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Translation and psychometric properties for the Demoralization Scale in Chinese breast cancer patients

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ABSTRACT

Purpose: To translate and validate the Chinese version of the Demoralization Scale among breast cancer patients.
Method: A cross-sectional, descriptive correlational design was employed. From September 2016 to May 2017, 203 breast cancer survivors completed the survey. Content, construct, concurrent and divergent validity and internal consistency of the Chinese version of the Demoralization Scale were evaluated.
Results: The proposed factor structures of the Demoralization Scale in previous studies cannot be confirmed using confirmatory factor analysis in the present study. Moreover, four factors were extracted by exploratory factor analysis, which accounted for 58.66% of the variance. Each subscale yielded satisfactory internal consistency with coefficient alphas ranging from 0.720 to 0.894. Relationships/differences between demoralization, quality of life, despair and depression provide initial support for the concurrent/divergent validity. Given these results, the Chinese version of the Demoralization Scale appears to be both valid and reliable.
Conclusions: Our results preliminary supported that the Chinese version of the Demoralization Scale is a reliable and valid instrument for assessing demoralization among mainland Chinese breast cancer patients, and the factor structure of this measurement needs to be further addressed in future studies.

1. Introduction

In China, the incidence of breast cancer is lower than that in Western countries (Li et al., 2016). However, this incidence is increasing rapidly due to the fast development of the economy and the availability of exogenous estrogen (DeSantis et al., 2015). Nowadays breast cancer has been stated as the most common cancer among Chinese women, with an annual incidence of about 273,000 new cases (Chen et al., 2016). Meanwhile, the 5-year-survival for breast cancer has improved because of earlier detection and improvements in treatment (Li et al., 2016). As a result, more and more Chinese women will have to spend the rest of their lives with breast cancer.

Breast cancer survivors face stress and uncertain outcomes from the illness and often have negative emotional responses, of which depression has been reported as the most common (Ye et al., 2018). However, some survivors who suffer from demoralization may be misdiagnosed as depressed because these two concepts share common symptoms of distress. The concept of “demoralization” refers to expression of existential distress, hopelessness, helplessness, and loss of meaning and purpose in life (Clarke and Kissane, 2002). In fact, depression and demoralization need to be distinguished because they have distinct qualities: namely, demoralization, at its core, is a maladaptive coping state with a sense of subjective incompetence, whereas depression is characterized by anhedonia and lowered mood (Li et al., 2015). Meanwhile, their treatments are different: severe depression should be treated with medication, whereas due to the maintenance of mood's responsivity, psychological interventions may be obviously effective for demoralized patients through restoring spirit and regaining their previous coping strategies (Kimmel and Levy, 2012). Such misdiagnosis might explain why patients with subthreshold symptoms of depressive states do not respond to depression treatments as expected in clinical practice. Meanwhile, factor analytic studies also confirm the conceptual and

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clinical distinction between demoralization and depression in cancer survivors (Clarke et al., 2005; Jacobsen et al., 2006). Therefore, we can deduce that demoralization might be a common but neglected phenomenon among breast cancer survivors.

Demoralization syndrome and depression can occur either independently or co-morbidly among cancer survivors. It has been reported that 21.7–33% of patients were demoralized and depressed at the same time, while 14–27.4% suffered only demoralization (Kissane et al., 2004; Lee et al., 2012). Meanwhile, approximately one-fifth of cancer survivors show clinically relevant levels of demoralization according to recent reviews (Tecuta et al., 2015; Robinson et al., 2015). Significant associations between demoralization and suicidal ideation among cancer patients have been consistently confirmed in previous studies (Robinson et al., 2016; Fang et al., 2014; Vehling et al., 2017). As for breast cancer, demoralization has been explored to significantly correlated to higher levels of worry, negative coping styles and poor quality of life (Grassi et al., 2004). Moreover, hopelessness, the hallmark of demoralization, is associated with a significantly increased risk of recurrence or death at 5 and 10 years after early-stage breast cancer (Watson et al., 2005).

