ensured data quality (more engagement and less distraction) by excluding the lowest and highest 10% in total response times ($<$ 194 seconds and $>$ 630 seconds). The final sample consisted of 439 participants (293 females, aged 17–27, $M \pm SD = 20.25 \pm 1.88$). We then divided the sample equally into two parts according to the participants' number (first part = 1–219; second part = 220–439). The first part of 219 participants was used for exploratory analyses, whereas the other 220 participants were used for confirmatory analyses. According to the cutoff scores of the TAS-20 (61 and 51; Taylor et al., 1988), 246 participants (56%) scored lower than 51 and 55 participants (13%) scored higher than 61 (low TAS-20 = 164 females with a score of 43.64 ± 5.67; high TAS-20 = 41 females with a score of 65.39 ± 4.04). The participants were paid for completing the questionnaire. The study was approved by the local ethics committee and informed consent was obtained from all of the participants.

The BVAQ

The English version of the 40-item BVAQ was established by Vorst and Bermond (2001). This self-report questionnaire assesses alexithymia across five dimensions: (a) verbalizing one's own emotional states (eight items); (b) fantasizing about virtual matters (eight items); (c) identifying the nature of one's own emotions (eight items); (d) emotionalizing (eight items); and (e) analyzing one's own emotional states (eight items). Each item is rated on a Likert scale ranging from 1 (*this in no way applies to me*) to 5 (*this definitely applies to me*). Half of the items are negatively scored. For analysis, the negatively formulated items are reverted and the item scores for each respective dimension are totaled. The total score is calculated as the sum of all the items. High scores represent low strength of the traits and thus low levels of alexithymia. Regarding the psychometric properties of the five-factor BVAQ, it has good validity and reliability (total Cronbach's $\alpha = 0.81$ and the α for the five factors is 0.85, 0.83, 0.79, 0.67, and 0.72, respectively, explaining 46% variance). In addition, factor analyses (Bermond et al., 2007) have shown that the BVAQ contains two high-order factors—a cognitive dimension (verbalizing, identifying, and analyzing) and an affective dimension (fantasizing and emotionalizing). These two orthogonal high-order factors also have good psychometric properties.

Translation of the BVAQ from English to Chinese

We obtained permission from one of the original authors (Dr Bermond) of the BVAQ to translate the questionnaire into Chinese. Following the guidelines for cross-cultural adaptation (Beaton et al., 2000), the processes of translation from English to Chinese were as follows. First, forward translations were made by the first two authors independently, and any discrepancies between the two forward translations were resolved by a research group (including two forward translators and nine researchers in the field of cognition–emotion interactions) to generate a common translation. Then, one bilingual speaker of English and Chinese conducted backward translation (note that the backward translator was completely blind to the original version). After discussions with the research group and an expert in alexithymia, a consensus was reached that the small differences between the original English version and the backward-translated version were of a cultural and linguistic nature. This stage established cross-cultural equivalence and generated a pre-final Chinese version of the BVAQ. Finally, we conducted a pilot study with a small group of five students using a convenience sampling method. They were asked to fill out the questionnaire and give feedback on the readability and applicability of all of the items. None of the items were inappropriate according to their feedback.

The TAS-20 (Chinese Version)

The TAS-20 measures three facets of alexithymia: (a) difficulty identifying feelings (seven items), (b) difficulty describing feelings (five items), and (c) externally oriented thinking (eight items). In a self-reporting manner, each item is rated on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), with five items being negatively scored. For analysis, the negatively keyed items are reverted and the item scores for each respective dimension are totaled. The total score is calculated as the sum of all of the items. High scores represent high levels of alexithymia (Bagby, Parker, & Taylor, 1994). Importantly, the Chinese version of the TAS-20 has been established with acceptable reliability (total Cronbach's $\alpha = 0.83$; the three factors = 0.78, 0.61, and 0.55, respectively) and validity (Yi et al., 2003). The Cronbach's α coefficient of the TAS-20 in the 219 samples was satisfactory at 0.804.

