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# Psychometric properties of the chinese version of the value-based stigma inventory (VASI): a translation and validation study

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## Abstract

**Objective** This study aimed to develop a culturally adapted Chinese version of the Value-based Stigma Inventory (VASI) and to evaluate its psychometric properties, including reliability and validity, among the general Chinese population.

**Methods** This study is a cross-sectional study. Convenience sampling was used to recruit 708 general citizens from Shenyang City, Liaoning Province, China. The VASI's internal consistency, split-half reliability, and test–retest reliability were tested to assess the translated scale's reliability. Several validity tests were performed, including expert consultation, exploratory factor analysis, and confirmatory factor analysis. Data were analyzed using SPSS 25.0 (IBM Corp., Armonk, NY, United States) and AMOS 23.0 (IBM Corp., Armonk, NY, United States).

**Results** The Chinese version of the VASI showed good reliability, with a Cronbach's  $\alpha$  value of 0.808, and the dimensions ranged from 0.812 to 0.850. Test–retest reliability showed good temporal stability with a value of 0.855, and the split-half reliability value was 0.845, indicating a high degree of consistency. The scale also demonstrated good content validity with a content validity index of 0.952. After conducting exploratory factor analysis, a five-factor structure was identified, including factors of self-realization, personal enrichment, reputation, meritocratic values, and security. In the confirmatory factor analysis, all recommended fit indicators were found to be within the acceptable range, including  $\chi^2/DF = 1.338$ ,  $GFI = 0.960$ ,  $AGFI = 0.940$ ,  $RMSEA = 0.031$ ,  $TLI = 0.985$ ,  $CFI = 0.989$ ,  $IFI = 0.989$ ,  $PGFI = 0.640$ , and  $PNFI = 0.729$ .

**Conclusion** The Chinese version of the VASI is valid and reliable among the Chinese general public. The five-factor structured scale effectively assessed public stigma against mental illness, including the value orientations associated with personal stigma. Given the harsh and widespread public stigma against mental illness, the findings from the questionnaire may inform the development of future public health education programs. Public health education is needed to reduce the stigma of mental illness, increase public awareness of mental health issues, and mitigate the continued stigmatization of mental illness.

**Keywords** Stigma, Mental illness, Values, Factor analysis, Psychometric validation, Cross-cultural adaptation

## Introduction

The World Health Organization (WHO) defines stigma as “a mark of shame, disgrace, or disapproval that results in an individual being rejected, discriminated against, and excluded from participating in several different areas of society” [1]. This definition originated from Erving Goffman, who first introduced stigma in 1963 as an

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“attribute that is deeply discrediting” and a “situation of the individual who is disqualified from full social acceptance” [2].

Individuals diagnosed with mental illness often face marginalization, stigma, and isolation compared to those with other physical illnesses like tuberculosis, cancer, and epilepsy [3–5]. Stigmatization exacerbates the psychological burden of individuals with mental illnesses and often leads them to avoid seeking necessary medical help for fear of negative societal judgment [6]. This avoidance behavior can worsen the condition, creating a vicious cycle [7]. Misunderstanding and fear of mental illnesses within society are significant causes of stigmatization, with the media often portraying mental illnesses in a dramatic and stereotypical manner, further intensifying public prejudice [8, 9].

Mental illness significantly impacts the global population. According to a 2014 WHO report, one in four people will suffer from a lifetime mental illness, accounting for 15% of the global disease burden [10]. Recent WHO data indicate that nearly 2.8 billion people worldwide suffer from mental disorders, with about 230 million suffering from depression [11]. In China, the number of people with mental illness is rising due to rapid socio-economic development and the scarcity of mental health services. The prevalence rate has risen from 3.2% in the 1970s to 15.56% [12]. The 2013–2015 National Epidemiological Survey of Mental Illness revealed a lifetime prevalence of mental illness in China of about 16.6%, with a 12-month prevalence of 3.6% and a lifetime prevalence of 6.8% for depression [13].

The stigma of mental illness is common worldwide [14], manifesting differently across socio-cultural contexts [15, 16]. Cultural ideology profoundly influences public attitudes and perceptions of mental illness [16]. Yang et al. introduced the theory of “what matters most” (WMM) to understand cultural differences in mental illness stigma, arguing that specific cultural measures are needed because stigma is influenced by local culture [17]. In collectivistic cultures like China, mental health stigma may be mitigated by social support systems [18]. In contrast, individualistic cultures such as the United States emphasize addressing mental illness on one’s own [18]. Without adequate support and facing public discrimination, people with mental illness may feel powerless, hindering recovery [19].

However, “WMM” differences exist both across and within cultures. In China, the interplay between modern and traditional values is notable. Despite modernization, traditional values continue to hold significant influence [20]. Social psychologists such as Yang suggested that Chinese people may adopt both personal modernity (emphasizing gender egalitarianism) and personal

traditionalism (grounded in Confucianism) [21]. Personal traditionalism includes obedience to authority, filial piety, respect for ancestors, peace and conformity, fatalistic self-preservation, and male dominance [22]. Personal modernity includes egalitarianism, openness, independence, voluntarism, proactivity, assertiveness, respect for emotions, and gender equality [22]. These values shape public attitudes towards mental illness and influence perceptions of its stigmatization [23].

Schomerus and Angermeyer explored cultural differences in mental illness stigma using WMM theory, linking it to conservative/authoritarian values and liberal/modern ones [24]. They hypothesized a “blind spot in stigma research,” suggesting that liberals may also stigmatize people with mental illness if perceived as a threat to “self-fulfillment.” In family-oriented Asian cultures, stigma is exacerbated because mental illness is seen not only as a personal problem but also as a source of family shame [25, 26]. In traditional Chinese culture, mental illness may be viewed as a “bad seed” that negatively reflects the family lineage [26–29]. Cultural misconceptions and stigmas about mental illness affect the intent to seek professional help and use healthcare resources [30].

Most domestic surveys on mental illness stigma focus on measuring public stigma and its associated factors, considering social psychology, cultural perceptions, educational levels, personal experiences, and media portrayals. Research shows that prejudices against unknown or labeled groups can translate into stigmatizing attitudes [31]. Cultural factors significantly influence responses to mental illnesses, with some cultures more inclined to exclude and discriminate against those with mental health conditions [32]. Educational level is important; lower education levels are associated with more misconceptions and fears about mental illnesses [33, 34]. Personal experiences with individuals with mental illnesses can reduce stigmatizing attitudes [35]. Media portrayals often exacerbate public stigmatization through stereotypes and negative labels [36]. Questionnaires used in these studies include the Public Stigma of Mental Illness Scale [37], the Mass Discrimination Scale [38], the Link Perceived Devaluation Discrimination Scale [39], and the Psychiatric Attitude Questionnaire [40]. The instruments mentioned are all designed to be utilized with the public. However, these tools often overlook the intricate role of personal and societal values in shaping stigmatizing attitudes.

