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Psychometric properties of the Depression Stigma Scale (DSS) in Chinese cancer patients: a cross-sectional study

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ABSTRACT

Objectives The Depression Stigma Scale (DSS) is commonly used to assess depression stigma in the general population and in people with depression. The DSS includes two 9-item subscales assumed to measure personal depression stigma (ie, personal perceptions of depression) and perceived depression stigma (ie, perceptions of how others perceive depression). The aim of the present study was to examine its psychometric properties in terms of validity and reliability in Chinese cancer patients.

Design A cross-sectional study design.

Participants and settings This study focused on 301 Chinese cancer patients recruited from two hospitals in Xi'an, China.

Methods Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were used to assess the factor structure. Internal consistency was assessed using Cronbach's alpha. To examine concurrent validity, symptoms of depression were used as the criterion.

Results For each subscale of the DSS (ie, personal and perceived depression stigma), the EFA and CFA confirmed a two-factor structure: weak-not-sick (ie, perceiving that depression is not a real illness, but rather a sign of weakness) and discrimination (ie, perceiving that depressed people are discriminated against). The Cronbach's alphas were adequate, ranging from 0.70 to 0.80. Symptoms of depression were positively but weakly correlated to personal and perceived depression stigma.

Conclusions The DSS appeared to show satisfactory psychometric properties in our sample of cancer patients. Both personal depression stigma and perceived depression stigma subscales consisted of two underlying aspects.

BACKGROUND

Currently, in China, as the number of cancer patients is rapidly growing, more than half of the Chinese cancer population reports elevated symptoms of depression.[1] Severe symptoms of depression can cause lower quality of life,[2] difficulties in insisting on cancer treatment,[3] long-term hospitalisation[4] and elevated mortality rates.[5] Although psychological interventions have

Strengths and limitations of this study

► Exploratory and confirmatory factor analyses were performed to assess the factor structure of Depression Stigma Scale (DSS).

► A representative sample of people with heterogeneous types of cancer living in Xi'an, China provided data for the present study.

► It remained unclear to what extent our findings could be generalised to other populations (including healthy or depressed persons) in other countries.

► Given the design of the study, we could not thoroughly test the construct validity and test–retest reliability of the DSS.

proven effective in treating depressive symptoms,[6 7] only a small number of depressed cancer patients seem willing to seek professional help.[8 9] One reason for this could be that people hold stigmatising beliefs and attitudes about depression (ie, depression stigma).[10–12] Research on depression stigma to date has mainly focused on healthy individuals and depressed persons, and no study has examined the levels and roles of depression stigma in cancer patients' outcomes. One requirement for further research on depression stigma in cancer patients is the existence of a valid scale to assess depression stigma.

The Depression Stigma Scale (DSS) is commonly used to assess depression stigma in the general population and in depressed individuals.[13] The 18-item DSS includes two 9-item unidimensional subscales: the personal depression stigma subscale reflects an individual's personal attitudes towards people with depression, and the perceived depression stigma subscale reflects an individual's perceived beliefs about the attitudes of other people.[13] The DSS has been validated to measure depression stigma in community samples and people with depression, and has demonstrated good

internal consistency and test–retest reliability across various countries including Japan,[14] Germany[15] and the Netherlands.[16] Previous findings have shown that the two 9-item subscales comprise various factors.[16]

However, existing research has mainly examined the psychometric properties of the DSS in the general population and people with depression, and no research has been conducted to examine whether the DSS is suitable for cancer patients. Moreover, previous research has been conducted on Western cultures. Given the culturally sensitive experiences of depression stigma, the psychometric properties of the DSS cannot be assumed when used in a culture (such as Chinese culture) vastly different from its Western origins.

Before using the DSS to measure depression stigma among Chinese cancer patients, a crucial first step is to examine factor structure and internal consistency of the DSS. To fill in the knowledge gap, the present study focused on a heterogeneous sample of cancer patients in China. The primary aim of this study was to examine the validity and reliability of a Chinese version of the DSS among Chinese cancer patients. To examine the concurrent validity of the personal and perceived stigma subscale, symptoms of depression were used as the criterion of the personal and perceived stigma subscale. Given that higher perceived depression stigma was found to be related with higher levels of symptom severity,[17] it was expected that higher levels of depression stigma would be associated with more severe levels of depression.