Exploring the Structure of the BVAQ in Chinese

Statistical analyses were performed using SPSS 22.0 and Mplus 7.0. Figure 1 shows a flowchart of the data processing. First, a discrimination test of items was conducted within the associated subscale, rather than on the BVAQ sum score, because of the complexity of the BVAQ (Vorst & Bermond, 2001). The BVAQ

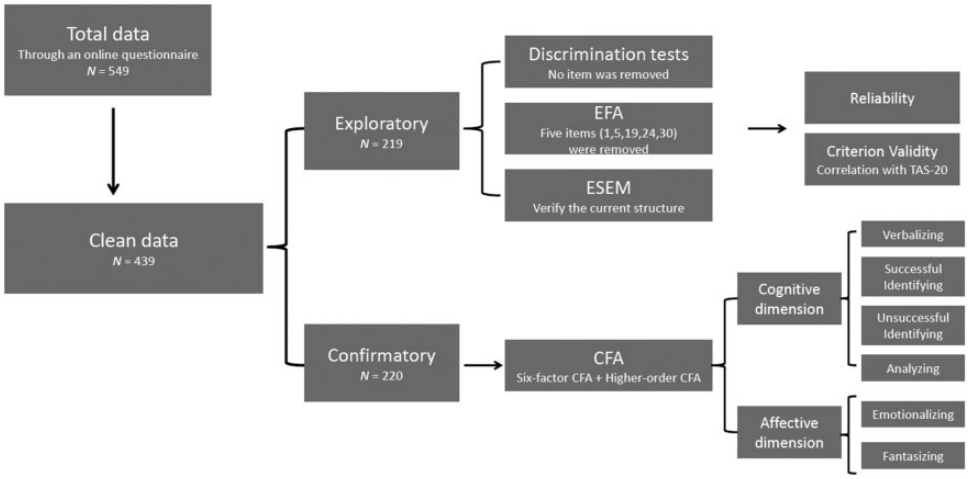

Figure 1. Flowchart of Data Processing.
Note. RT = response time.

consists of five subscales, which correlate mutually low to moderate in different languages, and two higher cognitive and affective dimensions, which correlate zero to low (Vorst & Bermond, 2001). Specifically, we ran independent-samples t tests to compare the differences of each item score between the top 27% group and the bottom 27% group. These two groups were divided according to the sum score of the corresponding subscale. No items were removed ($t_{(125)} \geq 3.51$, $p < .001$). We also performed a discrimination test based on the item response theory approach at the subscale level. All of the discrimination values were positive (≥ 0.210; for details, see Table 1), indicating that all of the items had good discriminatory capacities.

Second, given the effect of cultural differences on the potential structure of the BVAQ (Le et al., 2002), we carried out a parallel analysis, a data-driven method, to determine the number of factors. Specifically, the obtained eigenvalues by principal component analysis were compared with random values generated by the Monte Carlo simulation. We conducted the simulation 1000 times, and the threshold of the significant eigenvalue was 0.95. Then, we ran an EFA (n-factor, with n being determined by the result of the parallel analysis) to examine each item. In light of the initial version of the BVAQ, items with cross-loading were allowed but items with loadings of less than 0.30 on their factor (based on the initial BVAQ) were removed (Vorst & Bermond, 2001).

Next, we conducted an n-factor ESEM to verify the structure of the questionnaire. The method of maximum likelihood with geomin oblique rotation was used to estimate the model. Goodness-of-fit was evaluated by a chi-square test, and the indices were the comparative fit index (CFI), Tucker–Lewis index (TLI), root-mean-square error of approximation (RMSEA), and standardized root-mean-square residual (SRMR). Generally, CFI and TLI need to be larger than 0.90 (0.85 is acceptable), while SRMR and RMSEA should be less than 0.05 (0.08 is acceptable), which was the criterion for an acceptable model (Fleming et al., 2013; Soberg et al., 2017). Furthermore, we compared the n-factor EFA result with the n-factor ESEM result, especially for the belongingness of each item.

Finally, the reliability (i.e., Cronbach's α) of the BVAQ and its subscales was calculated, as well as Pearson's correlations between the BVAQ (and its subscales) and the TAS-20 to assess convergent and discriminant validity. Gender differences were also compared in both the BVAQ and its subscales by independent-samples t tests.