To address the gap in understanding the role of personal and societal values in shaping stigmatizing attitudes, Sophia Rieckhof and Christian Sander developed the Values-based Assessment of Stigma in Illness (VASI) scale [41]. To substantiate the criterion validity of the VASI, we administered the Perceived Derogatory

Discrimination (PDD) scale and the 21-item Portrait Values Questionnaire (PVQ-21). The VASI evaluates stigma within conservative/authoritarian and liberal/modern value systems. The original scale has shown acceptable internal consistency, with a Cronbach's alpha of 0.879 for the overall scale and between 0.721 to 0.805 for the subscales [41]. In a study on public attitudes toward euthanasia or assisted suicide for psychiatric conditions in Germany, the VASI exhibited an internal consistency of 0.85, reinforcing its validity [42].

Despite its robust properties and demonstrated validity in various contexts, the VASI has not been adapted into other languages or introduced in China. This study aims to translate the VASI into Chinese and assess its reliability and validity. We aim to provide a quick and accurate measure of public perceptions of mental illness stigma, including personal stigma-related value orientations. It is expected that the Chinese version of the VASI will demonstrate satisfactory reliability and validity, enabling effective identification and implementation of interventions to reduce the negative effects associated with mental illness stigma in future studies.

### Study design and participants

From October to December 2022, we conducted a cross-sectional study in three communities of Shenyang City, Liaoning Province, China. The inclusion criteria were as follows: we recruited literate adults who lived in the target neighborhoods of Shenyang City, were at least 18 years old, were able to provide self-reported information, and voluntarily agreed to participate. Exclusions were made for severe cognitive and psychiatric impairments, communication impairments, unclear communication, and involuntary participation. Ultimately, 708 participants were recruited through community workers using a convenience sampling method. Basic demographic information such as age, gender, education level, and personal contact with mentally ill individuals was collected.

### Translation procedure

We obtained permission by email from Dr. Sophia Rieckhof, the author of the original version, to translate and adapt the VASI. Based on an adapted Brislin translation model, including translation, back-translation, transcultural adaptation, and a pilot study, the first draft of the Chinese version was translated from the English version of the VASI [43, 44].

### Translation and back-translation

Step 1: Forward translation: Two proficient Chinese speakers who were fluent in English translated the English version of the VASI twice independently to form the

first Chinese version. Translator 1, a nursing graduate student who has passed the CET-6 exam with experience in foreign language translation, ensured clinical equivalence of the translated scale with the original. Translator 2, a master's student in English without any medical background, translated the questionnaire from a linguistic perspective.

Step 2: Integration: In addition to the forward translation, a native Chinese-speaking graduate nursing student who is fluent in English compared the two translations. The second Chinese version of the VASI was developed through discussion among the three researchers. In this stage, the three researchers agreed to integrate their differences.

Step 3: Back Translation: Two nursing PhDs, native Chinese speakers, translated the second Chinese version into English. Both of them had excellent medical English skills but had not seen the original VASI, which helped to avoid information bias and elicit unexpected meanings of the items in the translated questionnaire. To ensure accuracy, two bilingual nurse educators, unaware of the original English version, compared and adjusted for inconsistencies between the two translated versions. The back-translators repeated the translation several times, and if the translations did not match the original English version, multiple adjustments and back-translations were made as needed until the translations matched the original English version. It resulted in the final draft of the Chinese version of the VASI.

### Transcultural adaptation

Step 1: Expert consultation: Several experts were invited to modify the scale items to make them more consistent with the Chinese cultural context and expressions while ensuring that the original wording and meaning of the items remained unchanged to ensure that respondents could clearly understand the content of the items. An expert committee consisting of two psychiatrists, two psychologists, one clinical nurse specialist, one English language specialist, and one nurse researcher with experience in acculturation and validation studies reviewed and revised the semantics, language expression habits, and professional nature of the first draft of the Chinese version to make it consistent with the Chinese cultural context.

Step 2: Pretest: Convenience sampling was used to select 30 participants who met the inclusion criteria. Before distributing the scales, the researchers explained the study's purpose, methods, and significance to the participants and obtained informed consent. Afterward, an interview was conducted in which the interviewer asked if any of the items on the scale were ambiguous, difficult to understand, or unpleasant. Based on the consistent

feedback from the interviews, the final Chinese version of the VASI was completed after the final revision of the scale was corrected and proofread. The translation procedure is shown in Fig. 1.

**Questionnaire design**

**Background characteristics**

Our general demographic characteristics questionnaire, which included age, gender, education level, and personal contact with mentally ill people, was developed after a systematic literature review and expert group consultation.

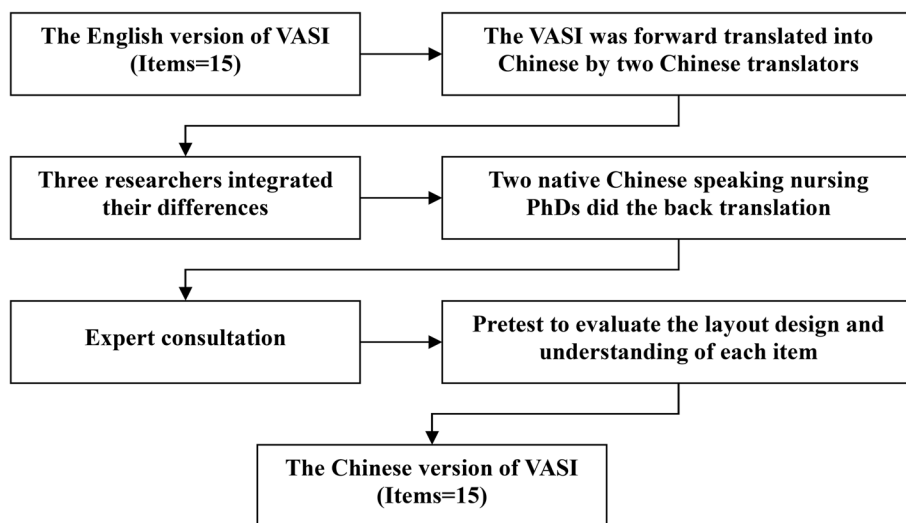
**The VASI**

The VASI is a 15-item scale developed by Dr. Sophia Rieckhof et al. [41] to comprehensively measure public stigma of mental illness, including personal stigma-relevant value orientations. The scale is structured around five dimensions that reflect various aspects of stigmatization: Factor 1 focuses on Self-realization, Factor 2 on Personal Enrichment, Factor 3 on Reputation, Factor 4 on Meritocratic Values, and Factor 5 on Security, with three items corresponding to each dimension. An example item from the scale is as follows: “If you live together with a mentally ill person, it is difficult to lead a life according to your own ideas.” This item reflects the challenges that may be felt in terms of self-actualization when an individual approaches a person with mental illness. The scale has both positive and negative wording (reverse scoring for items 3, 7, and 9) and a 5-point scoring system ranging from 1 to 5, with higher scores indicating a stronger level of stigma against mental illness. The scale has acceptable internal consistency, with a Cronbach’s

alpha of 0.879 for the overall scale and 0.721–0.805 for the subscales. The unique strength of the VASI scale lies in its explicit focus on the value orientations that underpin the stigma associated with mental illness. Unlike the Perceived Devaluation Discrimination (PDD) scale, which primarily measures public perception of mental illness stigma, the VASI is designed to delve into the value-based dimensions that contribute to the formation of such stigma. Therefore, the VASI scale provides a more refined and multidimensional tool for researching and understanding the stigmatization of mental illness, especially when considering the impact of personal and societal value orientations on attitudes towards stigmatization. This makes the VASI a tool of choice for research that aims to explore the complexity and multifaceted nature of stigma by considering the complex role of values in shaping public perceptions of mental illness.

