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A cultural validation of the Chinese version of the Multidimensional Depression Assessment Scale (MDAS) in clinically depressed patients in Inner Mongolia

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Title: A Cultural Validation of the Chinese version of Multidimensional Depression Assessment Scale (MDAS) in Clinically Depressed Patients in Inner Mongolia

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Abstract:

Introduction: Depression symptoms and assessment in China are influenced by unique cultural values of collectivism and by social-political factors specific to China. This study validated the Chinese version of the 52-item Multidimensional Depression Assessment Scale (MDAS) with clinically depressed patients in Inner Mongolia. The study sought to examine the psychometric properties of the MDAS and understand the construct of depression in a specific collectivistic cultural context using a scale with comprehensive dimensions of depressive symptoms in the emotional, cognitive, somatic and interpersonal domains. *Method*: A total of 171 clinically depressed

participants in Inner Mongolia completed the Chinese versions of the MDAS and the Beck Depressive Inventory (BDI). The reliability and validity of the MDAS were tested, and an exploratory factor analysis (EFA) was conducted on the MDAS to examine the underlying structure of the measure. The MDAS and BDI were compared in terms of sensitivity and reactivity on the basis of the cut-off value of BDI. *Results*: The Chinese-MDAS was found to have good psychometric properties, including high Cronbach's alphas for the total scale and for each subscale (0.90–0.97), indicating good reliability, as well as a high and significant correlation with the BDI ($r = 0.72$; $p < .001$), suggesting good validity. The factor analysis indicated the emergence of a salient factor of interpersonal symptoms in Chinese depressed patients, suggesting the importance of interpersonal symptoms in Chinese depressed individuals. A cut-off value of 118.5 with high sensitivity and specificity was found on the MDAS based on the cut-off value of the BDI. *Conclusion*: The Chinese-MDAS demonstrated good psychometric properties among depressed individuals in Inner Mongolia. This study paves the way for the measure's further development and cultural adaptation in a Chinese depressed population.

Keywords:

Declarations
Funding

Introduction

The World Health Organization (WHO) has identified major depressive disorder (MDD) as a serious threat to global wellbeing. It has become the leading cause of disability, affecting 300 million people of all ages worldwide (World Health Organization (WHO) 2017), but only after 2000 did Chinese researchers begin to adopt the diagnostic criteria and standardised interview instruments that are internationally recognised in psychiatric epidemiological surveys (Guo et al. 2011). Additionally, Chinese populations have been recognised as being less willing to report psychiatric symptoms

until they become highly impairing, a phenomenon known as 'cultural stoicism' (Liao et al. 2012).

Chinese populations experience different economic, social and cultural contexts relevant to mental health than people in Western societies. In particular, Mainland China pursues government-planned economic and social policies that are not implemented in places outside of China. Within the country, the northern part of China, including Heilongjiang, Jilin, Liaoning and Inner Mongolia, has been found to have stronger collectivistic attitudes than the southern parts of China, such as Shanghai and Guangdong, while Hong Kong has been identified as the most individualistic Chinese area (Van de Vliert et al. 2013).

Traditional Chinese culture is strongly influenced by Confucianism and collectivism, which influence the social norms for maintaining appropriate interpersonal relationships, classifying social relationships and behaving appropriately towards others. Relationships with others, especially with family members, are strongly emphasised in Chinese society (Hwang 2001). An individual's self is embedded within the family, which is regarded as the 'great self' (*da wo*) in Chinese culture (Bedford and Hwang 2003). It is crucial that individuals in the family maintain family harmony (Hsiao et al. 2006) whereas Western cultures typically conceptualise the self in terms of autonomy and individual identity (Singh et al. 1962).

The inclusion of interpersonal symptoms in assessing depression in Chinese populations is thus particularly important (Cheung and Power 2012). Indeed, Chinese depressed individuals are reportedly more likely to attribute the cause of their depression to interpersonal problems. Tam and Wong (2007) describe themes of depressive symptoms consistent with collectivist interpersonal relationships and social functioning, such as 'need for approval', 'role performance within family hierarchy', 'familial harmony' and 'relational harmony'. Similarly, Wong et al. (2012) note that Chinese depressed participants reported interpersonal symptoms including 'being judged', 'social comparisons' and 'cut-off relationship' rather than psychological distress. These studies show that the interpersonal domain of depression symptoms is related to the expression of depression in Chinese individuals and should therefore be explored more systematically in developing scales.