A valid and reliable measure is urgently required for the accurate diagnosis of demoralization, which in turn guides treatment selection. Of all the quantitative instruments constructed to measure demoralization, the Demoralization Scale (DS) (Kissane et al., 2004) is the most widely accepted. It was designed by Kissane and his colleagues (2004) and consists of five dimensions, namely, loss of meaning and purpose, dysphoria, disheartenment, helplessness, and sense of failure. Psychometric properties of the original DS have been tested in advanced cancer patients (Kissane et al., 2004). Up to date, different language versions of DS have been validated and applied mainly in cancer population or palliative care patients (Mehnert et al., 2011; Hung et al., 2010; Rudilla et al., 2016; Grassi et al., 2017). Overall, appropriate psychometric properties of the DS were confirmed, while its factor structure varied between 4 and 5 factors in different social and cultural context (Mullane et al., 2009; Mehnert et al., 2011; Rudilla et al., 2016).

To the best of our knowledge, despite the evidence suggesting that demoralization impacts upon coping and quality of life in cancer patients, no research has been conducted on demoralization among Chinese breast cancer survivors. Lack of a valid and reliable measurement may be a root cause for this phenomenon. Although the DS was translated into Chinese and tested among cancer survivors in Taiwan (Lee et al., 2012), the cultural and grammatical differences between Mainland China and Taiwan restrict its application. Thus, our objective was to translate the original DS into a Chinese version (DS-C) and test its validity and reliability in a Chinese breast cancer sample.

2. Methods

2.1. Design

A cross-sectional, descriptive correlational design was employed. The present study was given ethical clearance by the relevant hospital research ethics committee (L2015ZSLYEC-003).

2.2. Participants

We recruited female inpatients in the breast ward of an oncology hospital in Guangzhou City, China, to generate a convenience sample. Criteria for inclusion were ages over 18 years, breast cancer diagnosis in all stages, and ability to communicate in Mandarin or Cantonese. Subjects with severe complications or a history of mental illness were excluded. A sample size of 200 was desired, given the rule of thumb that a sample between 200 and 300 subjects should be required for factor analysis (Wu, 2009).

2.3. Data collection

Data collection occurred between September 2016 and May 2017. Firstly, the researcher introduced the purpose of this study to patients and obtained their informed consent. Then participants were asked to fill out questionnaires measuring demographic characteristics, demoralization, quality of life, despair and depression. Medical information was taken from patients' clinical chart. N = 203 out of 272 screened patients completed questionnaires in this study (74.6% response rate), and reasons for refusal were feeling too tired (n = 31), not being interested (n = 26), and personal reasons (n = 12). It took participants about half an hour to fill out the questionnaire, and they were allowed to ask the data collector for help if they did not understand any questions. Besides, the data collector checked and verified with the participant any missing data on receipt of completed questionnaires. To prevent any judgment bias caused by communication between the data collector and participants, standardized explanation was carried out.

2.4. Instruments

2.4.1. Socio-demographic and disease-related information sheet

We designed an information sheet to collect patients' demographic data, including age, marital status, and educational level. In addition, some disease-related characteristics, such as years since the diagnosis of breast cancer, cancer stage and family history of breast cancer were gathered from patients' clinical chart.

2.4.2. Chinese version of the Demoralization Scale (DS-C)

The original DS contains 24 self-report items, covering 5 dimensions: loss of meaning (item 2, 3, 4, 14, 20), dysphoria (item 10, 11, 13, 15, 16), disheartenment (item 6, 18, 21, 22, 23, 24), helplessness (item 5, 7, 8, 9), and sense of failure (item 1, 12, 17, 19) (Kissane et al., 2004). Responses are categorized into on a five-point Likert scale that evaluate the frequency (0 = never, 1 = seldom, 2 = sometimes, 3 = often, 4 = all the time) of the experience in the past two weeks. A total score was obtained by summing the single subscales scores, and higher scores indicated higher levels of demoralization. Psychometric results from the original DS study prove satisfactory reliability with Cronbach's α coefficient ranging from α = 0.71 (sense of failure dimension) to α = 0.94 (total DS) (Kissane et al., 2004). Psychometric performance of the DS has also been proven to be satisfactory in further validation studies in the Ireland, Italy, Spain, Germany and in Taiwan (Mullane et al., 2009; Grassi et al., 2017; Rudilla et al., 2016; Mehnert et al., 2011; Hung et al., 2010).

