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Questionnaire for the Assessment of Self-Disgust: The psychometric testing among mental disorders in China

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Abstract

Research on self-disgust is relevant to psychopathologic tendencies because it has been shown to play a critical role in several mental disorders. Examining self-disgust and exploring its role in mental health are significant goals. The purpose of this study was to translate the Questionnaire for the Assessment of Self-Disgust (QASD) into Chinese and evaluate its validity and reliability. The translation and validation of the QASD were guided by the World Health Organization's Process of Translation and Adaptation of Instruments. Three phases were undertaken: (a) professional translation and expert panel review, (b) pretesting, and (c) psychometric evaluation. The psychometric evaluation was tested among 1,068 patients who were recruited from two psychiatric hospitals and three psychological clinics of tertiary hospitals. In this study, multigroup confirmatory factor analysis (CFA) supported the two-factor structure of the original QASD construct. Measurement invariance showed that the QASD is invariant across the patients with heterogeneous mental health diagnoses. The correlation of QASD with the Self-Esteem Scale (SES) and the Trait Anger Scale (TAS) showed that it has good convergent validity and discriminative validity. Internal consistency and test-retest yielded acceptable results. Thus, the findings suggest that the Chinese version of the QASD is a reliable and valid instrument with adequate psychometric properties for assessment of self-disgust among patients with mental disorders in China.

KEYWORDS

disgust, mental disorders, reliability, self-disgust, validity

1 | INTRODUCTION

"Disgust has shown a great potential for being transferred to objects, as well as to other individuals and, in some instances, to the self" as stated in Davey (1994). That is to say, although the disgust response serves an important and adaptive function in the external stimulus, feelings of disgust may be generalized and directed towards the self when some aspects are seen as toxic, repugnant, or even dangerous, and this type of disgust response has been labelled self-disgust (Ille et al., 2014; Power & Dalgleish, 1997; Rozin, Haidt, & McCauley, 2000). Specifically, self-disgust is a persistent and maladaptive disgust response,

reflecting a harsh, noxious and embodied feeling state (Roberts & Goldenberg, 2007). It is considered a stable and dysfunctional psychological phenomenon that encloses two interrelated domains of the self: physical self-disgust and behavioural self-disgust (Overton, Markland, Taggart, Bagshaw, & Simpson, 2008).

In the present, a number of studies have correlated self-disgust with varying numbers of pathologies. A qualitative study has suggested that self-disgust is a negative self-conscious emotion schema, associated with depression, problem around eating self-persecution, physical appearance, and interpersonal relationships (P.A. Powell, Overton, & Simpson, 2014a). Besides, self-disgust has been

shown to be involved in a number of mental health issues, including depression (Overton et al., 2008; P.A. Powell, Overton, & Simpson, 2014b; P.A. Powell, Azlan, Simpson, & Overton, 2016; Simpson, Hillman, Crawford, & Overton, 2010; Ypsilanti, Lazuras, Powell, & Overton, 2019), sexual dysfunction (de Jong & Borg, 2015), borderline personality disorder (BPD; Abdul-Hamid, Denman, & Dudas, 2014; Rüsche et al., 2010; A. Schienle et al., 2003), unhealthy behaviour (Palmeira, Pinto-Gouveia, & Cunha, 2017), and anxiety (Amir, Najmi, Bomyea, & Burns, 2010; B.O. Olatunji, Cox, & Kim, 2015; P.A. Powell et al., 2016). Furthermore, self-disgust has been shown to be a significant strong predictor of specific psychological problem, such as depressive symptoms (Overton et al., 2008; P.A. Powell, Simpson, & Overton, 2013), self-harm urges (Abdul-Hamid et al., 2014), and suicide risk (Brake, Rojas, Badour, Dutton, & Feldner, 2017). Finally, self-disgust has also been linked to psychological wellbeing in cancer groups (H.A. Azlan, Overton, Simpson, & Powell, 2017a; H.A. Azlan, Overton, Simpson, & Powell, 2017b).

Obviously, all aforementioned studies have focused on psychopathology and have shown that self-disgust plays a critical role in several mental disorders. Given previous theoretical associations have been made between self-disgust and other psychological phenomena, it suggests that the early detection and treatment of self-disgust may be important for prevention to clinical mental health problems (A. Schienle, Ille, Sommer, & Arendasy, 2014). Therefore, the precise measurement of self-disgust will be meaningful to better understanding these relationships. In 2008, Overton et al. provided the first evidence on the factor structure of self-disgust and developed a Self-Disgust Scale (SDS). Over the past decade, the SDS was the only available self-report measure of disgust towards the self (P.A. Powell, Overton, Simpson, 2014a). However, this scale does present some limitations. The first shortcoming is the method used to construct the factors; the authors used an orthogonal rotation method to obtain a more readily interpretable simple structure and assumed a hierarchical structure of self-disgust by calculating a composite score. The second shortcoming involves the size and composition of the sample; the authors combined a relatively small sample of mentally healthy individuals with a low set of indicator variables to measure different aspects of self-disgust. These limitations are known to affect the property of factor-analytic methods aiming to find stable factor structures with unbiased estimates of factor loadings. And as a result of the restraint of healthy respondents, concern exists about whether the results can be generalized to different psychopathologies.