**The perceived devaluation discrimination scale (PDD)**

This study used the PDD scale to assess criterion validity [39, 45]. The PDD scale is mainly used to measure individuals’ perceptions of how the public views and thinks about people with mental illness and assesses the degree of social stigma against people with mental illness. A higher score reflects more stigma. An example item from the PDD scale illustrates this measurement: “Most people would willingly accept a person who has had mental illness as a close friend.” This item taps into the social acceptance dimension, which is a key aspect of perceived devaluation experienced by individuals with mental health conditions. Xu Hui translated and localized the Chinese scale version in 2008 [46]. The scale consists of 12 items, scored on a 4-point scale, with two



**Fig. 1** The translation procedure for Chinese version of the VASI

theoretical dimensions of perceived discrimination and perceived devaluation [47]. The scale has been shown to have good reliability and validity in Western community populations (Cronbach's alpha of 0.78 to 0.82) [47, 48], in patients with schizophrenia (Cronbach's alpha of 0.87) [49], and in patients with depressive disorders (Cronbach's alpha of 0.94) [50].

#### **The 21-item portrait values questionnaire (PVQ – 21)**

In this study, personal values were also measured by the 21-item Portrait Values Questionnaire (PVQ-21) [51], which was adapted from the European Social Survey (EES) [52]. The 21-item scale is divided into ten subscales: Self-Direction, Stimulation, Hedonism, Achievement, Power, Security, Conformity, Tradition, Benevolence, and Universalism. Each subscale has two items, except for universalism, which has three. Each item describes a portrait: "He takes advantage of every opportunity to enjoy himself. It is important to him to do what makes him happy." The subjects were asked to respond to how much the person described resembles themselves on a scale from Very much like me (1) to Not like me (6). The sum of the items on each subscale was the score for that subscale. When investigating European attitudes, beliefs, and behavior patterns, the average internal consistency coefficient of the scale was 0.56, with a range of variation from 0.36 for traditional values to 0.70 for achievement values [52–54]. Gao Zhihua translated and localized the Chinese version of the scale in 2016 [55]. The scale demonstrated strong psychometric properties in the Chinese population, with a Cronbach's alpha coefficient of 0.877, indicating good reliability and validity.

#### **Data collection**

In this study, a total of six researchers were recruited and equally divided into three groups of two people each. This grouping was intended to improve the efficiency and quality of the survey through teamwork. Each team was responsible for visiting a specific community to collect data. Three different communities were purposely selected for the study in order to ensure that the findings were broad and representative. Between October and December 2022, researchers visited each of these three communities after receiving relevant training and recruited participants through posters with the assistance of community staff. For adults who expressed interest in participating, we explained in detail the content, purpose, and meaning of the questionnaire and reminded them to fill it out carefully before distributing it. After obtaining informed consent, we distributed the questionnaires on site so that participants could complete them independently. After completing the questionnaires, all questionnaires were also collected on site. In order to ensure

the completeness and quality of the data, the researcher carefully checked the completion of the questionnaires. In addition, to assess the retest reliability of the questionnaires, 60 participants were randomly selected two weeks later and invited to complete the same questionnaires again.

#### **Statistical analysis**

Statistical analysis was conducted with a 95% confidence level using SPSS 25.0 (IBM Corp., Armonk, NY, United States) and AMOS 23.0 (IBM Corp., Armonk, NY, United States). The participants' general demographic characteristics were described using frequency and composition ratios, while the quality of the items was evaluated using item analysis and the content validity of the scales using expert consultation. In this study, we utilized Exploratory Factor Analysis (EFA) to investigate the underlying factor structure of the translated scale. We opted for Principal Axis Factoring (PAF) as the method for conducting EFA due to its robustness when dealing with initial factor matrices. PAF extracts factors by maximizing the variance, which aids in more accurately identifying and interpreting the latent structure within the data. Furthermore, an advantage of PAF is its less stringent requirements regarding the normality of data distribution. This characteristic renders the method applicable to a variety of data distribution types and enhances its suitability across different research contexts. Confirmatory factor analysis (CFA) was conducted using AMOS 23.0 to examine the scales' structural validity, and the scales' homogeneity and stability were assessed using internal consistency and test–retest reliability analyses.

#### **Item analysis**

For item analysis, we utilized the critical ratio and item-total correlation tests, complemented by Cronbach's  $\alpha$  item deletion method, to assess the suitability and internal consistency of each item. The independent sample t-test was performed to calculate the absolute t-value between a high-score group, comprising the top 27% of respondents, and a low-score group, comprising the bottom 27%. Items were considered for deletion if their absolute t-values were below the threshold of 3, indicating insufficient discrimination between the groups [56, 57]. In addition, we calculated the corrected item-total correlation coefficient to identify any items with a coefficient less than 0.4, which would suggest a lack of homogeneity within the scale [57, 58]. Cronbach's alpha coefficient was calculated at the scale level, and the impact of each scale item was assessed by calculating Cronbach's alpha when the item was removed to assess internal consistency. Given the potential limitations of Cronbach's alpha coefficient in assessing the internal consistency reliability of

the VASI scale [59], this study employs the Omega coefficient for a more accurate estimation of reliability [60], thereby addressing the biases associated with Cronbach's alpha when dealing with ordinal data. It is suggested that if the value of the internal consistency coefficient alpha of the scale increases after deleting a specific item, then the item should be removed [57, 61]. This process helps to assess whether each item of the translation scale can be retained.

### **Reliability analysis**

To assess the reliability of the translated Chinese VASI, we conducted an internal consistency test based on Cronbach's alpha coefficient and a stability test based on the split-half coefficient. In split-half reliability analysis, the items are divided into two parts in odd and even order and the correlation between the scores of the two parts is calculated [62]. To assess the test–retest reliability of the VASI, we conducted a remeasurement with a two-week time interval on 60 participants who were remeasured with the translated scale, and correlation coefficients were calculated to evaluate the stability of the scale. We chose interval for the test–retest reliability assessment, considering that it is long enough for participants to forget the specific answers given in the last completed questionnaire. Their stigmatization towards individuals with psychiatric diagnoses and their values remain unchanged within a two-week period. Therefore, it is expected that there will be no bias in the selection of two weeks for the test–retest reliability analysis. All three Cronbach's coefficients, the split-half reliability coefficient, and the test–retest reliability coefficient had to be at least 0.7 to satisfy our requirements [58].