A standardized forward–backward procedure was employed to translate and cross-cultural adapt the original DS (Guillemin et al., 1993). First, forward translation was conducted by two Chinese researchers. One of them was familiar with demoralization, while the other person had a non-medical background and did not know the objective of this study. Second, five experts assessed the consistency of the translations. Minor modifications were discussed for three items requiring an additional consultation with the authors of the original DS (Kissane et al., 2004) before reaching consensus on the initial Chinese version. Third, back translation was conducted by two other bilingual specialists, who had no knowledge of the original DS. Fourth, an expert committee consisting of six health professionals (three surgeons and three nurses specializing in breast cancer care) made an item-by-item comparison of the back translation with the first Chinese version and the original English version, and created a pre-final version of the DS-C after resolving any discrepancies or any other problems. Finally, 20 breast cancer patients were included in a pretest to assess the need for cultural adaptation. Consensus was reached on the final version of DS-C and it was then subjected to psychometric testing.

2.4.3. McGill Quality of Life Questionnaire (MQOL)

Respondents' quality of life was measured using the Chinese version

of the MQOL. The original MQOL is a multidimensional questionnaire measuring quality of life among advanced illness populations (Cohen et al., 1995). Cui (2011) translated the MQOL into Chinese and validated it in cancer patients. The Chinese version of the MQOL with 17 items has been demonstrated to have good acceptability, practicability, and validity (Cui, 2011). Respondents were asked to choose from a numerical scale of 0–10 for each question. A score of 0 represents the worst quality of life, while a score of 10 indicates that the respondent's quality of life is in the most desirable situation.

2.4.4. Patient Health Questionnaire-9 (PHQ-9)

The original PHQ-9 was designed on the basis of the diagnostic criteria for major depressive disorder in the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV) (Lowe et al., 2004). It was translated into Chinese by Wang (2013) and showed good reliability and validity in malignant tumor patients. The Chinese version of PHQ contains 9 items whose responses ranged from 0 (not at all) to 3 (nearly every day) according to the frequency of symptoms during the previous 2 weeks, with a total score ranging from 0 to 27. A score greater than or equal to 10 is recommended as a criterion for clinical depression (Kroenke et al., 2001).

2.4.5. Beck Hopelessness Scale (BHS)

The original BHS is a self-rating scale with 20 items to evaluate individuals' pessimism and negative expectancies. For each item, respondents were required to choose an answer of either true or false to describe their attitude during the past week. The total score is between 0 and 20, with higher scores implicating more severe hopelessness (Beck et al., 1988). Kong and her colleagues translated the BHS into Chinese and found that the psychometric properties of the Chinese version of the BHS have yielded satisfactory results among adolescents (Kong et al., 2007).

2.5. Data analysis

SPSS version 22.0 and AMOS 21.0 were applied. Descriptive statistics were employed to describe demographic characteristics and to present the data collected by the 4 measurements: DS-C, MQOL, PHQ-9, and BHS. An expert consisting of three surgeons and three experienced nurses specializing in breast cancer evaluated the content validity of the DS-C.