However, the existing assessment scales lack sufficient items to assess the multidimensionality of depression (Vares et al. 2015), especially the interpersonal symptoms of depression. For example, the Patient Health Questionnaire-9 (PHQ-9) focuses on somatic items whereas the Beck Depression Inventory-II (BDI-II) emphasises the cognitive symptoms of depression (Vares et al. 2015). It has been recommended that depression scales expand beyond the current Diagnostic and Statistical Manual of Mental Disorders (DSM) and International Statistical

Classification of Diseases and Related Health Problems (ICD) criteria to be broad enough to detect possible subtypes (van Loo et al. 2012). There is also a clear need to develop more efficacious and culturally sensitive screening tools for Chinese populations. Marsella (1987) and Fabrega (1996) highlight the importance of including five dimensions in all depression scales: affective, somatic, interpersonal, cognitive and existential. Similarly, a systematic review of depressive symptom patterns by van Loo et al. (2012) suggests that choosing a scale with a more complete phenomenological picture of depressive symptoms could make it easier to find symptomatic subtypes or dimensions in the data-driven approach and result in greater efficacy and accuracy in screening.

In light of the above, the current study explored the psychometric properties of a self-reported depression instrument, the Chinese version of the Multidimensional Depression Assessment Scale (Chinese-MDAS), on clinically depressed patients in a highly collectivistic part of China, Inner Mongolia, which has been little researched in either the Chinese or Western literature. Research from Western populations and more westernised areas of China, such as Hong Kong, Taiwan and Shanghai, suggests that Inner Mongolia populations demonstrate distinctive cultural characteristics that may influence how they express depressive symptoms. Limited official statistics exist on depression prevalence in Inner Mongolian, and insufficient training and the lack of a

depression screening protocol may cause a high rate of under-detection and under-diagnosis of mental illness there. Every 100,000 people in Inner Mongolia share 1.48 mental health specialists (Duan 2016). The China Family Panel Studies, a nationally representative longitudinal survey conducted by the Institute of Social Science of Peking University (Xie and Hu 2014), has collected mental health-related data, including data on depression, from 95% of the Chinese population across 25 provinces, but Inner Mongolia was excluded from the study, making it a highly under-researched area with regard to depression in China and around the world. Thus, the prevalence of depression remains relatively unknown.

The current study explored the potential application of the Chinese-MDAS as a self-report instrument that includes comprehensive interpersonal symptoms for a collectivistic Chinese population. The study translated and tested the Chinese-MDAS in a clinically depressed population in Inner Mongolia for its potential use in a larger population, employing exploratory factor analysis (EFA) to examine the symptom profile of those individuals. They study aimed to contribute to the current literature on depression assessment and screening in collectivistic areas and to study the sensitivity and specificity of the MDAS using the well-established cut-off value of the BDI. It explored the possible optimal cut-off scores to demonstrate the ability to distinguish true positives from negatives.

Material and Methods

Participants

This study received ethical approval from the ethics committees of the University of Edinburgh and the Mental Health Centre of Inner Mongolia. A total of 171 depressed inpatients were recruited in mental health facilities in Hohhot, Inner Mongolia, and the major site of data collection was the Mental Health Centre, Hohhot. Inpatients were recruited who were over 18 years of age and formally diagnosed with MDD by clinicians using the diagnostic manual of the Chinese Classification of Mental Disorders, Version 3 (CCMD-3) (Chinese Society of Psychiatry 2001). The exclusion criteria included those who were under 18 or incapable of reading Chinese. Because the CCMD-3 was developed entirely in the Chinese context, it is as yet unknown whether its diagnostic criteria align with the internationally recognised DSM criteria for depression. Hence, the clinical participants with various degree of depression severity were compared to the well-validated BDI to calibrate and determine the appropriate cut-off values for the Chinese-MDAS. The demographic details of the sample are summarised in Table 1. In brief, over half of participants were female, and the participants' ages ranged from 19 through 83 with a mean age of 43.79 (SD = 13.55).