### **Validity analysis**

A panel of three psychiatrists, two psychologists, and two sociologists assessed the content validity of the translated scales using the Delphi method. These seven experts evaluated clinical terminology, the meaning of terms, completeness, appropriateness, logical sequence of statements, and accuracy. The experts were selected based on (i) their extensive expertise in psychiatry, psychology, and sociology; (ii) their familiarity with the scale's Chinese translation steps and psychological measures; (iii) requirements of at least bachelor's degrees and ten years experience in their fields; and (iv) their voluntary participation in this study and their availability to guarantee continuous attendance during the study period. We scored the experts' responses using a Likert scale (1 = not relevant, 2 = weakly relevant, 3 = strongly relevant, and 4 = highly relevant).

Strongly relevant and highly relevant were scored 1, while irrelevant and weakly relevant were scored 0. An item's content validity index (I-CVI) is the proportion of experts who rate an item as a 3 or 4. The S-CVI is the scale's content validity index, which is the mean of the I-CVI for each item in the scale. When the I-CVI is  $\geq 0.78$ , and the S-CVI is  $\geq 0.90$ , there is already an indication of good content validity, suggesting a good overall content validity of the scale [63]. We also assessed the ceiling/floor effect. A ceiling/floor effect was considered to exist if more than 15% of participants achieved the highest or lowest score [64]. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were used to investigate the underlying factor structure of the translated scale. We randomly divided the sample of 708 cases into two groups, one group ( $n=354$ ) for EFA and the other group ( $n=354$ ) for CFA. In general, the characteristics of the two groups were similar. The EFA and CFA were examined comprehensively for different population subgroups to effectively identify and confirm the scale's factor structure and construct validity. Using another sample to confirm the factor structure generated by the EFA would be more valid and convincing. KMO sampling adequacy with a cutoff value of 0.5 was used as an inclusion criterion for EFA [65]. Principal axis factor analysis of EFA was completed, and the dataset was considered suitable for factor analysis to explore the underlying factor structure of the scale of the Bartlett sphericity test was significant ( $p < 0.05$ ) [66] and the Kaiser–Meyer–Olkin (KMO)  $> 0.60$  [67, 68]. According to the recommendations, we should eliminate factors with cross-loadings or factor loadings less than 0.4 [69, 70]. If items do not meet these statistical methodological requirements, the corresponding items will be deleted [71]. Generally, over 50% of contributions are acceptable, and over 70% are suitable [72]. We then used an Analysis of Moment Structure (AMOS) to check the fit between the translation scale structures and observed the data through CFA. Like the EFA analysis, there were also inclusion criteria for whether an item would be retained in the CFA model. The inclusion criterion was that the path coefficient between an item and its predicted subscale in the EFA needed to be statistically significant ( $p < 0.05$ ). The following metrics must meet specific criteria to confirm the replicability of the first-order five-factor structure of the VASI:  $\chi^2/DF$ , the goodness-of-fit index (GFI), the adjusted goodness-of-fit index (AGFI), the incremental fit index (IFI), the Tucker Lewis index (TLI), and the comparative fit index (CFI). Typically,  $\chi^2/DF$  must be  $< 3$ , while all other values must be  $> 0.9$ , indicating a good fit of the model [71, 73]. Furthermore, the root means a square error of approximation (RMSEA) should be  $< 0.08$ , indicating a good fit and a well-structured model [74].

Additionally, convergent and discriminant validity tests were performed to determine the scale’s structural validity. Convergent validity was measured using the average variance extracted (AVE) values and the composite reliability (CR) values, with an acceptable model having a  $CR > 0.7$  and an  $AVE > 0.45$  [75]. We calculated the square root of the AVE value and the correlation coefficient for each factor to assess discriminant validity. We required that the square root of the AVE value exceeds the correlation coefficient between the corresponding factors [76].

**Convergent validity**

The calibration correlation tests the degree of correlation between the new and standard scales using a recognized valid scale. This study used the established measure of stigma, the PDD scale, and the scale for assessing personal values, the PVQ-21, as its calibration standards. A Pearson correlation analysis was conducted to determine whether the Chinese version of the VASI was correlated with the PDD scale and the PVQ-21. Correlation coefficients:  $r < 0.40$ =low,  $0.40 < r < 0.70$ =moderate, and

$r > 0.70$ =high were used to assess the validity [77]. Figure 2 illustrates the steps for the statistical analysis of the data.