For the construct validity, two steps were carried out. First, confirmatory factor analysis (CFA) was carried out to inspect whether the factor structures of the DS demonstrated in the previous studies (Kissane et al., 2004; Mullane et al., 2009; Mehnert et al., 2011; Rudilla et al., 2016; Grassi et al., 2017) could be replicated in the present study. Fitness of the model was estimated according to the following fit indices: normed χ^2 (χ^2/df, recommended criteria is < 3.0), comparative fit index (CFI, should be greater than 0.90), non-normed fit index (NNFI, preferably greater than 0.90), root mean square error of approximation (RMSEA < 0.08 indicates an acceptable fit), and standardized root-mean-square residual (SRMR, recommended criteria is < 0.05) (Wu, 2009). Second, exploratory factor analysis (EFA) with varimax rotation would be conducted in case of poor goodness of fit of the CFA. Eigen-values (> 1) and scree plots were used to determine the number of factors. Items were assigned to a specific factor if they got a loading of greater than 0.4, and were removed if they failed to load significantly on a particular factor (Wu et al., 2018).

Internal consistency reliability of the DS-C and its subscales was tested using Cronbach's α coefficient. To measure concurrent validity, correlations between the DS-C, MQOL, BHS and PHQ were explored. Divergent validity was analyzed using cross-tabulation frequencies comparing low, moderate and high DS-C scores (using a cutoff of mean ± SD for demoralization as recommended by Mullane et al. (2009) and Qiu (2012) with PHQ categories (scores of ≥10 identifying depression). Bivariate association between sample characteristic and DS-C were examined by independent sample t-tests or one-way analysis of variance (ANOVAs). Finally, a multiple regression analysis with the backward-selection method was employed to identify the explanatory variables of patients' DS-C score.

Table 1
Characteristics of Chinese breast cancer patients (n = 203).

Variable	*N*	%
Age (years) [a]		
25–40	56	27.59
41–68	147	72.41
Academic level		
Primary school	28	13.79
Middle school	70	34.48
College degree or above	105	51.72
Marital status		
Single/divorced	23	11.33
married	180	88.67
Monthly family income per person (Yuan[b])		
< 4000	106	52.22
4000~	97	47.78
Number of children		
0	12	5.91
1	103	50.74
2–4	88	43.35
Cancer stage		
I	9	4.43
II	57	28.08
III	33	16.26
IV	104	51.23
Family history of cancer		
No	151	74.38
Yes	52	25.62
Time since diagnosis (year)		
0–1	97	47.78
~5	67	33.00
~24	39	19.21

[a] Age: the mean score was 46.26 years with a standard deviation of 9.70.
[b] 4000 Yuan is equivalent to about 580 USD.

3. Results

3.1. Sample characteristics and descriptive statistics of the DS-C

A sample of 203 was retained in the final analysis. Breast cancer survivors' characteristics are summarized in Table 1. The respondents were 46.3 ± 9.7 years old, ranged from 25 to 68. A majority of them were married (88.7%) and only 5.9% did not have a child. With respect to tumor stage, 4.4%, 28.1%, 16.3% and 51.2% of the respondents were in stage I, II, III, and IV, respectively.

As shown in Table 2, the total score of DS-C ranged from 0 to 65 (mean 32.81 ± 12.82), while the scores of four subscales are 13.79 ± 5.92 (dysphoria & disheartenment), 5.40 ± 3.75 (loss of meaning and purpose), 8.58 ± 2.90 (sense of failure), 4.64 ± 2.68 (helplessness).

3.2. Content validity

The S-CVI of the DS-C was 0.99. As for the semantic expression I-CVI value, only two items (Item 14, 19) got 0.83 and all of the remaining 21 items got 1.0; Regarding the content relevance I-CVI value, only two items (Item 4, 5) got 0.83 and all of the remaining 21 items got 1.0. All items presented high levels of both semantic expression I-CVI and content relevance I-CVI values ranging from 0.83 to 1.0, indicating excellent content validity.

3.3. Construct validity and internal consistency

Five CFAs were conducted to test the factor structures of the DS

Table 2
Item and scale characteristics (principal components analysis, varimax rotated 4-factor solution) of the Chinese version of the DS.