Table 1 Descriptive statistics of the clinical sample in Inner Mongolia

Demographic variables	N	(%)
Male	53	31.5

Female	115	68.5
Educational Attainment		
Primary school	28	16.5
Middle school	34	20.0
High school	41	24.1
Bachelor degree or above	59	34.7
No qualification	8	4.7
Marital status		
Single	27	16.2
Married	131	78.4
Divorced	8	4.8
Widowed	1	0.6
Occupation		
Full time occupation	79	48.2
Student	7	4.3
Unemployed	37	22.6
Other (retired)	41	25.0
Previous History of depression prior to the current episode		
Yes	82	49.1
No	85	50.9

Measures

The Multidimensional Depression Assessment Scale

The 52-item MDAS was developed by Cheung and Power (2012) and designed to assess depressive severity in four domains of depressive symptoms: emotional (12 items), cognitive (16 items), interpersonal (12 items) and somatic (12 items). In a pilot study on a non-selected community sample of 100 individuals in Hong Kong and the UK, the good psychometric properties of the English version were illustrated as it

achieved a high Cronbach's alpha for the whole scale (0.87) and each subscale (emotional = 0.87; cognitive = 0.88; somatic = 0.83; interpersonal = 0.89). A significant high positive correlation (r = 0.77) between this scale and the BDI-II indicates a good convergent validity (Cheung and Power 2012). The MDAS has also been validated with high internal consistency (α=0.96) and a significant moderate positive correlation (r = 0.59) between this scale and the BDI in a sample of pregnant individuals in Inner Mongolia (Cheung et al. 2020). Descriptions of the items are given in Table 3.

Using the parallel back-translation procedure (Brislin 1986), the 52-item MDAS was translated into Chinese by a Chinese-English bilingual researcher. A second bilingual psychologist in Inner Mongolia, who had never seen the scale, back-translated it into English. The Chinese phrases and vocabulary in the translated version closely adhered to those used in the CCMD-3, increasing validity. Following the forward-translation process, the Chinese-MDAS was revised by another Chinese bilingual psychologist to make the phrases more consistent with everyday usage, improving the readability of the scale. The chief psychiatrist and a senior psychiatrist at the Inner Mongolia Mental Health Centre then double-checked the translated version for the accuracy of the translation and its cultural adaptation (Sousa and Rojjanasrirat 2011).

Beck Depression Inventory

The BDI was included in this evaluation study to examine the validity of the newly

translated version of the MDAS. The BDI is a 21-item self-report depression instrument developed by Beck et al. (1961) through clinical observations of depressed psychiatric patients. Patients rate the frequency of each symptom that has appeared in the past seven days on a 4-point scale from 0 to 3. The total score, calculated by summing the item ratings, ranges between 0 and 63. Previous studies have reported a Cronbach's alpha range from 0.73 to 0.95 with a median co-efficient of 0.86 (Beck et al. 1988). The BDI also possesses a high concurrent validity that correlates well with many other measures of depression; most of the reported validity coefficients range from the middle 0.60s to the middle 0.70s (Beck et al. 1988). The Chinese version of the scale, which was used in the current study, has likewise demonstrated good psychometric properties (Shek 1990). Zhang et al. (1990) report a split-half reliability of the scale of 0.88 and a Cronbach's alpha of 0.89. It has been found to perform well as a screening tool for depression (Lasa et al. 2000). An optimal cut-off value of 16 yielded good sensitivity (0.79) and specificity (0.91) in Chinese-American patients in primary care (Yeung et al. 2002). In the current sample, a Cronbach's alpha of 0.92 was found. Although the BDI-II has largely replaced the original version, the first version is still used in studies due to its availability in China and its long history of validation in the Chinese population. The current study therefore used the first version due to the ease of acquiring it at the point of data collection. In light of the existence of validation studies of the BDI among

Chinese populations, it was accepted for use in the current study.

Procedure

Participants willing to take part in the study were required to sign a consent form before completing a questionnaire with basic demographic information, such as age, occupation, educational attainment and a brief history of mental illness. This was followed by the MDAS and BDI. However, consent was also provided if the questionnaires were completed and returned by those who did not wish to give their names on the consent forms for reasons of anonymity. The participants who agreed to take part in the study were invited to a quiet room with a nurse and the researcher. Instructions for each scale were clearly printed above each scale, but the participants could ask questions during the study if they required clarification of the procedure. If they wished to answer the questions privately, the researcher went through the information sheet and consent form with them beforehand. If the participants reported difficulties in reading and understanding the phrases and items on the questionnaires, they were read and explained to them by the researcher, who spoke fluent Mandarin Chinese.