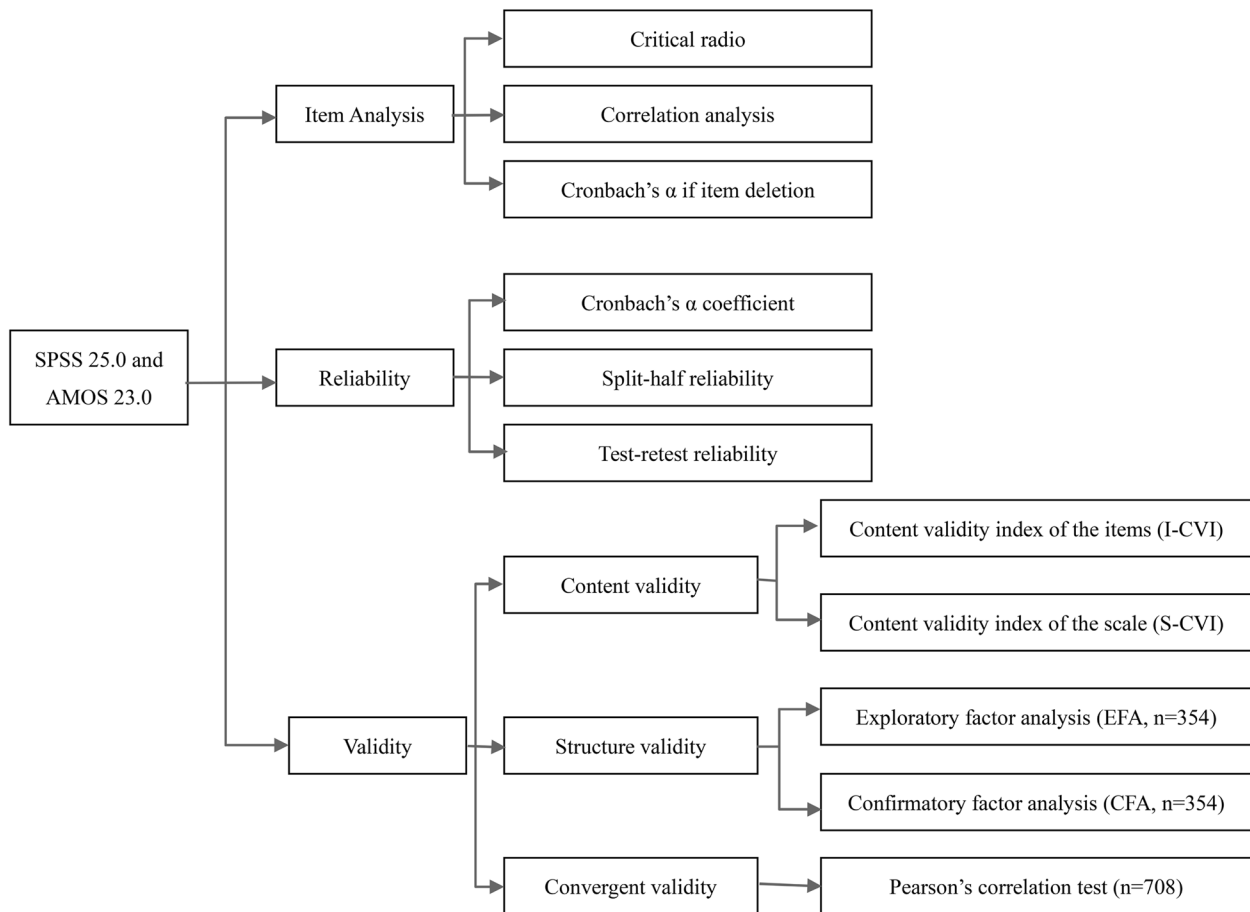
**Ethical considerations**

The Ethics Committee of Jinzhou Medical University reviewed and approved the study protocol (No. JZMULL2022092). The original author authorized the VASI, and informed consent was obtained from participants. During the survey, data confidentiality was maintained. Informed consent was obtained from each participant, and the study data were kept confidential.

**Results**

**The general demographic characteristics**

The study involved 708 participants, comprising 355 men (50.1%) and 353 women (49.9%). Participants aged between 55–65 years accounted for 24.3% of the participants. More than half (57.1%) of participants had personal contact with people with mental illness, and 42.9%



**Fig. 2** The development procedure of the Chinese version of the VASI

had primary education or below. Table 1 provides more detailed sociodemographic information.

### Cross-cultural adaptation

The original Chinese version of the VASI was developed through translation, back translation, and cultural adaptation. Seven experts were invited to conduct an expert consultation on the draft Chinese version of the VASI. The scale included five dimensions (Self-realization, Personal Enrichment, Reputation, Meritocratic Values, and Security) and 15 items. Throughout the translation and cross-cultural adaptation process, translators encountered some difficulties regarding semantics and language morphology. In the process of translation, we found minor semantic differences, and we changed “the appearance of a city” to “cityscape”; “residential area” to “neighborhood” In terms of language morphology, the order of words is inappropriate if the original sentence is translated word by word. For example, the original English item “It is damaging to my reputation if a mental illness becomes known in my family,” was translated as “If my family knew I was mentally ill, it would damage my reputation”. According to all 30 participants in the initial survey, the revised draft of the Chinese version of the VASI was easy to understand and answer. Eventually, 15 items were developed as a pretest version of the Chinese version of the VASI.

**Table 1** General demography data ( $n = 708$ )

Factors	Group	n	%
Age	18–24	86	12.1
	25–34	100	14.1
	35–44	98	13.8
	45–54	128	18.1
	55–64	172	24.3
	≥ 65	124	17.5
Sex	Men	355	50.1
	Women	353	49.9
Education level	Primary education and below	285	40.3
	Junior secondary education	148	20.9
	High school education/Technical secondary school education	78	11.0
	Technical secondary school education	149	21.0
	Undergraduate education and above	48	6.8
Personal contact with mentally ill people	YES	404	57.1
	Friend	240	33.9
	Family member	66	9.3
	Relative	62	8.8
	Other	36	5.1
	None	304	42.9

### Item analysis

Quality of the items was evaluated based on the critical ratio, the item-scale correlation coefficient, and Cronbach's coefficient. The items' quality was estimated based on critical ratios, the item scale correlation coefficients, and Cronbach's coefficients. The critical ratio (CR) evaluated the discriminability of the items, and  $> 3.000$  indicates a high discriminability of the items. The results showed that the critical ratios of all items in the translation scale ranged from 7.953 to 18.593 ( $p < 0.001$ ), indicating good discriminability of each item. After deleting each item, Cronbach's coefficient for the translated scale was 0.788–0.808, which did not exceed Cronbach's coefficient of the scale itself (0.808). Therefore, each item of the translated scale can be retained without deletion.

### Reliability analysis

An analysis of the stability and homogeneity of the Chinese version of the VASI was conducted based on internal consistency, split-half reliability, and test–retest reliability. The translated scale showed high internal consistency with a Cronbach's alpha value of 0.808, while Cronbach's  $\alpha$  values of the dimensions ranged from 0.812 to 0.850. The McDonald Omega coefficient for the whole scale was 0.887. The intra-class correlation coefficient for TL was 0.853 (95% CI: 0.766, 0.910). The split-half reliability of the scale was 0.845. Test–retest reliability was assessed in a random sample of 60 participants after two weeks, with a reliability of 0.855 (Table 2).

### Validity analysis

#### Content validity

The content validity of the translation scales (I-CVI and S-CVI) was assessed by seven qualified experts. The results showed a range of 0.857 to 1.000 for I-CVI and 0.952 for S-CVI, indicating that the translation of the Chinese version of the VASI scale met the content and item equivalence requirements between the English version of the VASI and its Chinese version. The questionnaire showed sufficient content validity.

#### Exploratory factor analysis

In the EFA, the Kaiser–Meyer–Olkin value was 0.841, and the Bartlett sphericity test was significant ( $\chi^2 = 2483.933$ ;  $P < 0.001$ ). Therefore, the matrix is not an identity matrix and can continue factor extraction. Kaiser's rule showed that the five-factor model explained 75.492% of the total variance with initial eigenvalues  $> 1$  each. A scree plot further confirmed the five-factor structure within the original scale, showing that the descending tendency weakened after the fifth point. Based on the varimax rotation results, five factors could explain



35.947, 13.358, 10.191, 8.775, and 7.221% of the variance, respectively. Furthermore, the factor loadings of the factors are also satisfactory Table 3.

**Confirmatory factor analysis**

The analysis within this study encompassed the evaluation of two models to ascertain the optimal representation of the data. Initially, the five-dimensional structure of the VASI questionnaire was confirmed through EFA,

aligning with the scale’s original framework. Additionally, considering the potential negative inter-factor correlations that could impact the composite score’s validity, a bifactor model analysis was implemented with AMOS to determine whether a singular overarching factor integrates the various dimensions. In Table 4, the fit indices for the two VASI models are compared. The first model is based on the framework established by Sophia Rieckhof [41], and the second model explores the bifactor model.