Dimensions and Items	Factor loadings				Items characteristics				Original subscale
	Factor 1	Factor 2	Factor 3	Factor 4	Mean	SD	Item Total correlation	Alpha if removed	
Dysphoria & Disheartenment(13.79 ± 5.92)(explained variance, 20.50%)									
5. I no longer feel emotionally in control.	0.737				1.45	0.913	0.596	0.840	Helplessness
11. I feel irritable.	0.746				1.77	0.905	0.649	0.838	Dysphoria
13. I have a lot of regret about my life.	0.602				1.51	0.992	0.535	0.842	Dysphoria
15. I tend to feel hurt easily.	0.727				1.50	0.841	0.620	0.840	Dysphoria
16. I am angry about a lot of things.	0.787				1.55	0.862	0.568	0.841	Dysphoria
18. I feel distressed about what is happening to me.	0.572				1.99	0.859	0.633	0.839	Disheartenment
21. I feel sad and miserable.	0.572				1.25	0.795	0.666	0.839	Disheartenment
23. I feel quite isolated or alone.	0.553				1.10	0.881	0.670	0.837	Disheartenment
24. I feel trapped by what is happening to me.	0.542				1.67	0.930	0.657	0.837	Disheartenment
Loss of meaning and purpose (5.40 ± 3.75)(explained variance, 16.30%)									
4. My role in life has been lost.		0.459			1.02	0.957	0.501	0.843	Loss of meaning and purpose
9. I feel hopeless.		0.526			1.06	0.851	0.696	0.837	Helplessness
10. I feel guilty.		0.404			0.90	0.881	0.404	0.847	Dysphoria
14. Life is no longer worth living.		0.789			0.67	0.786	0.591	0.841	Loss of meaning and purpose
20. I would rather not be alive.		0.786			0.62	0.704	0.557	0.843	Loss of meaning and purpose
22. I feel discouraged about life.		0.675			1.11	0.825			Disheartenment
Sense of failure (8.58 ± 2.90)(explained variance, 11.24%)									
1. These is a lot of value in what I can offer others[a]			0.645		2.01	0.853	−0.529	0.865	Sense of failure
12. I cope fairly well with life[a]			0.640		2.55	1.077	−0.409	0.876	Sense of failure
17. I am proud of my accomplishments[a]			0.706		1.76	0.957	−0.402	0.869	Sense of failure
19. I am a worthwhile person[a]			0.808				−0.576	0.870	Sense of failure
Helplessness(4.64 ± 2.68)(explained variance, 10.63%)					2.26	1.031			
2. My life seems to be pointless.				0.702	1.15	0.837	0.511	0.843	Loss of meaning and purpose
3. There is no purpose to the activities in my life.				0.778	1.14	0.862	0.468	0.852	Loss of meaning and purpose
7. No one can help me.				0.527	1.24	0.963	0.586	0.840	Helplessness
8. I feel that I cannot help myself.				0.545	1.13	0.910	0.518	0.843	Helplessness

[a] Reverse items.

Table 3
Results of CFAs for the factor structures of the DS demonstrated in the previous studies[a].

Model	χ^2/df	CFI	NNFI	RMSEA	SRMR	AIC
Kissane et al. (2004)	2.170	0.865	0.778	0.077	0.070	642.772
Mullane et al. (2009)	2.795	0.796	0.799	0.095	0.069	792.509
Mehnert et al. (2011)	2.200	0.808	0.863	0.077	0.059	649.246
Rudilla et al. (2016)	2.617	0.824	0.827	0.090	0.062	687.760
Grassi et al. (2017)	2.354	0.844	0.846	0.082	0.062	687.046

[a] CFA = confirmatory factor analysis. Five CFAs were carried out to inspect whether the factor structures of the DS demonstrated in the previous studies could be replicated in the present study.

demonstrated in the previous studies (Kissane et al., 2004; Mullane et al., 2009; Mehnert et al., 2011; Rudilla et al., 2016; Grassi et al., 2017). The results showed poor fit indices for all of these models, as are summarized in Table 3. Therefore EFA was conducted to establish a new factor structure.