Data Analysis

Analyses of the reliability and validity of the MDAS were carried out with IBM SPSS Statistics version 20.0 at 5% significant levels. The reliability of the Chinese-MDAS

and its four subscales was assessed using internal consistency (Cronbach's alpha) and Guttman's split-half reliability (Guttman 1945). The item-total correlation between each item and the total scale was also calculated to evaluate how well each item assessed depression severity and to judge its coherence with the total scale. Items with a correlation below 0.3 were considered poor and were eliminated from the scale (Field 2005). A Spearman rank correlation test was performed to investigate the convergent validity between the MDAS and the BDI (Gill et al. 2007; Rozario et al. 2006).

An exploratory factor-analytic approach was adopted in this study to explore the factor structure of the MDAS. This data-driven method yields insights into cultural characteristics in the pattern of item correlations. The EFA was conducted using the FACTOR software package (Lorenzo-Seva and Ferrando 2006) based on the recommendation of Baglin (2014). It provides the recommended EFA methods with many powerful features and focuses on the analysis of ordinal variables in Likert-type rating scales. In particular, it evaluates the skewness of the items and computes polychoric correlations rather than Pearson correlations, which may greatly underestimate the strength of the relationship between ordinal variables and may lead to spurious multidimensionality and biased factor loadings (Bernstein and Teng 1989). The polychoric correlation technique estimates the correlation between two bivariate, normally distributed continuous variables, which are measured with an ordinal scale

(Olsson 1979). It was adopted in the program (FACTOR) used in this study because of the advantages described.

Principal-component analysis with oblique (Promax) rotations was performed on the MDAS. Studies such as that of Costello and Osborne (2005) indicate that an oblique rotation should be preferred in most situations, which allows inter-correlated factors, unless there is a strong argument for the factors to be uncorrelated (Matsunaga 2010; Gaskin and Happell 2014). Oblique rather than orthogonal analysis was chosen because high internal consistency and high inter-item correlation were found in the MDAS. It is reasonable to postulate that the factors extracted would be correlated, so oblique rotation was thus preferred to orthogonal. In terms of factor extraction, a parallel analysis (PA)-based method was used in this study that has been shown to outperform Horn's PA which is based on principal axis factoring (Humphreys and Ilgen 1969) as well as Kaiser criteria and scree plot (Baglin 2014). The parallel analysis used in this study was proposed by Timmerman and Lorenzo-Seva (2011), is computed based on the random permutation of the sample data and compared the percentage of common variance extracted by the Minimum Rank Factor Analysis (MRFA). The factor model was constructed based on the identification of the salient individual item loadings in the EFA factor pattern matrix. All the items were allowed to load on only one factor, and items with crossed loadings (>0.32) were deleted from the model (Costello and

Osborne 2005). The missing values were computed using the multiple imputation method (Rubin 1978), which replaces missing values by creating a number of data sets by imputation and which merges the outcomes in each data set to provide more accurate standard errors and inferential conclusions (Lorenzo-Seva and Ginkel 2016).

The cut-off value of MDAS to distinguish depressed and non-depressed individuals was determined by a Receiver Operating Characteristics (ROC) curve. The ROC graph plots sensitivity (y axis) against 1-specificity (x axis) and allows one to choose a cut-off value closest to the point and to obtain a balance between sensitivity and specificity. The area under the curve indicates the test's overall discriminatory ability, with a larger area representing a stronger test (Akobeng 2007; Habibzadeh et al. 2016).

Results

Reliability (Internal Consistency)

High Cronbach's alphas were found for the whole scale (0.97) and the four subscales: emotional (0.92), cognitive (0.94), somatic (0.90) and interpersonal (0.92). In terms of item level, none of the 52 items was found to have an item-total correlation below 0.3, and thus all were retained in the scale (see Table 2). A high Guttman split-half coefficient of 0.91 was found, indicating the good split-half reliability of the MDAS.