Considering the aforementioned shortcomings of SDS, A. Schienle et al. (2014) constructed a new Questionnaire for the Assessment of Self-Disgust (QASD). In addition to using better samples and statistical methods than SDS, the QASD is more accurate in terms of item settings. For the SDS, Overton et al. (2008) had formulated items pertaining to the construction of "behaviour," "appearance," and "lack of self-esteem" and constructed four items for each of the constructs ($k = 12$). In contrast to SDS, the QASD contained twice as many items ($k = 26$).

Key Practitioner Message

- The Chinese version of the Questionnaire for the Assessment of Self-Disgust (QASD) is a reliable and valid instrument to assess the self-disgust among patients with mental disorders in China.
- The two-factor structure of QASD is highly tenable.
- The QASD is a promising tool for further investigation of the role of self-disgust in mental disorders.
- The QASD could be useful to better explore the psychological construct of self-disgust and the correlations with other psychological phenomena.

Furthermore, items on the QASD contain positive and negative wording, which is the same with SDS. Although the use of positive and negative item wording is often recommended in the literature (DeVellis, 1991; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), some studies have argued that the combination of positive and negative item wording can affect the structural validity of self-report measures. For this reason, A. Schienle et al. (2014) used multitrait-multimethod confirmatory factor analytic methods to measure the detrimental effect of item wording on the construct validity in the QASD (Eid, 2000; Höfling, Moosbrugger, Schermelleh-Engel, & Heidenreich, 2011). One limitation for the QASD needs to be clarified: same as the SDS, a few items of the QASD include vocabularies such as hate and shame; the concerns about the content validity of the QASD have been raised by P.A. Powell, Overton, Simpson (2014b). For example, the measured self-disgust may share at least as much commonality with other negative self-directed constructs, such as self-criticism and self-hatred. However, the developed QASD was a more precise scale in terms of factor construction and the composition of the sample selected to ensure that the scale was more comprehensive.

Because the QASD has been shown to be a reliable tool for measuring the self-disgust in mental disorders (Clarke, Simpson, & Varese, 2019; Ille et al., 2014; A. Schienle et al., 2014; A. Schienle, Leutgeb, & Wabnegger, 2015; A. Schienle, 2018), we believe that the QASD must be adapted for application to Chinese patients in future research. Thus, in order to advance the clinical research of self-disgust in China, especially the relationship between self-disgust and other psychopathology, we performed this study to translate the questionnaire for the assessment of self-disgust (QASD) into Chinese and evaluate its validity and reliability among Chinese mental disorders. The Chinese version of the QASD would be a promising tool for investigation of psychological construct of self-disgust, and it could be useful to provide methods and theoretical basis for subsequent clinical research on the relationship between self-disgust and other psychological disorders.

2 | METHODS

2.1 | Design

This study was designed as a cross-sectional survey to evaluate the psychometric properties of the QASD among mental disorders in Chinese. The translation and validation were guided by the World Health Organization's Process of Translation and Adaptation of Instruments (World Health Organization, 2014). As depicted in Figure 1, three distinct and sequential phases were undertaken: (a) professional translation and expert panel review, (b) pretesting, and (c) psychometric evaluation.

2.2 | Phase 1: Professional translation and expert panel review

Based on our review of current literatures, German and English versions of QASD are available at the present, but the validation of the QASD was only conducted in German but not in English, so we choose to translate German into Chinese in our study.

2.2.1 | Forward Translation

Permission to translate and validate the QASD was obtained from the author of the original scale. Two bilingual translators separately

translated the original QASD into Chinese. Both of them had a medical background. One translator was aware of the purpose of the QASD translation, whereas the other was not. After the two translators finished the initial translation, discrepancies between the two Chinese versions were discussed, and the two versions were merged into a single version.

2.2.2 | Expert panels and backward translation

A panel of five experts, including three nursing experts and two psychology experts, examined the forward-translated and the original version of the QASD. Three important questions were addressed: (a) Is the translated word in Chinese the exact equivalent of the word in German? (b) If the Chinese word is not the exact equivalent, is there a better Chinese word to use? (c) Is it likely that the word will be easily understood by the Chinese who will complete the questionnaire? If a German word had multiple meanings for a research participant, the most appropriate Chinese word was used in its place.