As shown in Table 2, principal component analysis (varimax rotation with Kaiser normalization) identified 4 factors with eigenvalues > 1, explaining 58.66% of the total variance. Item 6 ("I am in good spirits") was removed as it loaded poorly (< 0.4) on all four factors. The final EFA model therefore consisted of four factors (KMO test = 0.908; Bartlett's sphericity test = 2206.237; pSYMBOL 0 \f "Times New Roman" \s 120.001).

The Cronbach's α coefficient of DS-C and its 4 subscales were 0.853, 0.894, 0.720, 0.839, and 0.730, respectively, suggesting that the scale has a good internal consistency.

3.4. Concurrent validity and divergent validity

Concurrent validity was examined using correlation coefficients of demoralization with depression, quality of life and despair. As shown in Table 4, the score of PHQ is positively correlated with the total DS-C and the score of each subscale except the Sense of failure subscale, while the score of MQOL is significantly correlated with the total DS-C and the score of each subscale. Regarding BHS, it is positively correlated with the score of Sense of failure subscale, while we cannot detect any significant relationship between it and the total DS-C and the score

Table 4
Correlation coefficient of demoralization with depression、quality of life and despair (n = 203).

	Total DS	Dysphoria & Disheartenment	Loss of meaning and purpose	Sense of failure	Helplessness
PHQ	0.552**	0.562**	0.491**	−0.113	0.481**
MQOL	−0.626**	−0.548**	−0.564**	0.366**	−0.487**
BHS	0.025	0.074	0.036	0.144*	0.057

*$p < 0.05$; **$p < 0.01$.

Table 5
The distribution of depression and demoralization of breast cancer patients (n = 203).

	Low demoralization[a]	Moderate demoralization[a]	High demoralization[a]
NO depression	37(24.03%)	105(68.18%)	12(7.79%)
depression[b]	23(46.94%)	23(46.94%)	3(6.12%)

[a] Based on a mean of 32.81 (SD = 12.82): low demoralization (≤19.99); moderate demoralization (20.00–45.62); high demoralization (≥45.63).
[b] PHQ scores of ≥10 identifying depression.

of other subscales.

Divergent validity was tested by examining cross-tabulation frequencies of PHQ and DS. In the present study, the criterion of major depression in the DSM-IV (PHQ ≥10) was used to identify depression. Based on this standard, patients were divided into two groups, with 49 patients being depressed and accounting for 24.14%. Regarding demoralization, according to recommended by Mullane et al. (2009) and Qiu (2012), DS score was subdivided into three distinct categories using the mean ± 1 standard deviation as the cut-off. Consequently, the frequency and percentage of the patients with high, moderate and low degree of demoralization in these groups were also reported. As shown in Table 5, 12 (12 of 15, 80.00%) participants with high demoralization were non-cases on the PHQ, while among those who were moderate demoralized or low demoralized, 105 (105 of 128, 82.03%) and 37 (37 of 60, 61.67%), respectively, did not show any symptoms of depression.

3.5. Explanatory demographic and illness-related variables of demoralization

Table 6 shows the bivariate associations between demoralization and sample characteristics, and then the variables that were significantly correlated with demoralization were entered into a multivariable linear regression model. As shown in Table 7, less monthly family income ($\beta = -0.184$, $p < 0.05$), lower academic level ($\beta = -0.182$, $p < 0.05$) and higher cancer stage ($\beta = 0.150$, $p < 0.05$) were significantly associated with higher total DS-C; the model explained about 12.9% of the variance in the total DS-C ($F = 6.881$, $p < 0.001$).