METHODS

Sample and procedure

Shaanxi Provincial Tumour Hospital and Xijing Hospital (in Xi'an, China) were involved in recruiting participants for this cross-sectional study between May and December 2016. Cancer patients who sought and received medical treatment at two hospitals were informed of this study by the research nurses. Eligible participants should fulfil the following criteria[1]: diagnosed with cancer,[2] >18 years and[3] could read and write Chinese.

Patient and public involvement

In the current study, a self-reported questionnaire was used to collect data from participants. Participants were not involved in the design and execution of the current study. Findings of this study will be open to the public. However, we will not be able to disseminate the results to each participant, as we did not collect their contact details.

Measures

Sociodemographic and medical characteristics

A self-report questionnaire was used to collect participants' sociodemographic and medical characteristics. Educational level was classified into three levels: low level=primary schooling, moderate level=secondary schooling and high level=university education and higher.

Depression stigma

Depression stigma was measured using the 18-item DSS. The DSS includes two subscales: the 9-item personal depression stigma and the 9-item perceived depression stigma.[13] The personal depression stigma subscale comprised the first nine items, measuring the extent to which each participant personally agreed with a statement about depression (eg, 'depression is a sign of personal weakness'). The perceived depression stigma subscale comprised the other nine items, measuring how participants perceived other people thinking about the same theme (eg, 'most people believe that depression is a sign of personal weakness'). Each item was answered on a 5-point Likert scale ranging from 0 (*strongly disagree*) to 4 (*strongly agree*). The total score of each subscale ranged from 0 to 36, with higher scores indicating greater stigma. Sufficiently good internal consistency and test–retest reliability for the DSS has been reported.[14 16 18]

The DSS was translated into Chinese using a multiple forward and backward procedure based on the translation procedure of the DSS in previous studies.[14–16] Two researchers independently translated the 18 items of the DSS from English to Chinese. Discrepancies in the translation procedure were identified and resolved by discussion to come up with a version that both researchers agreed on. A third native English speaker translated the Chinese version back into English independently. This English version was compared with the original English version and discrepancies were discussed by all three translators until agreement was reached.

Symptoms of depression

The patient health questionnaire (PHQ) was originally developed as a depression screening module, and the 9-item version of the PHQ (PHQ-9) has been validated as a reliable measure of depression severity.[19] Previous research has validated the use of the PHQ-9 among cancer patients.[20] Each of the nine items asked patients to rate the frequency of depressive symptoms during the last 2 weeks on a 4-point Likert scale ranging from 0 (*not at all*) to 3 (*nearly every day*). The total score of the PHQ-9 was used to indicate the severity of depression, with cut-off scores of 10 or higher for a diagnosis of major depression. The Cronbach's alpha of the PHQ-9 was 0.89.

Statistical analyses

Because the personal and perceived depression stigma subscales used the same items (although worded slightly differently) to reflect various themes regarding stigmatising attitudes towards depression, psychometric analyses of the DSS were examined using the two subscales separately.

First, for the personal and perceived stigma subscales, we examined each of their one-factor models using confirmatory factor analysis (CFA) with M*plus* 7.3.[21] Model fit was evaluated using the Maximum Likelihood Robust estimator's Satorra-Bentler corrected χ^2-test statistic (S-Bχ^2). Other statistics to evaluate model fit were also used, including the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), the Root-Mean-Square Error of Approximation (RMSEA) and Standardised Root Mean Square Residual (SRMR). It has been suggested that

CFI and TLI values >0.95 and RMSEA and SRMR values <0.06 indicate good model fit, and that CFI and TLI values >0.90 and RMSEA and SRMR values <0.08 indicate acceptable model fit.[22]

Second, if the initial CFA failed to support the one-factor model, exploratory factor analysis (EFA) would be conducted to further test the construct of personal and perceived depression stigma subscale using M*plus* 7.3. The EFA used the maximum likelihood estimator method, with oblique Geomin rotation. The number of factors was determined based on the scree plot and initial eigen-values (>1). Items were included if their primary loadings were 0.40 or higher. The new constructs from the EFA would be examined using the CFA.

Third, for each of the personal and perceived depression stigma subscale, internal consistency was examined using Cronbach's α, with a value >0.70 being considered appropriate.[23]

Lastly, the concurrent validity was assessed by testing the correlations between the personal and perceived depression stigma subscales and depressive symptoms.