Table 2 Item-total correlations of items in the MDAS

MDAS	Item description	Item-Total Correl	MDAS	Item description	Item-Total Corre

		ation			lation
Item 1(E)	Low mood	.64	Item 29(S)	Feel slowed down	.65
Item 2(E)	Sadness	.65	Item 30(S)	Fatigue	.68
Item 3(E)	Low spirits	.68	Item 31(S)	Change in weight	.50
Item 4(E)	Gloominess	.73	Item 32(S)	Crying	.54
Item 5(E)	Sad mood	.73	Item 33(S)	Agitation	.66
Item 6(E)	Guilt	.54	Item 34(S)	Slowed movement	.64
Item 7(E)	Unhappiness	.71	Item 35(S)	More pain sensitivity	.42
Item 8(E)	Not cheerful	.73	Item 36(S)	Intestinal problems	.52
Item 9(E)	Irritable mood	.49	Item 37(I)	Decrease in activities	.72
Item 10(E)	Dysphoric mood	.64	Item 38(I)	Social withdrawal	.75
Item 11(E)	Shame	.47	Item 39(I)	Feeling worse than others	.75
Item 12(E)	Anxiety	.55	Item 40(I)	Feel a burden on others	.70
Item 13(C)	Feelings of hopelessness	.68	Item 41(I)	Social avoidance	.71
Item 14(C)	Loss of interest	.70	Item 42(I)	Feeling undeserving of others' care	.66
Item 15(C)	No pleasure	.74	Item 43(I)	Hypersensitive to criticism	.57
Item 16(C)	The future feels bleak	.78	Item 44(I)	Feeling less attractive than others	.53
Item 17(C)	Feeling worthless	.73	Item 45(I)	Feel too sensitive to others	.54
Item 18(C)	Poor concentration	.68	Item 46(I)	Feeling let down by others	.54
Item 19(C)	Self-blame	.70	Item 47(I)	Unable to love others	.61
Item 20(C)	Life feels meaningless	.75	Item 48(I)	Aggression towards others	.47
Item 21(C)	Feeling a failure	.74	Item 49(C)	Poor Memory	.54
Item 22(C)	Ruminations	.68	Item 50(C)	Unable to plan things	.70
Item 23(C)	Thoughts of suicide	.58	Item 51(C)	Feeling disorganized	.73
Item 24(C)	Unable to make decision	.59	Item 52(C)	Unable to care for myself	.63
Item 25(S)	Low energy	.69			
Item 26(S)	Problems with sleeping	.60			

| Item 27(S) | Change in appetite | .64 |
| Item 28(S) | Lower sex drive | .56 |

E-Emotional subscale; C-Cognitive Subscale; S-Somatic Subscale; I-Interpersonal Subscale

Convergent Validity

A significant positive correlation was found between the BDI and the MDAS and its subscales. The results suggest the good convergent validity of the new scale (Table 3).

Table 3 Spearman Correlations of BDI and Chinese MDAS

MDAS and subscales	BDI total score	P value
MDAS total score	0.72**	<.001
Emotional subscale	0.59**	<.001
Cognitive subscale	0.68**	<.001
Somatic subscale	0.63**	<.001
Interpersonal subscale	0.71**	<.001

Values represent r **P<.001 (2-tailed)

Exploratory Factor Analysis

The EFA extracted three factors that contributed to 55.4% of the total variance (Table 4). Factor 1, Factor 2 and Factor 3 accounted for 21.8%, 16.0% and 17.7% of the variance, respectively. The Kaiser-Meyer-Olkin (KMO) test of sampling adequacy yielded a KMO value of 0.93 (in the range of 0 to 1), suggesting that the sample was suitable for factor analysis. In addition, 11 items were deleted as they loaded onto more than one factor (items 2, 13, 16, 17, 20, 23, 25, 30, 33, 38 and 47). They were dropped from the scale and are not shown in Table 4, which indicates the resulting factor

structure of MDAS with the factor loading of each item on three factors: affective (13 items), interpersonal (15 items) and somatic (13 items). The Cronbach's alphas of the resulting three factors are presented in Table 4 (all >0.90). The resulting scale had a Cronbach's alpha of 0.97, ranging from 0.94–0.97 across the three factors. The convergent validity of the three factors with BDI ranged from 0.63 to 0.66 (as shown in Table 4).