For example, Item 14 of the QASD in the personal disgust subscale contains the question "I find it unpleasant to touch my problem areas." The Chinese translation of the German word "berühren" was the meaning of "contact with hands", which is not accurate in the sense of the original text. Therefore, the panel replaced a Chinese word that has a similar meaning to the word "mention." The purpose of this step is to review discrepancies in the meanings of the scale

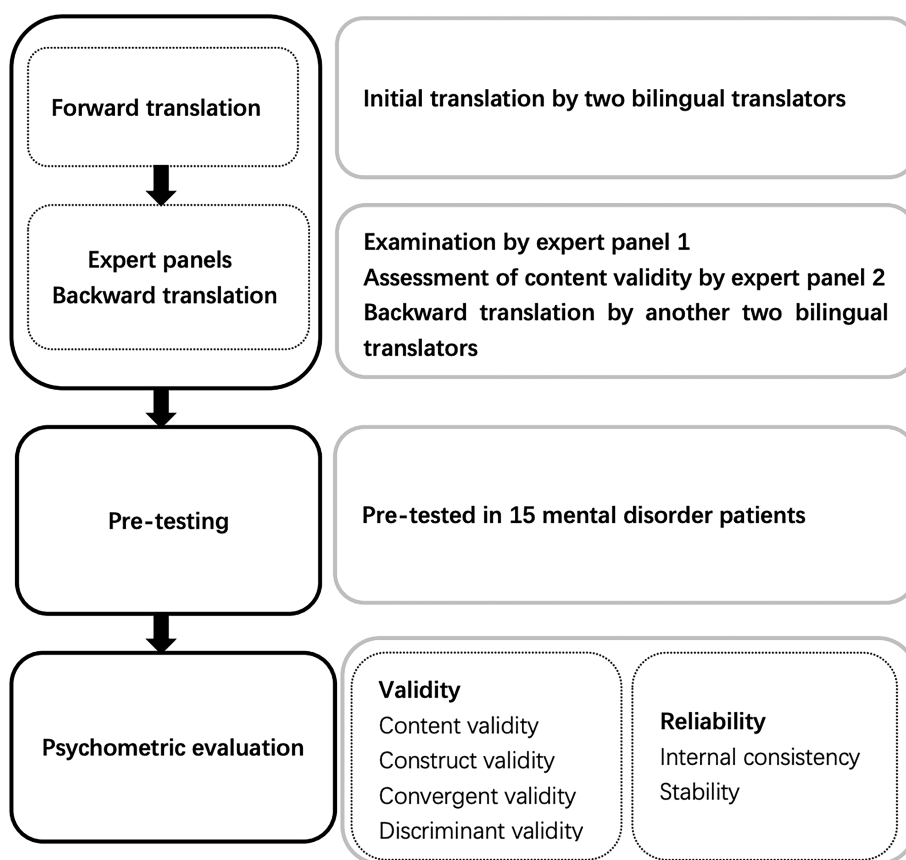


FIGURE 1 Flowchart depicting the process used for translation and validation of the instrument

items and evaluate the cultural and linguistic equivalence of each item until a consensus was achieved.

The second expert panel was then engaged to determine if the language, content, and structure of the Chinese-translated version of the QASD were appropriate for measuring the self-disgust in Chinese population. In this step, 15 experts, including five psychiatrists, five associate professors, and five nursing specialists, were invited to score and evaluate the validity of each item using a 4-point rating scale (1 = *uncorrelated*, 2 = *weakly correlated*, 3 = *moderately correlated*, and 4 = *highly correlated*; D.F. Polit, Beck, & Owen, 2007). The content validity index (CVI) was used to examine the content validity scores for each item (I-CVI) and the scale-level CVI/average (S-CVI/Ave). The I-CVI is the proportion of experts who rate an item as relevant, whereas the S-CVI/Ave is the proportion of items rated as relevant by all raters (D.F. Polit & Beck, 2006). For a scale to be judged as having excellent content validity, it should contain only items with an I-CVI of $\geq .78$ and have a S-CVI/Ave of $\geq .90$ (D.F. Polit et al., 2007). The outcomes of the CVI processes are presented in the result section.

Following the recommendation of World Health Organization, the modified Chinese version of the QASD was given to another two bilingual translators separately for translation back into German. The back-translated version was remarkably similar to the original QASD. Then, the prefinal version was developed.

2.3 | Phase 2: Pretesting

The prefinal version was tested in 15 patients with mental disorder. The inclusion criteria were as follows: the subjects had been diagnosed mental disorder; had no cognitive impairment, able to communicate, and willing to participate. Participants were asked to comment on their understanding of the wording, and modifications were made according to the participants' feedback on the items. Finally, the final Chinese version of the QASD was generated (The translated Chinese version and English version of the 14-item QASD are provided in Supporting Information).