RESULTS
Participants' characteristics
In total, 360 cancer patients were informed, and 330 agreed to participate and filled out the questionnaire. The 30 decliners did not differ significantly in age, gender or cancer types from the 330 other participants (p>0.05). Of those 330 participants, 29 did not complete the questionnaire and were therefore excluded, and thus 301 individuals (response rate: 301/360=84%) were included in the data analyses. Those 29 participants did not differ from the 301 others in sociodemographic or medical characteristics (p>0.05). Each patient was given a coffee cup as a participation gift.

Participants' sociodemographic and medical characteristics and levels of depression stigma are shown in table 1. Our sample was 60.4% female, with a mean age of 50.07 (SD=13.09). Around half had a moderate education and most were married. Lung, breast and gynaecological cancer were the most commonly reported cancer types, which is comparable to the cancer prevalence statistics in China.[24] The average scores on personal and perceived stigma were 18.54 (SD=5.77) and 19.10 (SD=5.76). The average level of depressive symptoms in our sample was 7.33 (SD=6.21), with 33.7% reporting moderate-to-high levels of depressive symptoms (PHQ-9 ≥10).

The one-factor CFA model of the personal and perceived depression stigma subscales
For both the personal and perceived stigma subscales, the initial one-factor models fitted data poorly: for personal stigma subscale, S-Bχ^2=139.76; df=27; CFI=0.70; TLI=0.60; RMSEA=0.12; SRMR=0.08; and for perceived stigma subscale, S-Bχ^2=125.47; df=27; CFI=0.80; TLI=0.74; RMSEA=0.11; SRMR=0.08. These results indicate that the unidimensional models for the personal and perceived stigma subscales are not supported.

Table 1 Participants' sociodemographic and medical characteristics and levels of depression stigma and depressive symptoms (n=301)

	Mean (SD)
Age	50.07 (13.09)
Months since diagnosis	14.25 (16.44)
Personal stigma (9-item)	18.54 (5.77)
Perceived stigma (9-item)	19.10 (5.76)
Depressive symptoms (PHQ-9)	7.33 (6.21)

	%
Gender	
Male	39.6
Female	60.4
Marital status	
Single	7.8
Married	89.1
Divorced	1.7
Widowed	1.4
Educational level	
Low	27.8
Middle	56.9
High	15.3
Cancer type	
Breast cancer	22.3
Lung cancer	16.7
Gastric cancer	10.5
Gynaecological cancer	16.7
Colorectal cancer	4.5
Pancreas cancer	2.8
Liver cancer	2.1
Lymphoma cancer	4.9
Multiple malignant tumours	3.1
Others	16.4
Recurrence	
Yes	28.4
No	71.6
Cancer stage	
Stage I	18.9
Stage II	28.4
Stage III	21.1
Stage IV	31.6
Type of medical treatment	
Chemotherapy	65.1
Surgery	21.8
Radiation	6.3
Chinese medicine treatment	4.0
Chemotherapy + surgery + radiation	1.6
Others	1.2

The EFA of the personal and perceived depression stigma subscales
An EFA was performed to further explore the factor

Table 2 Factor loadings from EFA of personal stigma subscale (n=301)

	Factor loadings	
Items	Factor 1	Factor 2
1.People with depression could snap out of it if they wanted	**0.74**	−0.04
2.Depression is a sign of personal weakness	**0.66**	0.25
3.Depression is not a real medical illness	**0.57**	0.10
8.I would not employ someone if I knew they had been depressed	0.12	**0.79**
9.I would not vote for a politician if I knew they had been depressed	0.08	**0.65**

The boldface values indicate on which factor the items are loading the highest.
EFA, exploratory factor analysis.

structure of the subscales. The Kaiser-Meyer-Olkin measure indicators were 0.78 and 0.83 for the personal and perceived depression stigma subscales, which verified the sampling adequacy for the EFA. For the 9-item personal depression stigma subscale, both the eigen-values (eigen-values >1) and the scree plot suggested a two-factor solution. However, items 4 and 5 displayed cross loadings on both factor 1 (item 4=0.24; item 5=0.30) and factor 2 (item 4=0.41; item 5=0.31), and items 6 and 7 loaded <0.40. After deleting these four items, a two-factor solution of the personal depression stigma subscale was obtained and the remaining five items loaded >0.40, with no cross loadings >0.20 (see table 2). The two factors accounted for 48.86% of total variance: the first factor explained 31.43% of the variance and the second explained 17.43% of the variance. The first factor was labelled as *weak-not-sick*, comprising items about beliefs that the person was weak but not ill (items 1, 2, 3). The second factor was labelled *discrimination*, comprising items about discriminative views of people with depression (items 8, 9). Their correlation was 0.21 (p<0.001)