Structural Validity of the BVAQ in Chinese

CFA was conducted according to the results of EFA and ESEM by Mplus 7.0 on another sample to make sure that the current structure worked in a cross-validation manner. We then ran a six-factor first-order model and a high-order model of cognitive and affective components according to the BVAQ's fundamental theory (Vorst & Bermond, 2001).

Results

The Six-Factor BVAQ

After discrimination tests, a 40-item BVAQ version (with no item excluded) was used for parallel analysis. This revealed that the six-factor model was the best

Table 1. BVAQ: Varimax Rotated Item-Factor Loadings ($N = 439$).

	Factor					
Items	F1 (Verbalizing)	F2 (Fantasizing)	F3 (Successful identifying)	F4 (Unsuccessful identifying)	F5 (Emotionalizing)	F6 (Analyzing)
6	.76				.31	
11	.54		.44			
16	.35		.44	.45		
21	.56					
26	.65					
31	.40		.43	.36		
36	.62					
2		.39				
7		.71				
12		.57	.34			
17		.50				
22		.70				
27		.71				
32		.56		.35		
37		.73				
3			.57			
13			.44			.45
28			.59			
8				.57		
18				.65		
23				.60		
33				.68		
38	.32		.38	.40		
4			−.34		.55	
9				.43	.51	
14					.61	
29					.52	
34			−.42		.46	
39					.57	
10						.66
15				.31		.43
20						.64
25				.33		.63
35	.36		−.44			.35
40	.38		.32			.42
1	.24			.58		
5				.49		.20
19				.35	.21	
24				.37	.28	
30					.31	.01

Note. The extraction method is principal component analysis. The rotation method is the orthogonal rotation method with Kaiser standardization. Rotation converges after nine iterations. The gray shadow means loading less than .30.

(Figure 2). We then ran the six-factor EFA model (which explained 45.27% variance) for 40 items to examine the standardized loadings. Five items (1, 5, 19, 24, and 30—one item of verbalizing, two of emotionalizing, and two of analyzing in the original BVAQ factors) were problematic (main loading < 0.30; see Table 1). The resulting six-factor 35-item BVAQ was re-estimated by a six-factor ESEM. The parameter estimates from the six-factor ESEM showed acceptable goodness-of-fit indices (see Table 2). Also, the belongingness for these 35 items by the EFA was the same as the result of the six-factor ESEM.

As shown in Table 2, the first factor (F1) contained seven items with significant main loadings (items 6, 11, 16, 21, 26, 31, and 36). According to the original questionnaire, this factor should be the factor of verbalizing (e.g., "I like to tell others about how I feel"). The second factor (F2) contained eight items with

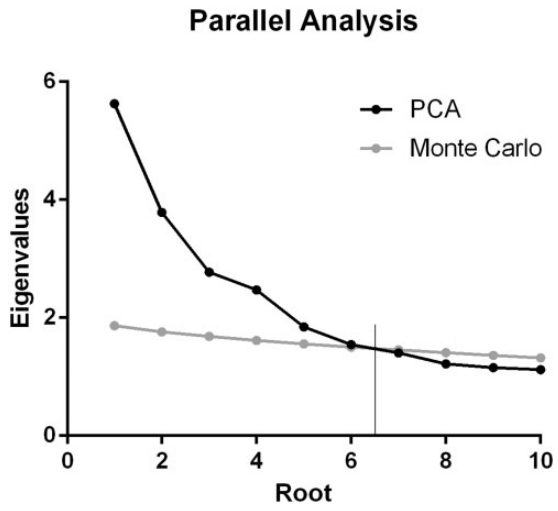

Figure 2. Parallel Analysis.
Note. PCA = principal component analysis.