2.4 | Phase 3: Psychometric evaluation

2.4.1 | Setting and participants

The participants were recruited from a psychiatric hospital in Tianjin, north China. The inclusion criteria were as follows: (a) age over 18 years; (b) ability to communicate; and (c) willingness to participate. The exclusion criteria were as follows: suffering from serious acute or chronic diseases, such as severe heart failure, liver disease, kidney failure, malignant tumour, and so forth. After obtaining approval from the Tianjin University of Traditional Chinese Medicine Ethics Committee, the participants were enrolled in this study. Prior to the study, the participants were informed of the objectives, significance, and principles of privacy protection. Each of

the participants signed the informed consent form and had the right to drop out at any time during the study. The research team consists of a doctoral student as the leader and five master students as research assistants, all of whom have been systematically trained. During the study period, five research assistants distributed questionnaires to patients and checked whether there were missing items when the questionnaires were collected. Once the missing items were found, the corresponding patients were immediately asked to fill in.

During the study period (2016–2020), a total of 1,100 questionnaires were sent out, and 1,068 remained after the invalid questionnaires were removed, with no missing values. The 1,068 participants were outpatients and inpatients at a psychiatric hospital. According to the diagnostic criteria (Chinese Classification of Mental Disorders, Third Edition [CCMD-3]) of the clinical psychiatrist on the patients' medical record, the participants have the following diagnoses: moderate to major depression ($n = 210$), eating disorders ($n = 221$), schizophrenia ($n = 202$), BPD ($n = 204$), and anxiety ($n = 231$). A total of 630 (58.99%) were male and 438 (41.01%) were female. The ages ranged from 18 to 57 years, with a mean age of 36.58 ± 14.14 years. Table 1 provides the participants' descriptive characteristics. Subsequently, 29 patients received a second survey approximately 2 weeks after responding, to assess test–retest reliability of the QASD.

2.5 | Measures

2.5.1 | Demographics and clinical information

Demographic and clinical information was obtained from the participants using a questionnaire designed by the researcher that yielded information about age, gender, education, marital status, place of residence, financial status, and mental disorder diagnosis.

2.5.2 | The Questionnaire for the Assessment of Self-Disgust

The QASD is a 14-item, self-reported measure for self-disgust that can be used in clinical and nonclinical samples (A. Schienle et al., 2014). It contains two subscales: "personal disgust", with nine items to assess the devaluation of one's own physical appearance and personality (e.g., "I find myself repulsive"), and "behavioural disgust", with five items that assess the devaluation of one's own behaviour (e.g., "I regret my behavior"). All items are rated on a 5-point Likert scale (*not true at all* to *absolutely true*). The total score reflects the standard of self-disgust, with high values indicating more self-disgust (Data S1). In the original version of the study, the QASD showed good psychometric properties, and the subsequent studies also reported the strong internal consistency of the QASD ($\alpha = 0.85$, A. Schienle et al., 2015; $\alpha = 0.92$, A. Schienle, 2018).

TABLE 1 Demographic characteristics of the samples

Variables	N = 1,068	%
Age (mean \pm SD)	36.58 \pm 14.14	
Gender (n/%)		
Male	630	58.99
Female	438	41.01
Education (n/%)		
Primary and below	80	7.49
Junior high school	355	33.24
Senior high school	456	42.7
College and above	177	16.57
Marital status (n/%)		
Single	29	2.72
Married	951	89.04
Divorced	33	3.09
Widowed	55	5.15
Place of residence (n/%)		
City	958	89.7
Rural	110	10.3
Financial status (n/%)		
Poor	342	32.02
Fair	205	19.19
Good	376	35.21
Very good	145	13.58
Mental disorder diagnosis (n/%)		
Depression	210	19.66
Eating disorders	221	20.69
Schizophrenia	202	18.91
BPD	204	19.1
Anxiety	231	21.63

Abbreviation: BPD, borderline personality disorder.

2.5.3 | Self-Esteem Scale

The Self-Esteem Scale (SES) is a unidimensional measure of global feeling of self-worth (Rosenberg, Rosenberg, & McCord, 1978). The scale contains 10 items, and all items are rated on a 4-point Likert scale (*strongly agree* to *strongly disagree*). The total score for self-esteem of individual is calculated by adding the responses of the 10 items. The internal consistency of Chinese version of SES was $\alpha = 0.85$ (Lin & Huang, 2010).

2.5.4 | Trait Anger Scale

The Trait Anger Scale (TAS) is a 10-item scale that participants reported how angry they generally felt (Spielberger & Reheiser, 2003). All items are rated on a 4-point Likert scale (*almost never* to

almost always). The total score for anger of an individual is calculated by adding the responses of the 10 items. The internal consistency of Chinese version of TAS was $\alpha = 0.76$ (Liu & Gao, 2012).

2.6 | Statistical Analysis

IBM SPSS software Version 22.0 and Analysis of Moment Structure (AMOS) Version 17.0 were employed for data management and statistical analysis.