In addition, for the perceived stigma subscale, the eigen-values and the scree plot suggested a two-factor

structure. However, item 15 displayed a cross loading on both factor 1 (0.32) and factor 2 (0.36), and item 13 displayed a cross loading on both factor 1 (0.28) and factor 2 (0.31). Moreover, items 14 and 16 did not load >0.40. After deleting these four items, a two-factor solution was obtained and the remaining five items loaded >0.40; no cross loadings were >0.20 (see table 3). The two factors explained 49.25% of total variance: the first factor explained 34.99% of variance and the second explained 14.25% of the variance. The first factor was *discrimination* (items 17, 18) and the second factor was *weak-not-sick* (items 10, 11, 12). Their correlation was 0.30 (p<0.001). It should be noted that for perceived depression stigma, the first factor explaining most variance was related to discrimination, whereas for personal depression stigma, the first factor was related to weak-not-sick.

The two-factor CFA model of the personal and perceived stigma subscales

For the personal stigma subscale, the two-factor model fitted the data acceptably: S-Bχ^2=214.27; df=4; CFI=0.94; TLI=0.86; RMSEA=0.093; SRMR=0.04. The χ^2 difference test indicated that the differences in fit between the two-factor model and the initial one-factor model were statistically significant (ΔS-Bχ^2=2126.00; df=23; p<0.001), indicating that the two-factor model fitted better than the one-factor model.

For the perceived stigma subscale, the two-factor model also fitted the data well: S-Bχ^2=24.21; df=4; CFI=0.99; TLI=0.99; RMSEA=0.013; SRMR=0.03. The χ^2 difference test indicated that the two-factor model was better fitting than the initial one-factor model (ΔS-Bχ^2=2121.78; df=23; p<0.001).

The internal consistency and concurrent validity of the personal and perceived depression stigma subscale

For the personal depression stigma subscale, the Cronbach's alphas were 0.70 for discrimination, 0.74 for weak-not-sick and 0.71 for the total score. For the perceived depression stigma subscale, the Cronbach's alphas were 0.72 for discrimination, 0.80 for weak-not-sick and 0.73 for the total score. In terms of concurrent validity, the 5-item personal and perceived depression stigma subscales were

Table 3 Factor loadings from EFA of perceived stigma subscale (n=301)

	Factor loadings	
Items	Factor 1	Factor 2
10.Most people believe that people with depression could snap out of it if they wanted	−0.01	**0.51**
11.Most people believe that depression is a sign of personal weakness	0.21	**0.66**
12.Most people believe that depression is not a real medical illness	0.20	**0.59**
17.Most people would not employ someone they knew had been depressed	**0.80**	0.16
18.Most people would not vote for a politician they knew had been depressed	**0.81**	0.17

The boldface values indicate on which factor the items are loading the highest.
EFA, exploratory factor analysis.

Table 4 Correlations between personal and perceived stigma and depressive symptoms (n=301)

	1	2	3	4	5	6	7
1.Personal depression stigma (5-item)	–						
2.Personal depression stigma (3-item): weak-not-sick	0.85**	–					
3.Personal depression stigma (2-item): discrimination	0.69**	0.21**	–				
4.Perceived depression stigma (5-item)	0.64**	0.47**	0.53**	–			
5.Perceived depression stigma (2-item): weak-not-sick	0.60**	0.59**	0.30**	0.85**	–		
6.Perceived depression stigma (3-item): discrimination	0.43**	0.12*	0.59**	0.75**	0.29**	–	
7.Depressive symptoms	0.15*	0.09	0.13*	0.09	0.10	0.04	–

* p<0.05; ** p<0.01.

positively but weakly related to symptoms of depression (p<0.01) (see table 4).

DISCUSSION

The present study is the first to examine the psychometric properties of the DSS in a sample of Chinese cancer patients. The results of exploratory and confirmatory factor analyses showed that both the personal and perceived depression stigma subscales comprised two factors rather than one factor, namely, 'weak-not-sick' and 'discrimination'. The fit of the two-factor models for both subscales was found to be adequate to good, as well as their reliability in terms of the internal consistency.

Compared with previous studies, we found that Chinese people with cancer reported higher levels of personal depression stigma but similar levels of perceived depression stigma than Western people.[16] A possible explanation for these discrepancies could be the differences in cultural background. In China, people with psychiatric or psychological problems often experience higher internalised stigma than those without psychiatric diseases because they are concerned more about moral issue and are ashamed of themselves.[25] Future cross-cultural studies are needed to systematically compare the levels of depression stigma between Chinese and Western individuals.