Table 4 Exploratory factor analysis (EFA), internal consistency and construct validity of the Chinese MDAS

MDAS items	Factor 1	Factor 2	Factor 3
	Affective	Interpersonal	Somatic
1 Low mood	0.90		
2 Sadness	0.81		-0.37
3 Low spirits	0.77		
4 Gloominess	0.70		
5 Sad mood	0.85		
7 Unhappiness	0.93		
8 Not cheerful	0.96		
10 Dysphoric mood	0.45		
12 Anxiety	0.35		
13 Feelings of hopelessness	0.55	0.49	
14 Loss of interest	0.90		
15 No pleasure	0.85		
16 The future feels bleak	0.54	0.35	
18 Poor concentration	0.31		
23 Thoughts of suicide	0.42	0.39	
25 Low energy	0.58		0.49

26 Problems with sleeping	0.59		
33 Agitation	0.44		0.32
38 Social withdrawal	0.39		0.39
41 Social avoidance	0.38		
6 Guilt		0.80	
9 Irritable mood		0.70	
11 Shame		0.87	
17 Feeling worthless	0.36	0.51	
19 Self-blame		0.71	
20 Life feels meaningless	0.38	0.39	
21 Feeling a failure		0.72	
22 Ruminations		0.56	
32 Crying		0.39	
39 Feeling worse than others		0.65	
40 Feel a burden on others		0.48	
42 Feeling undeserving of others care		0.69	
43 Hypersensitive to criticism		0.54	
44 Feeling less attractive than others		0.61	
45 Feel too sensitive to others		0.41	
46 Feeling let down by others		0.63	
47 Unable to love others		0.38	0.37
48 Aggression towards others	-0.41	0.79	
24 Unable to make decision			0.44
27 Change in appetite			0.73
28 Lower sex drive			0.49
29 Feel slowed down			0.79
30 Fatigue	0.46	-0.36	0.64
31 Change in weight			0.55
34 Slowed movement			0.79
35 More pain sensitivity			0.51

36 Intestinal problems			0.74
37 Decrease in activities			0.77
49 Poor memory			0.56
50 Unable to plan things			0.51
51 Feeling disorganized			0.54
52 Unable to care for myself			0.64
Proportion of variance (%)	21.8	17.7	16.0
Reliability (Cronbach's alpha)	0.97	0.95	0.94
Convergent validity with BDI (r)	0.63*	0.65*	0.66*

Note. Asterisk * denotes statistical significance $p<0.01$

One hundred and thirty-two (77.2%) participants scored above the cut-off value of the BDI for depression. On the basis of the BDI screening, the mean score of the total MDAS and that of each subscale significantly differed above the cut-off value of the BDI than the MDAS mean scores below the cut-off value of the BDI, as shown in the result of a Mann-Whitney U-test for skewed data: U = 416.5, p <0.001 (MDAS total); U = 493.5, p <0.001 (emotional subscale); U = 550.5, p <0.001 (cognitive subscale); U = 553.5, p <0.001 (somatic subscale); U = 694.0, p <0.001 (interpersonal subscale). The ROC curve is shown in Figure 1. The Area under the Curve (AUC)is 0.919 (95% CI: 0.860–0.978). A cut-off value of 118.5 yielded a sensitivity of 87.1% and a 1-specificity of 82.1%.

Figure 1: ROC curve for MDAS using the cut-off value of BDI
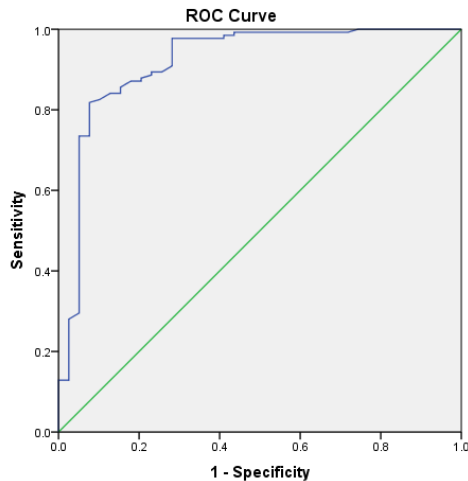
Discussion

The current study explored the validity of using the Chinese-MDAS in a clinical sample in Inner Mongolia and found evidence supporting the good psychometric characteristics of the Chinese-MDAS for use in a Chinese population. In addition, studying the symptom profile in the Inner Mongolia population highlights the cultural adaption of self-report depression instruments. This could potentially lead to the MDAS's being developed into a more efficacious screening tool in collectivistic areas.