First, descriptive statistics were used to describe the demographic characteristics of participants. Then, after checking and confirming the validity of the raw data, the research team then conducted a confirmatory factor analysis (CFA). CFA was used as a critical step in refining the instrument and identifying the factorial structure of self-disgust in the QASD.

We assessed the goodness of fit for model using various parameters, including chi-square, the Tucker–Lewis index (TLI), the comparative fit index (CFI), and the root mean square of approximation (RMSEA). For TLI and CFI, values greater than 0.95 are considered to reflect an excellent fit, while values between 0.95 and 0.90 are considered indicative of an acceptable fit. For RMSEA, values less than 0.06 are considered indicative of a good fit, while those between 0.06 and 0.08 are considered indicative of an acceptable model (Harrington, 2009).

In the CFA, we confirmed the two-factor structure of self-disgust, through evaluating the factor loading of each of the items ≥ 0.50 (Gorsuch, 1997). Using the bifactor model as a method to describe an instrument's latent structure has recently become more prevalent (Gibbons, Rush, & Immekus, 2009). This approach could provide an alternative factor structure and support the use of a general factor while accounting for specific factor. Therefore, we examined the factor structure by conducting a one-factor model and bifactor model to compare with the proposed model (i.e., a two-factor model), which could provide useful insights on the underlying factor structure of self-disgust. In addition, we examined the measurement invariance across patients with heterogeneous mental health diagnoses by using multiple-group confirmatory factor analysis.

Furthermore, convergent validity was measured by Pearson's correlation between the QASD and SES; discriminant validity was measured by Pearson's correlation between the QASD and TAS. Last, to evaluate internal consistency of the QASD, both Cronbach's alpha and omega coefficients with a 95% confidence interval (CI) were measured. The omega coefficients were measured using the Userfriendlyscience package in R. Cronbach's alpha has previously been insufficient to measure the reliability of psychological scales for a variety of reasons (for details, see Dunn, Baguley, & Brunsden, 2014). Therefore, we measured the omega coefficients so that the reliability can be estimated in an alternative manner. Internal consistency was considered adequate when $\alpha \geq 0.70$ (S) and omega coefficient ≥ 0.70 (Cicchetti, 1994). Stability of the QASD was calculated by the test–retest (Munro, Visintainer, & Page, 1986).

3 | RESULT

3.1 | Validity

3.1.1 | Content validity

In our study, the item-level CVIs (I-CVIs) ranged from 0.87 to 1.00, and the calculated scale-level CVI (S-CVI) was 0.99, indicating that the QASD content was valid.

3.1.2 | Construct validity

Figure 2 shows the results of factor structure and model fit of the QASD using CFA. Final fit statistics were all optimal as follows: chi-square ($\chi^2 = 92.427$, $df = 76$, $p < .001$), TLI = 0.995, CFI = 0.995,

RMSEA = 0.010 (0.001, 0.021). Table 2 presents the fit indexes for model comparison. In accordance with our hypothesis, the results showed that the chi-square difference test between one-factor model and two-factor model was significant (703.360, $\Delta df = 1$, $p < .001$), and the chi-square difference test between the bifactor model and two-factor model was significant (25.344, $\Delta df = 13$, $p < .05$), which indicated that the two-factor model had a significantly better fit than the one-factor model and the bifactor model.

Further, we evaluated, whether the two-factor model generalizes across patients with heterogeneous mental health diagnoses (moderate to major depression: $N = 210$; eating disorders: $N = 221$; schizophrenia: $N = 202$; BPD: $N = 204$ and anxiety: $N = 231$) by a multiple-group analysis. First, the configural invariance (i.e., the unconstrained multigroup) model was computed. Under this process, both factor loadings and intercepts were unconstrained, thus allowing to differ between groups. The resulting model had an acceptable fit