As for each subscale, no explanatory variables accounted for the variance in "Dysphoria & Disheartenment". Lower academic level ($\beta = -0.195$, $p < 0.05$), less monthly family income ($\beta = -0.152$, $p < 0.05$) and higher cancer stage ($\beta = 0.172$, $p < 0.05$) were significantly associated with higher score of "Loss of meaning and purpose"; the model explained about 15.1% of the variance in this subscale ($F = 8.036$, $p < 0.001$). Higher academic level ($\beta = 0.253$, $p < 0.01$) were significantly associated with higher score of "Sense of failure"; the model explained about 8.7% of the variance in this subscale ($F = 7.284$, $p < 0.001$). Less monthly family income ($\beta = -0.306$, $p < 0.01$) and family history of cancer ($\beta = 0.184$, $p < 0.01$) were significantly associated with higher score of "Helplessness"; the model explained about 15.4% of the variance in this subscale ($F = 9.987$, $p < 0.001$).

4. Discussion

Our results show that the DS-C has good validity and reliability among Chinese breast cancer survivors, and support its clinical application in measuring demoralization.

Compared with those found in two studies of Taiwanese cancer patients (31.03 ± 14.87, 30.38 ± 13.68) (Lee et al. (2012); Li et al., 2017) and a study of Australian cancer patients (30.82 ± 17.73) (Kissane et al., 2004), the mean score for DS in our result (32.81 ± 12.82) is fairly typical. However, other studies found lower scores than ours, including those of cancer patients in Irish (19.94 ± 14.62) (Mullane et al., 2009), German (20.6 ± 13.6) (Vehling et al., 2017), Italian (23.55 ± 14.10) (Grassi et al., 2017), and Taiwanese patients (28.26 ± 13.32) (Fang et al., 2014). This result

Table 6
Bivariate associations between sample characteristics and demoralization (n = 203).

	Total DS	Dysphoria & Disheartenment	Loss of meaning and purpose	Sense of failure	Helplessness
Age					
25–40	28.95 ± 12.52**	1.38 ± 0.62*	0.73 ± 0.58*	2.36 ± 0.70*	1.04 ± 0.70
41–68	34.27 ± 12.71	1.59 ± 0.66	0.96 ± 0.63	2.06 ± 0.72	1.21 ± 0.65
Academic level					
Primary school	39.85 ± 11.06**	1.67 ± 0.56*	1.11 ± 0.56**	1.91 ± 0.70**	1.31 ± 0.61**
Middle school	35.94 ± 10.93	1.39 ± 0.75	0.79 ± 0.67	2.30 ± 0.74	1.07 ± 0.73
College degree or above	29.00 ± 13.15	1.44 ± 0.62	0.57 ± 0.52	2.44 ± 0.56	0.94 ± 0.61
Marital status					
Single/divorced	34.14 ± 14.15	1.62 ± 0.84	1.03 ± 0.74	2.29 ± 0.73	1.19 ± 0.63
Married	32.64 ± 12.68	1.52 ± 0.63	0.88 ± 0.61	2.13 ± 0.73	1.16 ± 0.68
Monthly family income per person (Yuan[a])					
< 4000	36.29 ± 12.08**	1.65 ± 0.64**	1.06 ± 0.61**	2.03 ± 0.74*	1.37 ± 0.61**
4000~	29.00 ± 12.59	1.40 ± 0.67	0.72 ± 0.60	2.27 ± 0.69	0.93 ± 0.66
Number of children					
0	27.17 ± 13.27**	1.35 ± 0.66	0.56 ± 0.57**	2.33 ± 0.84	0.96 ± 0.57
1	30.90 ± 12.22	1.46 ± 0.67	0.78 ± 0.57	2.23 ± 0.70	1.10 ± 0.71
2–4	35.78 ± 12.91	1.64 ± 0.64	1.09 ± 0.65	2.02 ± 0.73	1.26 ± 0.63
Cancer stage					
I	28.22 ± 12.34*	1.43 ± 0.62	0.65 ± 0.54*	2.47 ± 0.70	0.94 ± 0.58**
II	30.71 ± 12.75	1.46 ± 0.67	0.78 ± 0.57	2.29 ± 0.77	1.13 ± 0.68
III	28.88 ± 12.17	1.37 ± 0.60	0.74 ± 0.56	2.1 ± 0.78	0.79 ± 0.59
IV	35.60 ± 12.62	1.63 ± 0.67	1.04 ± 0.65	2.04 ± 0.67	1.31 ± 0.65
Family history of cancer					
No	31.91 ± 12.73	1.48 ± 0.64	0.88 ± 0.62	2.17 ± 0.74	1.10 ± 0.66*
Yes	35.48 ± 12.86	1.69 ± 0.70	0.96 ± 0.64	2.07 ± 0.67	1.33 ± 0.68
Time since diagnosis (year)					
0–1	31.48 ± 13.13	1.51 ± 0.69	0.82 ± 0.61	2.21 ± 0.73	1.09 ± 0.69
~5	33.75 ± 11.53	1.53 ± 0.54	0.95 ± 0.59	2.04 ± 0.71	1.19 ± 0.62
~24	34.61 ± 14.05	1.59 ± 0.76	1.04 ± 0.70	2.16 ± 0.73	1.29 ± 0.70