The Chinese-MDAS demonstrated adequate psychometric properties, included a high reliability shown across indices including Cronbach's alpha, item-total correlations and the split-half coefficient. The reliability statistics suggest the good internal consistency of the Chinese-MDAS despite its multidimensionality of depressive symptoms. A high Cronbach's alpha indicates that items on the MDAS are highly related and points to the homogeneity of its construct (Tavakol and Dennick 2011). A significant high and positive correlation between the Chinese-MDAS and the BDI indicates that the two

scales are highly correlated in measuring the construct of depression. All the items on the Chinese-MDAS also performed adequately as shown in high item-total correlations. In terms of diagnosis, the Chinese-MDAS was also found to have a high agreement with the BDI in recognising true positive depressed individuals. This study yielded a comparable sensitivity and a higher specificity than found in other depression scales, such as the PH9 and the Center for Epidemiologic Studies Depression Scale (CES-D) (de Joode et al. 2019). The ROC curve using the cut-off value of the BDI indicated a sensitivity of 87.1% and a 12.9% chance of a false positive with the identified cut-off score, which is lower than that found in reviews of many other depression scales (de Joode et al. 2019).

A three-factor model of the MDAS was found in the study population, including affective, interpersonal and somatic symptoms. The cognitive subscale did not load on a single 'cognitive' factor as originally proposed but instead was distributed among all three factors. The first factor, explaining the greatest percentage of variance, comprised mostly emotional and cognitive symptoms. This is consistent with the Western construct of depression, which also emphasises the affective symptoms of depression (Ryder et al. 2008). Previous studies have yielded similar factors of depression in Chinese populations. Lai et al. (2010) also report affective symptoms, such as a sad mood and feelings of emptiness, in the factor that explained the largest proportion of

variance (32%). The China, Oxford and Virginia Commonwealth University Experimental Research on Genetic Epidemiology study of major depression, which conducted detailed clinical assessments of approximately 6,000 cases of recurrent major depression in Han Chinese women recruited in China and in a similar number of matched controls, yielded a comparable result (Yang et al. 2015). This collection of studies supports the notion that the affective and cognitive aspects of depressive symptoms are primarily reported across nations and cultures and could become an individual scale in the development of the shorter form of the MDAS.

The second factor (interpersonal) consisted mostly of interpersonal items. The interpersonal symptoms that emerged in the factor primarily assessed the respondents' sense of negative self-awareness in interpersonal interactions and the negative impact on their social relationships. The interpersonal factor has also been found in general populations using other self-report rating scales, including the CES-D (Zhang et al. 2012). Similarly, Ying (1988) reports that interpersonal symptoms (such as 'people are unfriendly' and 'people dislike me') merged with somatic/depressed symptoms (such as 'restless sleep' and 'crying') in the factor structure of the CES-D in Chinese American immigrants. This pattern in factor structure is denoted as 'self-other' integration in the Chinese expression of depressive symptoms, so these results suggest the possible existence of cultural characteristics of the expression of depression in a

Chinese population because Chinese depressed individuals interpret them as part of the interpersonal process. Previous research has demonstrated the tendency of Chinese American individuals to express depression in terms of interpersonal symptoms (Wong et al. 2012). For example, 'Feel less capable than others' was denoted as 'failure'. This is in line with the finding of this study that the participants' reports of 'Feeling worse than others' and 'Feeling like a burden on others' loaded onto the same factor as 'Feeling a failure', suggesting a close relationship between these symptoms. Reflecting this pattern, the interpersonal factor of the Chinese-MDAS was associated with the symptoms of the emotions of guilt and shame and cognitions of self-blame. This study thus contributes to the evidence base on how interpersonal symptoms are related to affective and cognitive impairments in the expression of depression in Chinese individuals. Yeung et al. (2004) found that Chinese individuals are less likely to consider a depressed mood as a symptom or to recognise depression as a diagnosable medical illness and that they are more likely to attribute their symptoms to psychosocial causes. These findings highlight the importance of the interpersonal subscale to indicate the severity of depression in Chinese depressed individuals.