A key finding of our study is that personal and perceived depression stigma were found not to be unidimensional. This is in line with previous research findings in the general population and in depressed individuals.[16 26 27] For the personal depression stigma subscale, the current study identified two factors: the weak-not-sick (item 1 'could snap out of it', item 2 'sign of weakness' and item 3 'not a real medical illness') and discrimination (item 8 'would not employ' and item 9 'would not vote for') factors. The identification of the weak-not-sick factor (comprising items describing problems of depression as a personal weakness under one's control rather than as a medical condition) is in line with previous research, although the precise items differ somewhat.[16 26 27] A finding different from previous research was that the discrimination factor (containing items characterising discriminative thoughts about people with depression)

found in both our study and the one by Boerema et al[16] was not identified by the other two studies.[26 27] In fact, the two items of the discrimination factor in our study were part of another factor (ie, dangerous/unpredictable) in previous studies.[26 27] A possible explanation for these different findings may be found in the exclusion of items. For both the personal and perceived depression stigma subscales, items measuring 'dangerous', 'best to avoid', 'unpredictable' and 'would not tell anyone' were excluded in the current study. However, these excluded items were found to comprise the weak-not-sick-avoidance factor and the dangerous/unpredictable factor in the personal depression stigma subscale in the previous study.[16]

For the perceived depression stigma, we found a two-factor structure (ie, weak-not-sick and discrimination) similar to the one we found for the personal depression stigma. This differs from Boerema et al,[16] who did not find a clear structure in the perceived stigma subscale. In our study, the items of the two factors of perceived stigma ran parallel to the items of the two factors of personal stigma. Four items of the perceived depression stigma subscale (item 13 dangerous, item 14 best to avoid, item 15 unpredictable and item 16 would not tell anyone) displayed low loadings or cross loadings and were removed, which is similar to the content of the items excluded in the personal depression stigma. Two of these removed themes were about depressed people being dangerous or unpredictable, which formed the dangerous/unpredictable factor in the general population in Boerema et al.[16] Given the inconsistent findings regarding the factor structure in different types of samples, more research is required to test the factor structure of the DSS across different cultures and different populations, including cancer patients, healthy individuals and depressed persons.

The Chinese version of the DSS demonstrated adequate construct validity by explaining 48.86% and 49.25% of the variance for the personal and perceived depression stigma subscales. Although the explained variances were higher than the explained 21% and 19.7% variances of the personal stigma scale and perceived stigma scale of the original DSS in Australian community samples,[17]

almost half of the variance still cannot be explained by the DSS. This suggests that there may be other factors influencing cancer patients' reporting of depression stigma. For example, the social distance dimension of depression stigma, which refers to one's avoidant behaviour rather than beliefs towards people with depression, has been found to be separate from personal and perceived depression stigma among a community sample and the general population.[26 27] Including items measuring the social distancing of people with depression may help improve the construct validity of the instrument's use for measuring depression stigma.

The Cronbach's alphas of the 5-item personal and perceived depression stigma subscales were fair to good, which supported internal consistency. However, this research found no convincing evidence for the concurrent validity of the DSS. The revised personal and perceived depression stigma subscales, although statistically significant, were weakly correlated with depressive symptoms. A previous study showed that depressive symptoms were related to depression stigma.[28]

The current study has several limitations. The first is that it could not examine the convergent validity of the DSS. Future research is required to examine the convergent validity of the DSS in the Chinese cancer population. Second, as this study focused on Chinese cancer patients, findings cannot be generalised to other populations (including healthy or depressed persons) in other countries. Third, using a cross-sectional design of this study made it impossible to examine the test–retest reliability of the DSS. A future study using a longitudinal design is needed to examine this factor. Fourth, using a self-reported questionnaire for depressive symptoms may have caused an overestimation of depressive symptoms. Future studies should use a clinical diagnostic instrument (eg, CIDI 2.1) to measure depressive symptoms and examine the relationships between depression stigma and depressive symptoms.

CONCLUSIONS

The present study suggested that the Chinese version of the DSS is a valid and reliable measurement of depression stigma in Chinese cancer patients. Using the DSS, clinicians and psychologists may pay special attention to how Chinese cancer patients perceive depressive symptoms, as stigma is likely to be a cause of delays for seeking help.

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