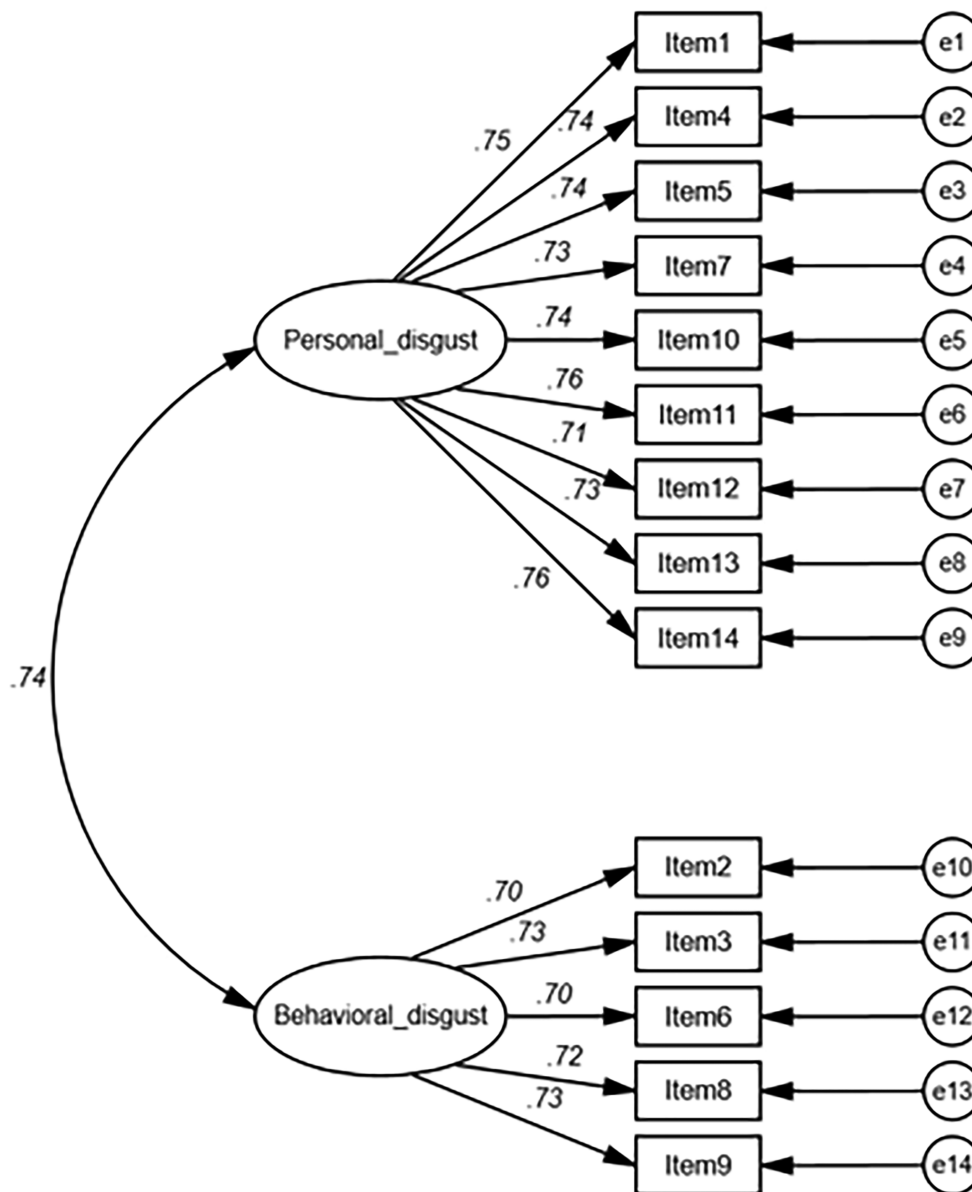


FIGURE 2 Factor structure of the refined model of the Questionnaire for the Assessment of Self-Disgust (QASD)

TABLE 2 Goodness-of-fit indexes of model comparison and invariance models ($N = 1,068$)

Model	χ^2	df	CFI	TLI	RMSEA	$\Delta\chi^2$	Δdf	p
Model comparison								
Two-factor model	92.427	76	0.995	0.995	0.010			
One-factor model	795.791	77	0.911	0.896	0.097	703.360	1	***
Bifactor model	67.803	63	0.922	0.906	0.088	25.344	13	.021
Measurement invariance								
Configural invariance	387.056	215	0.970	0.973	0.053			
Metric invariance	431.719	167	0.968	0.969	0.056	44.663	48	.610
Scalar invariance	489.269	119	0.964	0.969	0.056	57.550	48	.163

Abbreviations: CFI, comparative fit index; TLI, Tucker–Lewis index; RMSEA, root mean square of approximation.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

($\chi^2 = 387.056$, $df = 215$, CFI = 0.970, TLI = 0.973, RMSEA = 0.053). Metric invariance (factor loadings fixed, intercepts free) resulted in same fit indices as the configural invariance model ($\Delta\chi^2 = 44.663$, $\Delta df = 48$, $p = .610 > .05$). Scalar invariance (factor loadings fixed, intercepts fixed) resulted in same fit indices as the metric invariance model ($\Delta\chi^2 = 57.550$, $\Delta df = 48$, $p = .163 > .05$). In the current findings, all measurement invariance models exhibited a good fit to the data and the final invariance model is a scalar invariance model cross the patients with heterogeneous mental health diagnoses, indicating satisfactory psychometric properties for measurement invariance. (Table 2).

3.1.3 | Convergent validity

Convergent validity was assessed by the correlation of the QASD with the SES. The personal disgust and behavioural disgust showed a negative moderate correlation with the SES ($r = -.60$, $p < .01$; $r = -.55$, $p < .01$), indicating adequate concurrent validity of the QASD (Table 3).