**Table 2** Reliability analysis for the Chinese version of the VASI

The scale and its dimension	Score	Cronbach’s Alpha	Split-half reliability	Test–retest reliability	Intra-class correlation coefficient
The VASI	47.29 ± 8.71	0.808	0.845	0.855	0.853
Self-realization	9.45 ± 2.80	0.844	0.852	0.909	0.909
Personal Enrichment	8.68 ± 2.79	0.850	0.890	0.872	0.869
Reputation	9.30 ± 2.88	0.824	0.866	0.779	0.778
Meritocratic Values	9.72 ± 2.88	0.812	0.853	0.828	0.819
Security	10.14 ± 3.15	0.842	0.869	0.834	0.833

**Table 3** Factor loadings of exploratory factor analysis for the Chinese version of the VASI

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Communality scores
a1	<b>0.884</b>	0.027	0.158	0.038	0.094	0.818
a2	<b>0.838</b>	0.122	0.161	0.150	-0.014	0.766
a3	<b>0.818</b>	0.130	0.203	0.023	0.102	0.738
a4	0.353	0.179	<b>0.755</b>	0.166	0.134	0.772
a5	0.152	0.158	<b>0.841</b>	0.166	0.131	0.801
a6	0.168	0.134	<b>0.819</b>	0.150	0.193	0.776
a7	0.070	0.079	0.122	<b>0.881</b>	0.015	0.802
a8	0.048	0.096	0.152	<b>0.764</b>	0.289	0.702
a9	0.097	0.166	0.156	<b>0.805</b>	0.163	0.736
a10	0.057	0.166	0.083	0.093	<b>0.844</b>	0.759
a11	0.045	0.104	0.116	0.137	<b>0.807</b>	0.697
a12	0.086	0.175	0.217	0.184	<b>0.753</b>	0.686
a13	0.132	<b>0.859</b>	0.074	0.034	0.178	0.793
a14	0.067	<b>0.834</b>	0.120	0.167	0.119	0.757
a15	0.090	<b>0.781</b>	0.239	0.142	0.154	0.720
Eigenvalues	5.392	2.004	1.529	1.316	1.083	
Percentage of variance	35.947	13.358	10.191	8.775	7.221	

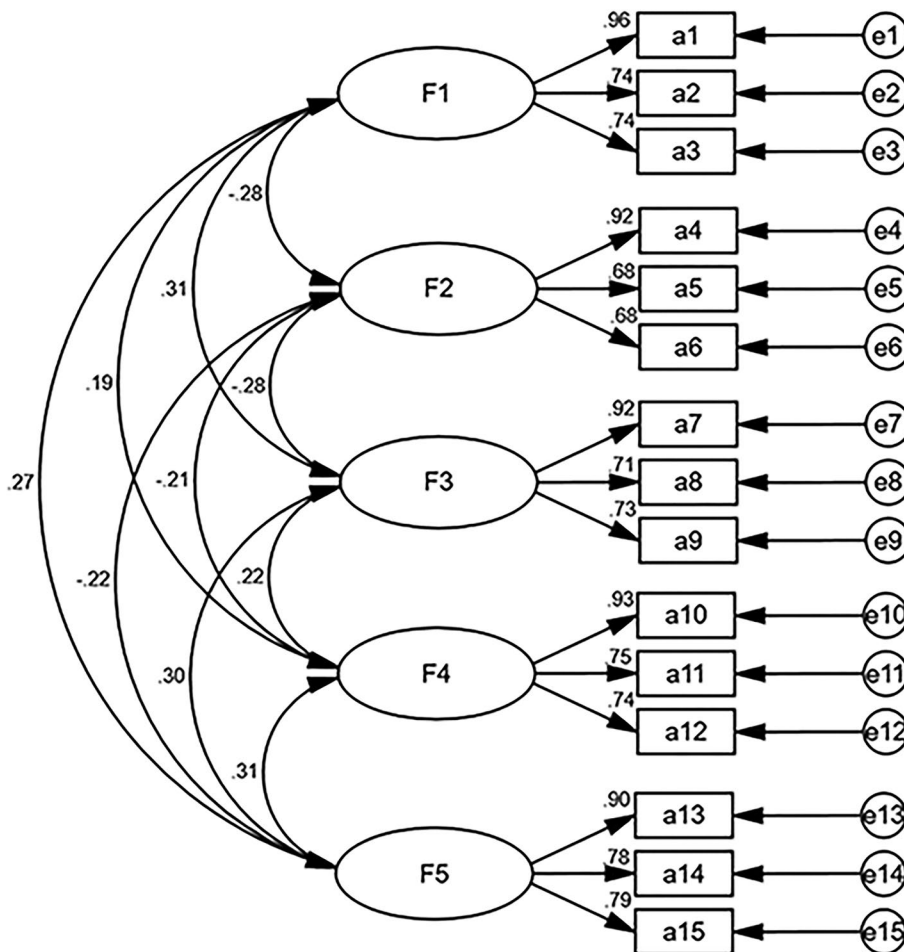
Major loadings for each item are bolded

**Table 4** Confirmatory factor analysis of the VASI

Models	χ <sup>2</sup> /DF	GFI	AGFI	RMSEA	TLI	CFI	IFI	PGFI	PNFI
Five-factor model	1.338	0.960	0.940	0.031	0.985	0.989	0.989	0.640	0.729
Bifactor model	14.882	0.642	0.517	0.198	0.391	0.484	0.487	0.476	0.398

According to the CFA analysis, the five-factor model was fitted using the maximum likelihood SEM (Fig. 3). There is no doubt that the fit indices indicate that the five-factor model is appropriate and can well represent the potential structure of the VASI. The correlations between the factors of the hypothesized model are shown in Table 5. The scores of the five subscales were significantly correlated with each other, with the

highest correlation between subscale Self-Realization and subscale Reputation and the lowest correlation between subscale Security and subscale Personal Enrichment. The convergent validity analysis showed that the AVE values ranged from 0.588 to 0.680, and the CR values ranged from 0.808 to 0.864. The discriminant validity analysis revealed that the square root values of AVE ranged from 0.767 to 0.825, greater than



**Fig. 3** Standardized five-factor model of the Chinese version of the VASI

**Table 5** Inter-correlation of the VASI

Scale Inter-correlation	Self-Realization (SR)	Personal Enrichment (PE)	Reputation (RE)	Meritocratic Values (MV)	Security (SE)
Subscale Self-Realization	1	-0.412***	0.487***	0.320**	0.429***
Subscale Personal Enrichment	-0.412***	1	-0.365***	-0.294***	-0.288***
Subscale Reputation	0.487***	-0.365***	1	0.319***	0.415***
Subscale Meritocratic Values	0.320**	-0.294***	0.319***	1	0.476***
Subscale Security	0.429***	-0.288***	0.415***	0.476***	1

Annotations: \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$

the correlation coefficients between the corresponding factors in the table (Table 6).

**Criterion validity**

The criterion validity of the VASI was assessed using the Chinese version of the PDD scale and the PVQ-21 as the criterion scales. Results of the correlation analysis showed that the VASI was positively correlated with the total PDD scale score ( $r=0.608, p<0.001$ ), with significant correlation coefficients for the different dimensions and the PDD scale being 0.312, 0.360, 0.403, 0.395, and 0.356, respectively ( $p<0.001$ ). The VASI was also positively correlated with the total score of the PVQ-21 ( $r=0.542, p<0.001$ ), with significant correlation coefficients for the different dimensions and the PVQ-21 being 0.360, 0.233, 0.381, 0.326, and 0.327, respectively ( $p<0.001$ ).