significant main loadings (items 2, 7, 12, 17, 22, 27, 32, and 37), all of which reflected the factor of fantasizing (e.g., "I have few daydreams and fantasies"). The third factor (F3) contained three items with significant main loadings (items 3, 13, and 28), all assessing the factor of successful identifying (e.g., "When I am upset, I know whether I am afraid or sad or angry"). The fourth factor (F4) contained five items with significant main loadings (items 8, 18, 23, 33, and 38), reflecting the unsuccessful identifying factor (e.g., "When I am tense, it remains unclear from which of my feelings this comes"). The fifth factor (F5) contained six items with significant main loadings (items 4, 9, 14, 29, 34, and 39), all reflecting the factor of emotionalizing (e.g., "When something unexpected happens, I remain calm and unmoved"). Finally, the sixth factor (F6) contained six items (items 10, 15, 20, 25, 35, and 40) with significant loading, all reflecting the factor of

Table 2. Results of the six-factor ESEM.

factor	items	estimate	S.E.	Est./S.E.	P-value
F1	6	.89	.06	16.21	< .001
	11	.50	.08	6.17	< .001
	26	.26	.09	2.90	.004
	21	.34	.08	4.17	< .001
	26	.57	.07	8.65	< .001
	31	.33	.09	3.87	< .001
	36	.50	.07	6.85	< .001
F2	2	.31	.07	4.17	< .001
	7	.65	.06	11.83	< .001
	12	.46	.08	6.04	< .001
	17	.43	.07	6.20	< .001
	22	.60	.06	10.14	< .001
	27	.62	.06	10.68	< .001
	32	.49	.07	7.32	< .001
	37	.74	.05	13.66	< .001
F3	3	.41	.11	3.69	< .001
	13	.32	.17	1.93	.053
F4	28	.58	.08	7.63	< .001
	8	.42	.08	5.41	< .001
	18	.59	.07	8.52	< .001
	23	.44	.11	4.07	< .001
	33	.63	.06	10.12	< .001
	38	.49	.11	4.33	< .001
F5	4	.68	.08	9.13	< .001
	9	.17	.08	2.02	.043
	14	.39	.09	4.43	< .001
	29	.61	.08	7.58	< .001
	34	.53	.07	7.18	< .001
	39	.19	.09	2.05	.040
F6	10	.56	.08	7.02	< .001
	15	.34	.10	3.39	.001
	20	.51	.10	5.31	< .001
	25	.70	.10	7.08	< .001
	35	.36	.12	2.95	.003
	40	.31	.11	2.69	.007

Chi-Square/df:1.30 RMSEA Estimate: .04 CFI: .94 TLI: .90 SRMR: .04

analyzing. Despite slight cross-loading in a few of the items (e.g., 13, 16, and 35), we still retained them for the reason of the strong theoretical background of these BVAQ factors, which was consistent with Vorst and Bermond (2001).

As shown in Table 3, the 35-item Chinese version of the BVAQ (and its subscales) showed acceptable reliability ($0.48 \sim 0.79$). Regarding the convergent and discriminant validity (Table 4), higher correlations were shown between F1, F3, F4, and F6 and the TAS-20 (correlation coefficients $= -0.61$, -0.41, -0.60, and -0.34, respectively, reflecting cognitive alexithymia in the original BVAQ) than between F2 and F5 and the TAS-20 (correlation coefficients $= 0.02$ and -0.05, respectively, reflecting affective alexithymia in the original BVAQ). Furthermore, the correlation with the TAS-20 was much higher for the cognitive BVAQ ($r = -0.71$, $p < .001$) than for the affective BVAQ ($r = -0.01$, $p = .906$). The correlation between the 35-item BVAQ and the original 40-item BVAQ was 0.989 ($p < .001$). With regard to gender differences, independent-samples t tests showed that males had significantly lower scores than females in F1, F5, and the total BVAQ scores (Table 5), suggesting higher levels of alexithymia in men compared to women in these dimensions. No significant gender difference was found in the TAS-20, its subscales, F2, F3, F4, and F6 (Table 5).

Table 3. The reliabilities and item numbers in each factor and the total questionnaire.

Factors	Cronbach's alpha	Item numbers
F1	.78	7
F2	.78	8
F3	.48	3
F4	.68	5
F5	.60	6
F6	.64	6
Total	.79	35

Note: F1 represents Verbalizing; F2 represents Fantasizing; F3 represents successful Identifying; F4 represents unsuccessful Identifying; F5 represents Emotionalizing; F6 represents Analyzing.