3.1.4 | Discriminant validity

Discriminant validity was assessed by the correlation of the QASD with the TAS. The personal disgust and behavioural disgust showed a low positive correlation with the TAS ($r = .28$, $p < .01$; $r = .23$, $p < .01$), indicating adequate divergent validity of the QASD (Table 3).

TABLE 3 Correlation of the QASD with the SAS and TAS ($N = 1,068$).

Dimensionality	SAS	TAS
Personal disgust	-.60	.28
Behavioural disgust	-.55	.23

Abbreviations: QASD, Questionnaire for the Assessment of Self-disgust; SAS, Self-Esteem Scale; TAS, Trait Anger Scale.

3.2 | Reliability

3.2.1 | Internal consistency reliability

The Cronbach's alpha of the personal disgust and behavioural disgust was 0.92 and 0.84, the omega coefficient was 0.92 [0.91, 0.92] and 0.84 [0.83, 0.86], indicating that the QASD had good internal homogeneity.

3.2.2 | Stability

To evaluate the test–retest reliability, 29 patients from the current sample completed the QASD twice, with a time interval of 2 weeks. The intraclass correlation coefficient (ICC) for the personal disgust and behavioural disgust was 0.62 and 0.77, indicating that the QASD has moderate stability over time.

4 | DISCUSSION

Given the self-disgust is increasingly used in clinical mental health, an adequate tool to effectively measure it is of great significance. Firstly, bridging the gap of previous researches, the present study is the first one to test the reliability and validity of the Chinese version of the QASD among Chinese mental disorders. Secondly, the study findings provide future researchers and clinicians with information of necessary steps to evaluate psychometric properties of QASD.

The translation of this study instrument dealt with two languages from different linguistic groups. The target language was Chinese, which is a Sino-Tibetan language,

whereas the source language was German, an Indo-European language. Due to the huge differences in cultural background, these languages differ from each other syntactically, semantically, and morphologically (G. Zhou, Chen, Feng, & Zhou, 2019; H. Zhou, Chen, Yang, & Dunlap, 2010). In cross-language translation, these factors, including cultural situation, emotiveness (the intention of the original

author is hidden in the text), untranslatability (no same meaning as the original word is available in the translated language), and the translators, should be considered (Degani et al., 2016). The effect of the aforementioned factors was minimized by following a standard method of translation in the translation process. In our study, we strictly followed the guidance of the World Health Organization's Process of Translation and Adaptation of Instruments. Through the translation-retranslation procedure and the evaluation of expert panels, we translated them into Chinese functional equivalence to the original items.

Assessment of the translated instrument's reliability and validity revealed acceptable outcomes that confirmed the QASD has good psychometric properties. As shown in results, the Chinese QASD Cronbach's alpha was consistent with the result in the Austria study (0.92) (A. Schienle, 2018). However, the Cronbach's alpha of the subscale "personal disgust" (0.92) and "behavioural disgust" (0.84) found in this research was slightly different from the study by Ille et al. (2014) (0.79, 0.91). We speculate that among other reasons, the subtle variations of internal consistency in our and previous studies could be due to differences in sample size and the clinical characteristics of the study subjects. Given the consensus in the psychometric literature that Cronbach's alpha is rarely appropriate and given the good performance of omega when the assumptions of alpha are not met, it is recommended that omega be calculated along with CIs for each subscale comprising the test (Dunn et al., 2014). Because there was no difference in the results of the alpha and omega of the subscale, this suggested that the evidence of good internal consistency in QASD is sufficient. Besides, the results showed moderate test-retest reliability; hence, our findings indicated that the QASD is stable for 2 weeks.

With regard to the construct of self-disgust, a model of problematic and enduring self-disgust as a distinct emotion schema was raised by P.A. Powell, Simpson, and Overton (2015). They described self-disgust as a lasting disgust-based cognitive-affective orientation towards self, composed of interacting state and higher order trait components. The construct of self-disgust has also been treated both as a negative personality trait (B.O. Olatunji, David, & Ciesielski, 2012) and as a distinct self-conscious emotion (Roberts & Goldenberg, 2007). Yet, despite these previous theoretical results, the self-disgust construct itself remains particularly ambiguous (P.A. Powell, Overton, Simpson, 2014a). Even so, the two-factor structure of self-disgust is persuasive in QASD and SDS. As had been predicted, our study revealed that the Chinese version of the QASD comprises two dimensions of self-disgust: personal disgust and behavioural disgust. These perfectly fits the two-factor model proposed by the original authors. Generally, the two factors of the QASD was consistent with those of the SDS: the "disgusting self," concerned with enduring context-independent aspects of the self, and "disgusting ways," concerned with behaviour (Overton et al., 2008). Moreover, similar factors have been obtained from studies of self-criticism: "hated self" and "inadequate self" (Gilbert, Clarke, Hempel, Miles, & Irons, 2004). This finding reveals that the experience of self-disgust may at times include some kind of self-criticism, which was consistent with the results of Simpson et al. (2010). The evidence of recent correlations