Factor 3 is dominated by items relating to the bodily complaints related to depression. Five cognitive symptoms (unable to make decisions, poor memory, unable to plan things, feeling disorganised, unable to care for myself) and one interpersonal symptom

(decrease in activities) also emerged in this factor. The loading of somatic symptom items onto a single factor is consistent with previous studies (Li et al. 2014). However, some studies of depressive symptoms in Chinese populations have revealed a combined emotional and somatic symptom factor, which could indicate somatisation (Chen and Mui 2014). In the current study, cognitive symptoms such as difficulty in planning things and taking care of oneself as well as the interpersonal symptom of a decrease in activities were conceptualised as physical difficulties or brain function issues, so they emerged in the same factor. Somatisation could be related to a lack of attention to emotional life that is shaped by cultural values (Ryder and Chentsova-Dutton 2012) or to insufficient emotional expression skills that result in the physical expression of psychological distress (Zhang et al. 2012). It may be that the depressed inpatients in this study had been made aware of the affective and cognitive symptoms in previous assessments as part of their routine clinical care and thus tended to provide the 'correct' answers on the depression scales by emphasising the affective element of depression. The factor analysis differs from the hypothesised four-factor model corresponding to the subscales of the MDAS. Instead, the three-factor model, driven by the empirical method of EFA, consists of mixed symptoms in various dimensions of depressive symptoms. The originally proposed four-factor model was based on the Western literature of depression. A deviation from the four-factor structure in this study may

therefore indicate Chinese characteristics of depression. This cultural characteristic arose from EFA's data-driven approach. The finding is also in line with similar findings on self-report questionnaires, such as the CES-D. The factor structure of which also substantially varied across racial/ethnic groups (Kim et al. 2011).

This study presents novel depression data from under-researched Inner Mongolia which, along with other interior areas of China, provides valuable evidence of the importance of interpersonal symptoms in self-report depression measures. The MDAS showed good psychometric properties in this clinical sample, which used the data-driven approach of EFA without presumptions. The MDAS also has a comprehensive symptom profile of depression, including the interpersonal symptoms overlooked in current self-report depression instruments. Therefore, the symptom pattern could be examined through the factor structure of the MDAS and the factor loadings of its items. In particular, the results shed light on the cultural characteristics of depressive symptoms by examining the symptom profile. The Chinese-MDAS adopts a holistic approach in symptom dimensions, and the inclusion of interpersonal symptoms suggests opportunities for a new screening instrument that could be useful in collectivistic populations.

Limitations and Future Studies

The study has a number of limitations, including a limited set of psychometric

indicators that exclude test-retest reliability. In addition, the cut-off value found in the study is compared to that of the BDI rather than to a clinical interview. Regarding the statistical approach using EFA, the factor structures vary across and within symptomatic instruments. The factor structure also depends on the depression measure and rotation methods (Fried 2014). Secondly, using diverse approaches to extract the factors could lead to a divergent factor structure in the same data set (Courtney 2013). Hence, future studies should investigate the factor structure of the MDAS, including the Chinese-MDAS, on populations across cultures. This would facilitate the cultural comparison of symptom patterns and provide a clearer picture of cultural influences on symptom profiles. In addition, the current study made an assumption based on previous research that Mainland China is recognised as one of the more collectivistic countries in the world (Tu et al. 2011). The findings were compared to the previous literature on the factor structure of other depression measures and indicated the possibility that the interpersonal symptoms of depression may characterise a cultural expression of depression. In future cross-cultural research, it will be important to measure individualism and collectivism and directly examine their relationships with depressive symptom patterns. Furthermore, the analysis was restricted to depressed inpatients, who represented a higher degree of symptom severity. The inclusion of a sample with a wider range of depressive symptoms could generate findings that could be generalised

to the wider population of depressed patients.

Conclusion

This validation study of the Chinese-MDAS on an Inner Mongolian clinical population diagnosed with a MDD reveals that the Chinese-MDAS has good psychometric characteristics. The Chinese-MDAS could be used in clinical settings to assess depression in Inner Mongolia and, potentially, in other parts of China. This study is the first to examine the cultural features of depression in Inner Mongolia, and it sheds light on the cultural aspects of depression symptoms and assessment.

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