Structural Validity by CFA

To test the robustness of the Chinese 35-item BVAQ, we conducted a six-factor CFA on the second group of

Table 4. Pearson correlations for investigating the convergent and discriminant validity.

	F1	F2	F3	F4	F5	F6	BVAQ
F1							
F2	.02						
F3	.22	−.03					
F4	.45	.02	.30				
F5	.23	.07	.07	.04			
F6	.36	.17	.16	.32	.15		
BVAQ	.71	.50	.35	.60	.44	.64	
TAS-20	−.61	.02	−.41	−.60	−.05	−.34	−.56

Note: BVAQ, Bermond-Vorst Alexithymia Questionnaire; TAS-20, Toronto Alexithymia Scale-20.

Table 5. Gender Differences in Each Factor and the Total BVAQ and TAS-20.

Factor	Male	Female	t	p	95% CI
Verbalizing	21.25 ± 4.24	22.97 ± 4.48	−2.70	.007*	−2.97, −.47
Fantasizing	29.96 ± 4.55	29.11 ± 5.06	1.20	.235	−.55, 2.24
Successful identifying	1.08 ± 2.15	1.35 ± 2.02	−.89	.372	−.86, .32
Unsuccessful identifying	16.77 ± 3.29	17.32 ± 3.16	−1.19	.236	−1.46, .36
Emotionalizing	19.13 ± 3. 00	2.52 ± 3.36	−2.97	.003*	−2.32, −.47
Analyzing	21.59 ± 3.60	22.17 ± 3.06	−1.23	.219	−1.5, .34
BVAQ	118.79 ± 12.03	122.45 ± 11.52	−2.17	.031*	−6.99, −.34
DIF	17.00 ± 4.70	16.25 ± 4.29	1.17	.242	−.51, 2.01
DDF	13.45 ± 3.65	12.78 ± 3.51	1.31	.191	−.34, 1.68
EOT	2.79 ± 3.58	2.86 ± 3.29	−.16	.876	−1.04, .88
TAS-20	51.23 ± 9.34	49.89 ± 8.96	1.03	.306	−1.24, 3.93

Note. BVAQ = Bermond–Vorst Alexithymia Questionnaire; TAS-20 = Toronto Alexithymia Scale-20; DIF = difficulty identifying feelings; DDF = difficulty describing feelings; EOT =externally oriented thinking.
*$p < .05$.

220 participants. It revealed acceptable goodness-of-fit indices (Chi-square/$df = 1.53$, RMSEA = 0.06, CFI = 0.87, TLI = 0.85, SRMR = 0.07). Furthermore, a high-order CFA of cognitive and affective structures also showed acceptable goodness-of-fit indices (Chi-square/$df = 1.51$, RMSEA = 0.06, CFI = 0.87, TLI = 0.85, SRMR = 0.07). This indicates that our data supports the high-order model of cognitive and affective components in the Chinese population. (For the Chinese adaptation, see Appendix I).

Discussion

As a psychometric tool of alexithymia, the BVAQ has been used increasingly to measure the cognitive and affective dimensions of alexithymia. Given the important role of alexithymia in mental diseases, the estimated prevalence of alexithymia (around 10% of the population), and the large population of China, it is of great importance to evaluate the psychometric properties of the Chinese version of the BVAQ. The present ESEM and CFA results indicate that, overall, the six-factor model and the two-factor high-order structure, with 35 items in the Chinese version, possess good reliability and validity to assess alexithymic characteristics. The comparability between the Chinese 35-item BVAQ and the TAS-20 supported the validity of the Chinese 35-item BVAQ. In sum, these results indicate that the 35-item BVAQ is a reliable and valid instrument to measure alexithymia in Chinese populations. Furthermore, our results support the two-factor high-order structure of the BVAQ.