suggest that self-disgust may share some commonality with self-directed negative cognitions (Overton et al., 2008; Simpson et al., 2010); it is likely that the self-disgust is somewhat an indicator of other negative self-directed constructs (e.g., self-criticism and self-hatred). P.A. Powell, Overton, Simpson (2014a) pointed that a minority of items in the SDS include vocabularies such as hate and dislike, which are likely to tap into additional constructs. However, these vocabularies about negative self-conscious emotion also appeared on the QASD scale, which is something we should be wary of.

To further identify the factorial structure of the QASD, we examined the factor structure by conducting a one-factor model and bifactor model to compare with the two-factor model. The results showed that the two-factor structure model of the QASD is convincing and worthy of promotion. Previous research has shown that different psychiatric disorders investigated differed from each other regarding the severity of dysfunctional self-perception and the associated psychopathologic symptoms. For example, patients afflicted with BPD and patients with eating disorders reported the most elevated personal disgust; personal disgust was predictive of psychoticism and depression, while behavioural disgust was predictive of anxiety (H.A. Azlan, Overton, Simpson, Powell, 2017a; Ille et al., 2014; P.A. Powell et al., 2013). Therefore, in order to determine whether the two-factor structure of QASD is stable in different psychiatric samples, we evaluated the extent to which the two-factor structure can be replicated across patients with heterogeneous mental health diagnoses. The findings indicated that the QASD has the same structure and meaning across patients with heterogeneous mental health diagnoses. These results provided important additional information on the potential utility of QASD for different groups of mental disorders.

The negative moderate correlation between the self-disgust and the self-esteem was consistent with the study of Simpson et al. (2010) ($r = -.67$), which implied that the structure of self-disgust and self-esteem are supposed to be similar to some extent. That is to say, as two extremes of cognition and emotion in the structure of self, self-disgust and self-esteem construct a continuum from negative to positive (Johnson & Wood, 2017). The low correlation between the self-disgust and trait anger showed that both of them belong to negative emotions, but they are not much related. This result suggested that although self-disgust has both cognitive components and emotional components, it is more specifically a self-concept of how one feels disgusted towards themselves.

In addition, the two factors personal disgust and behavioural disgust were moderately correlated with each other ($r = .68$), which was higher than the result of the original scale ($r = .48$; A. Schienle et al., 2014). This implied that the two trait facets of self-disgust are partially independent from each other and therefore may be differentially related to other trait factors as well as to specific psychopathologies. For example, hostility and psychoticism were the best predictors for personal disgust, while interpersonal sensitivity and anxiety predicted behavioural disgust (Ille et al., 2014). Therefore, further research should continue to focus on these interesting associations concerning different aspects of self-disgust and their potential relationship with other trait factors in mental disorders.

4.1 | Limitations

Although our findings provide important support for the psychometric properties of the QASD Chinese version, some methodological limitations may reduce the scope of their generalizability. First, according to the newly criteria for good content validity of a patient-reported outcome measure. Content validity is formed of item relevance, appropriateness of response options and recall period, comprehensiveness, and comprehensibility (Terwee et al., 2018). In our study, we just test the comprehensibility and item relevance, which only reflect some degree of content validity. For that, we suggest that a fuller investigation of content validity is warranted. Second, we gathered the sample exclusively in the urban area of Tianjin, and thus, the results might not be generalizable to other locations in China; a larger and more diverse sample is needed in future research. Besides, due to limitations in time and finance, we could not provide face-to-face instructions during the process of completing the questionnaire, which might have resulted in a higher response rate. Therefore, an alternative method of collecting the data may be needed in the future.

5 | CONCLUSION

In this study, our findings suggest that the QASD Chinese version is a reliable and valid instrument with adequate psychometric properties to assess self-disgust.

Furthermore, our study has the value of offering evidence that the QASD is a promising tool for further investigation of the role of self-disgust in mental health problems. Specifically, the two facets, personal and behavioural disgust, can be investigated together with other facets of mental health problems in clinical groups to explore potential relationships.

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AUTHOR CONTRIBUTIONS

Y. J. and M. J. were involved in the study's conception and design; Y. J. and Y. L. were involved in data collection and analysis; and Y. J., Y. L., M. J., and M. G. drafted the manuscript.

ETHICS DECLARATIONS

The study was approved by the Tianjin University of Traditional Chinese Medicine Ethics Committee (reference number: 2016-1217).

The participants signed the informed consent form and had the right to drop out at any time during the study.

CONSENT FOR PUBLICATION

Not applicable.

CONFLICT OF INTEREST

There is no conflict interest.

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