**Univariate analysis results**

Sociodemographic variables showed significant differences in VASI scores ( $p<0.05$ ). Personal contact with people with mental illness and gender were the two most significant variables that showed differences. A gender analysis revealed that female participants had lower levels of stigma against people with mental illness than males ( $t=5.492, p=0.019$ ). Moreover, significant differences were observed between participants who had personal contact with a person with mental illness and those who did not ( $t=6.526, P<0.001$ ). Table 7 details the univariate analysis of the impact of sociodemographic information on the VASI score.

**Discussion**

**Introduction to VASI in China**

China lacks a value-based concept to measure mental illness stigma in questionnaires. This study is the first

**Table 6** Convergent validity and discriminant validity of the VASI

Factors	Correlation between factors					AVE	Sqrt (AVE)	CR
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5			
Factor 1	1					0.675	0.821	0.860
Factor 2	-0.280	1				0.588	0.767	0.808
Factor 3	0.313	-0.284	1			0.631	0.794	0.835
Factor 4	0.191	-0.212	0.217	1		0.654	0.809	0.849
Factor 5	0.268	-0.217	0.296	0.314	1	0.680	0.825	0.864

**Table 7** Sociodemographic Influences on VASI Score—Univariate Analysis Results

Factors	Group	Total (N = 708) N (%)	The VASI score (M ± SD)	t/F	P
Age	18–24	86 (12.1)	48.90 ± 8.43	1.655	0.143
	25–34	100 (14.1)	47.39 ± 8.62		
	35–44	98 (13.8)	45.66 ± 8.19		
	45–54	128 (18.1)	46.89 ± 9.13		
	55–64	172 (24.3)	46.99 ± 9.07		
	≥ 65	124 (17.5)	48.22 ± 8.29		
Sex	Men	355 (50.1)	48.05 ± 8.60	5.492	0.019
	Women	353 (49.9)	46.52 ± 8.77		
Education level	Primary education and below	285 (40.3)	46.79 ± 8.53	1.909	0.107
	Junior secondary education	148 (20.9)	48.84 ± 8.11		
	High school education/Technical secondary school education	78 (11.0)	45.94 ± 9.07		
	Technical secondary school education	149 (21.0)	47.49 ± 9.07		
	Undergraduate education and above	48 (6.8)	47.06 ± 9.50		
Personal contact with mentally ill people	YES	404 (57.1)		6.526	< 0.001
	Friend	240 (33.9)	47.40 ± 7.86		
	Family member	66 (9.3)	42.24 ± 10.60		
	Relative	62 (8.8)	48.23 ± 9.01		
	Other	36 (5.1)	48.03 ± 8.09		
	None	304 (42.9)	48.02 ± 8.60		

to translate the VASI into Chinese and validate its psychometric properties among the general population through factor analysis. The VASI was first applied to a Chinese population, demonstrated good construct validity, discriminant validity, and reliability, and can be considered a valid tool for assessing public stigma of mental illness, including personal stigma-related value preferences.

By providing a psychometrically sound instrument that measures stigma through the lens of personal values, this study contributes to the theoretical framework of stigma research, offering a more nuanced perspective on the cultural nuances of mental health stigma. The instrument combines public perception of mental health stigma with personal value preferences. The VASI can be used in future studies to measure public perceptions of mental illness stigma, including value orientations associated with personal stigma. Due to the interdisciplinary nature of the VASI's research, it encompasses the fields of psychology, psychiatry, and sociology. Identifying different patterns of discrimination against people with mental illnesses may help discover stigma in different socioeconomic settings.

#### **Cultural and contextual differences**

In comparing our findings with the original validation study [41], it is noteworthy that the Chinese version of the VASI scale exhibited slightly lower Cronbach's  $\alpha$  values, which may be attributed to cultural differences, sample characteristics, and varying societal perceptions of mental health stigma. Notably, our sample was drawn from a specific geographical area in China, potentially limiting the generalizability of our results. Additionally, the inter-factor correlations observed in our study were substantially lower than those reported in the original research, suggesting that the factors of mental health stigma may be less interrelated in our context.

This discrepancy could be influenced by the collectivist tendencies within Chinese society, potentially weakening the association between stigma components related to personal values. The findings underscore the importance of considering cultural adaptations when applying the VASI scale cross-culturally and suggest that future research should explore the underlying reasons for these differences to enhance the scale's applicability in diverse cultural settings.

#### **Gender differences**

In this study, females demonstrated less stigmatization of people with mental illness than males, and there was a significant relationship. These findings support

earlier studies indicating that women tend to have more empathy toward people with mental illness [8, 78]. The causes of this phenomenon may be complex and involve not only biological differences, but may also be closely related to the cultural context. Gender role socialization processes and cultural expectations may shape the way in which people with mental illness are responded to in different cultures.

Current scholarly works indicate that females possess exceptionally responsive neural pathways associated with empathy and nurturing behaviors, potentially resulting in a heightened propensity to connect emotionally with others [79]. Further research suggests that gender differences in displays of empathy may become more pronounced with age, especially during adolescence, which may be related to the relative maturity of females in empathic skills [80]. Men may often stereotype people with mental illness as violent and dangerous and view recovery from mental illness as unlikely. Recognizing gender differences in empathy and stigmatization can inform tailored educational and awareness initiatives aimed at reducing mental health stigma. By targeting interventions towards specific demographic groups, such as males who may hold more negative attitudes, we can more effectively foster empathy and challenge stereotypes, ultimately promoting a more inclusive society.

#### **Personal contact with mentally ill people**

Our study also found a strong relationship between personal contact with mental illness and lower levels of stigma against mental illness. Stigma was lowest when the person with mental illness was a family member; stigma was highest when there was no personal contact with the person with mental illness. This finding is consistent with previous research claiming that personal contact with people with mental illness may reduce negative attitudes toward mental illness [81].

The practical implications of these findings underscore the importance of encouraging personal interactions and dialogues that break down barriers between those with mental illness and the public. By facilitating such engagements, we can leverage the power of personal stories to dispel myths and foster a greater sense of compassion and understanding, which is crucial for the development of supportive social policies and community-based interventions. No significant differences were found between education level and stigmatization of people with mental illness.

#### **Translation and validation of the VASI**

Following the Brislin translation principle (46), this study translated the VASI into Chinese and cross-culturally

adapted it. Seven experts conducted a thorough review of the content validity of the items and unanimously agreed that the scale showed good content validity in its initial configuration, with all items receiving agreement from the experts. In the preliminary survey, 60 participants indicated that the structure of the Chinese version of the VASI was simple and reasonable in design, clear in semantic expression, and easy to understand in content. The final Chinese version of the VASI consists of five dimensions and contains 15 items. The CR values in the item analysis were much higher than the standard values, and the items in the questionnaire showed high differentiation. Additionally, the score of each item had a moderate to high correlation with the scale's total score [82]. The Cronbach's  $\alpha$  values did not exceed the original value of the translated scale even after each item was removed. These findings suggest that the Chinese version of the VASI scale has good applicability and discrimination, and all 15 items can be retained.