With respect to the factor analysis of the original BVAQ, we observed a dissociation between items 3, 13, and 28 (F3) and items 8, 18, 23, 33, and 38 (F4) in our Chinese sample. Items 3, 13, and 28 reflect identifying one's own emotional state with confidence, and were thus defined as "successful identifying." In contrast, items 8, 18, 23, 33, and 38 reflect identifying one's emotions without confidence, and were thus defined as "unsuccessful identifying." This dissociation, interestingly, is reminiscent of a framing effect, where it is argued that there are different outcomes when the same statement is framed in different ways (Taylor et al., 1988). These differences were also demonstrated between negatively keyed items and positively keyed items in the "externally oriented thinking" subscale of the TAS-20 in a Peruvian population (Loiselle & Cossette, 2001), suggesting cultural differences regarding analyzing feelings. It has been suggested that there are different cognitive processes in positively keyed items and negatively keyed items (Vroege et al., 2018). Therefore, our observation of differences within the identifying factor could be explained by cultural differences.

The adaptation of the Chinese BVAQ version suggests stable distributions of items. Therefore, we propose a six-factor model for the Chinese 35-item BVAQ with F1 = verbalizing, F2 = fantasizing, F3 = successful identifying, F4 = unsuccessful identifying, F5 = emotionalizing, and F6 = analyzing. This six-factor structure corresponds closely to the original five-factor structure initially proposed by Vorst and Bermond (2001) for the 40-item BVAQ. The current six-factor adaptation explained 45.27% variance, similar to the Dutch (46%), French (45%), and English (46%) versions (Vorst & Bermond, 2001). In sum, we provide a novel six-factor alexithymic structure with satisfactory goodness-of-fit statistics of construct validity in the Chinese context.

With acceptable reliability, this provisional six-factor 35-item BVAQ showed good convergent and discriminant validity. First, we correlated all of the subscales of the BVAQ with the TAS-20. The BVAQ is thought to measure cognitive (identifying, verbalizing, and analyzing) and affective (fantasizing and emotionalizing) alexithymia (Bermond et al., 2007; Vorst & Bermond, 2001), whereas the TAS-20 is thought only to measure cognitive alexithymia (Bagby, Parker, & Taylor, 1994; Goerlich, 2018). As expected, the correlations were generally higher between the cognitive BVAQ dimension and the TAS-20 ($-0.34 \sim -0.61$) than between the affective BVAQ dimension and the TAS-20 ($0.02 \sim -0.05$), suggesting a reasonable pattern in convergent and discriminant validity.

We also found gender differences in alexithymic characteristics. Consistent with conditions in western culture (Bermond et al., 2007; Vorst & Bermond, 2001), we demonstrated higher levels of alexithymia in men compared to women in the factors of verbalizing and emotionalizing. These gender differences might be expected given that women are better than men at communicating information about their feelings (Parker et al., 1993), which may result in an increase in the impact of emotion-inducing experiences on emotional arousal. Therefore, males being more inclined than females to suffer from verbalizing and emotionalizing may be universal. In line with previous results using the Chinese version of the TAS-20 (Yi et al., 2003), no gender difference was found in either the TAS-20 or its subscales in the current study. Considering sampling bias in the current study (293 females vs. 146 males), interpretations based on these gender differences should be made with caution. Future studies could examine gender differences in different cultures.

Our results also support a two-factor high-order structure of the BVAQ in the Chinese context. It is commonly acknowledged that alexithymia entails cognitive and affective dimensions in the western world (at least in six languages and seven populations; see

Bermond et al., 2007; Vorst & Bermond, 2001). The current results indicate that the high-order structure of cognitive and affective components can be extended to eastern culture. Furthermore, this Chinese adaptation makes it possible to assess two additional features of alexithymia—the affective factors of emotionalizing and fantasizing, which are not included in the TAS-20.