#### Reliability analysis

Reliability analysis measures the consistency and stability of an instrument and reflects its authenticity [83]. In this study, we assessed the reliability of the Chinese version of the scale by measuring internal consistency, split-half, and test–retest reliability. Cronbach's  $\alpha$  coefficient, which measures the homogeneity of the scale's items [84, 85], was found to be 0.808 for the Chinese version of the scale, with each dimension having a Cronbach's  $\alpha$  coefficient ranging from 0.812 to 0.850. These values were slightly higher than the results of the original scale [41], indicating that the Chinese version of the scale had a higher internal consistency of the items. The split-half reliability coefficient was found to be 0.845, confirming the previous conclusion.

The test–retest reliability, which reflects the consistency of results produced by repeating measurements on the same group of subjects using the same research instrument, can represent the test's stability and consistency over time [86]. According to the results, the test–retest reliability of the Chinese version of the scale was 0.855, indicating that the Chinese version of the VASI has good stability and can be used to measure public stigma of mental illness, including personal stigma-relevant value orientations.

Overall, the Chinese version of the VASI has shown good reliability among the public. The robust reliability of the Chinese VASI scale not only strengthens the theoretical underpinnings of mental health stigma measurement but also holds significant practical implications. It provides mental health professionals, policymakers,

and researchers with a reliable tool to assess and monitor changes in public stigma over time, allowing for more targeted and effective anti-discrimination campaigns, which in turn fosters a deeper public understanding and compassion for mental health issues. Furthermore, the scale's reliability ensures that it can be used in cross-cultural comparative studies, contributing to a global understanding of mental health stigma and its complex interplay with cultural values.

#### Validity analysis

This study assessed the validity of the Chinese version of the VASI in terms of content validity, construct validity, and calibration validity. Seven experts evaluated content validity, and the results showed that the I-CVI ranged from 0.857 to 1.000, and the S-CVI was 0.952, exceeding the reference values of 0.78 and 0.9, respectively [87]. Content validity assessment indicated that the scale had good content validity.

Construct validity, which reflects the consistency of the scale with its conceptual framework, was evaluated using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). In this study, the EFA revealed a five-factor structure extracted by EFA was explained well with 75.492% of the total variance, the factor loadings of all items in the questionnaire met the above conditions, and the factor attribution of each item was consistent with the original scale [41]. The results suggest that these items possess strong explanatory power in assessing the public's stigmatization towards individuals with psychiatric diagnoses, as influenced by their personal values. Moreover, the CFA results demonstrated that the fit index of the Chinese version of the scale was within an acceptable range and was stronger than the original version [41], indicating that the Chinese version of the VASI displayed a good overall fit. The consistency of results between the Chinese version and the original version of the VASI in terms of exploratory and validation factor analysis indicates that the scale has comparable construct validity in both Chinese and Western populations, demonstrating its applicability in Chinese populations.

Calibration validity was assessed using the PDD scale and the PVQ-21. The high correlation between the VASI and the PDD scale ( $r=0.608$ ,  $p<0.001$ ), as determined by Pearson correlation analysis, indicates appropriate calibration validity, suggesting that the VASI aligns well with the widely used PDD scale in China to measure public stigma. Additionally, a moderately high correlation between the PVQ-21, a scale measuring values, and the VASI ( $r=0.542$ ,  $p<0.001$ ) further supports the appropriate calibration validity of the VASI.

### Limitation and perspectives

In this study, several limitations need to be noted and discussed. First, the non-probabilistic sampling method used in this study may reduce the study's external validity, but it does make it easier for researchers to approach study participants. Second, the study sample only covered community members in Shenyang City, Liaoning Province, China, which may not fully reflect the diversity of populations in different regions of China. In order to improve the representativeness of the sample and to explore the impact of cultural differences across regions, future studies should expand the scope to include populations from other regions of China. Third, this study relied on self-reported questionnaires, and bias is inevitable. Fourth, before this study, the VASI scale lacked adequate cross-cultural adaptation in other languages, so we could not assess the questionnaire's psychometric properties through measurement equivalence (ME) between different language versions of the instrument. Finally, although we have adequately validated the psychometric properties of the Chinese version of the VASI among the public, we did not explore the factors that influence public stigmatizing behaviors toward mental illness. Therefore, this will serve as a focus for our future work, which will be important for our next steps.

### Relevance to clinical practice

Using the VASI scale, the extent of public stigma against mental illness, including stigma-related values, can be objectively assessed, leading to the development of differentiated educational strategies. The Chinese version of the VASI scale, demonstrated to have robust psychometric properties, serves as a reliable tool for evaluating the impact of public health interventions aimed at reducing mental illness stigma, as well as for measuring the prevailing levels of stigma within the population. We hope to use the VASI scale for specific interventions and assessments to reduce the public stigma of mental illness and improve the mental health of individuals with mental illness.

### Conclusions

In conclusion, the psychometric properties of the Chinese version of the VASI scale were validated in the Chinese population after translation and cultural adaptation. The literature points to direct interpersonal contact and the portrayal of authentic experiences through media as key mechanisms for reducing stigma by fostering empathy and dispelling myths, which may be more effective than educational initiatives alone. The VASI scale is designed to measure the levels of stigma

present in the population, which can inform and guide the development of targeted public health interventions. It is through these strategic initiatives that we aim to cultivate a societal perspective that is more compassionate and supportive of individuals living with mental health conditions.

### Abbreviations

VASI	Value-based Stigma Inventory
WHO	World Health Organization
AIDS	Acquired immune deficiency syndrome
WMM	What matters most
PDD	Perceived Derogatory Discrimination
PVQ-21	21-Item Portrait Values Questionnaire
EES	European Social Survey
SEM	Structural Equation Model
I-CVI	Content Validity Index of the Item
S-CVI	Content Validity Index of the Scale
KMO	Kaiser–Meyer–Olkin
EFA	Exploratory Factor Analysis
CFA	Confirmatory Factor Analysis
$\chi^2/df$	Chi-Square Degree of Freedom
RMSEA	Root Mean Square Error of Approximation
GFI	Goodness-of-Fit Index
AGFI	Adjusted Goodness-of-Fit Index
TLI	Tucker Lewis Index
CFI	Comparative Fit Index
IFI	Incremental Fit Index
PGFI	Parsimonious Goodness-of-Fit Index
PNFI	Parsimonious Normed-of-Fit Index
AVE	Average Variance Extracted
CR	Composite Reliability

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### Authors' contributions

WL was primarily responsible for writing the paper, accurately integrating the findings and methodology, and ensuring the logic and clarity of the paper. QL played a crucial role in the revision process of the thesis. QL meticulously reviewed the first draft of the paper and made several constructive suggestions for improvement. QL also focused on improving the language presentation and logical coherence of the paper, ensuring that the article flowed well and was persuasive.

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### Availability of data and materials

The data that support the findings of this study are available upon reasonable request to the corresponding author, Qiujiu Li (liqiujiu1949@163.com).

### Declarations

#### Ethics approval and consent to participate

The studies involving human participants were reviewed and approved by the Ethics Review Committee of Jinzhou Medical University (No. JZMULL2022092). The patients/participants provided written informed consent to participate in this study.

#### Competing interests

The authors declare no competing interests.

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