Several limitations of the present study are worth mentioning. First, this psychometric tool was tested on a college sample. Given that alexithymia also prevails in patients with psychosomatic diseases (Sifneos, 1973; Taylor et al., 1991), it is necessary to test the current adaptation in clinical settings. Second, the self-report questionnaire has limited capabilities to measure alexithymia, especially for those who experience difficulty in describing their feelings (Sekely et al., 2018). Future studies should establish a Chinese version of observer-rated alexithymic questionnaires, such as the Toronto Structured Interview for Alexithymia, to improve the validity (Bagby et al., 2006; Goerlich, 2018; Velde et al., 2013). Third, the Chinese adaptation lacked measurements of temporal stability (i.e., test–retest reliability), although alexithymia was thought of as a subclinical personality trait (Tolmunen et al., 2011). Fourth, the advantage of the initial 40-item BVAQ was eliminated to some extent. Specifically, the factors in the Chinese version of the BVAQ entailed different numbers of items, leading to different contributions to the total scores of alexithymia for each factor (Vorst & Bermond, 2001). Fifth, some factors comprised a limited number of items (e.g., successful identifying with three items) and relative lower Cronbach's α coefficients (e.g., 0.476 in F3), although the current Chinese version of the BVAQ showed acceptable psychometric properties. Future studies could use our BVAQ version initially, but an adaption of the questionnaire taking into consideration these limitations would be desirable.

To conclude, the psychometric properties from ESEM and CFA in this study support the Chinese version of the six-factor 35-item BVAQ as a reliable and validated instrument to measure alexithymia. This adaptation retained the five original BVAQ factors (identifying, analyzing, verbalizing, emotionalizing, and fantasizing) and further specified the factor of identifying (successful identifying and unsuccessful identifying). The 35-item BVAQ version can measure affective features, which are essential for the construct of alexithymia, in addition to cognitive dimensions of alexithymia. The framework of the six-factor model may reflect cultural differences, especially in identifying emotions. In addition, the present results support the cognitive and affective high-order constructs of alexithymia. Our work provides an instrument with good psychometric properties to assess alexithymia in Chinese populations.

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Appendix 1

The Items in the Chinese BVAQ (in Chinese)

1．入睡前，我会回想各种事件、遭遇和对话。

2．当我感觉心烦时，我知道我是否是害怕、悲伤还是愤怒。

3．当出乎意料的事情发生时，我仍能保持冷静且不为所动。

4．我喜欢向他人诉说自己的感受。

5．我很少幻想和做白日梦。

6．当我紧张时，我不知道这种感受从何而来。

7．当看到别人失声痛哭时，我仍然无动于衷。

8．我应该试着弄清自己的感受。

9．即使和朋友在一起，我也很难表达出我的感受。

10．我常常会发挥我的想象力。

11．当事情变得让我不知所措时，我通常知道这是为什么。

12．当身边有朋友激烈争论时，我会变得情绪激动。

13．当感到不舒服时，我不会再问自己为什么不舒服来自寻烦恼。

14．当想要表达我有多么不开心时，我很容易找到恰当的词语来表达。

15．我对奇幻和怪诞的故事不感兴趣。

16．当我感觉很好时，我不清楚自己是开心、得意还是满足。

17．当感到不安时，我会试着找出为什么会有这种感觉。

18．人们经常建议我应该多表达一些自己的感受。

19．我几乎从不幻想。

20．我不知道自己在想什么。

21．就情绪而言，没有什么需要理解的。

22．当一些事情使我心烦意乱时，我会和别人诉说我的感受。

23．我喜欢想一些不同寻常的天马行空的故事。

24．当感到不开心时，我知道是否是因为害怕、沮丧还是悲伤。

25．意想不到的事件常常使我感情用事。

26．我可以用口头语言表达我的感受。

27．我认为幻想虚构的事物纯属浪费时间。

28．当苛责自己时，我不清楚自己是悲伤、害怕还是不高兴。

29．我能够不带情绪地接受令人失望的事情。

30．我认为别人过于频繁地分析他们自己的情绪很奇怪。

31．当与人交谈时，我更喜欢谈论日常生活，而不是我的情绪。

32．无事可做时，我会做白日梦。

33．当心情愉悦时，我知道这是否是满腔热情、兴高采烈还是得意洋洋。

34．当看到别人痛哭时，我的内心充满了悲伤。

35．当我紧张时，我想知道这种感觉究竟从何而来。

Note. Verbalizing = 4, 9, 14, 18, 22, 26, and 31; fantasizing = 1, 5, 10, 15, 19, 23, 27, and 32; successful identifying = 2, 11, and 24; unsuccessful identifying = 6, 16, 20, 28, and 33; emotionalizing = 3, 7, 12, 25, 29, and 34; analyzing = 8, 13, 17, 21, 30, and 35.