*$p < 0.05$; **$p < 0.01$.
[a] 4000 Yuan is equivalent to about 580 USD.

Table 7
Results of multivariable linear regression analysis: Explanatory variables of demoralization[a] (n = 203).

Outcome variables	Explanatory variables	Adjusted R^2	Standardized coefficients beta	*t*-test	P value	95% CI for β	
						Lower	Upper
Total DS	Monthly family income per person	0.129	−0.184	−2.443	0.015*	−8.510	−0.907
	Academic level		−0.182	−2.235	0.027*	−5.801	−0.363
	Cancer stage		0.150	2.174	0.031*	0.182	3.744
	Academic level		−0.195	−2.43	0.016*	−0.292	−0.03
Loss of meaning and purpose	Monthly family income per person	0.151	−0.152	−2.05	0.042*	−0.372	−0.07
	Cancer stage		0.172s	2.522	0.012*	0.024	0.195
Sense of failure							
	Academic level	0.087	0.253	3.36	0.001*	0.101	0.386
Helplessness							
	Monthly family income per person	0.154	−0.306	−4.279	< 0.001**	−0.597	−0.220
	Family history of cancer		0.184	2.769	0.006**	0.081	0.484

*$p < 0.05$, **$p < 0.01$.
[a] No explanatory variables accounted for the variance in "Dysphoria & Disheartenment", therefore result of this subscale was not presented in this table.

could be at least in part explained by considering the different cultures and the deletion of item 6 of the original DS in our study. Another possible reason might be the characteristics of the samples: those previous studies investigated both male and female cancer survivors with different sites of tumor, while all respondents in our study are female breast cancer survivors. This result was consistent with the Vehling et al. (2012) finding that women were at a higher risk for demoralization than men. These results indicate that demoralization exists across Asian and Western cultures, and maybe more serious in some illnesses that only occur in women. Consequently, we should recognize that demoralization is not uncommon, and special attention should be paid to the importance of identifying demoralization among breast cancer patients.

The proposed factor structures of the DS in the previous studies (Kissane et al., 2004; Mullane et al., 2009; Mehnert et al., 2011; Rudilla et al., 2016; Grassi et al., 2017) was not confirmed using CFAs; however, results of the EFA demonstrated a four-factor structure (i.e., dysphoria & disheartenment, loss of meaning and purpose, sense of failure, helplessness), which explain 58.66% of the variance. The factor structure of the "sense of failure" subscale in our study is highly similar to that identified by Mullane et al. (2009) and Grassi et al. (2017). However, other factor solutions revealed different item clusters compared with the previous studies (Rudilla et al., 2016; Mehnert et al., 2011; Grassi et al., 2017; Mullane et al., 2009), and the most obvious aspect is that items on the original dysphoria subscale and disheartenment subscale loaded onto one factor, yielding a new subscale of the DS-C. The variation in the factor structure of the DS may be due to the different types of diseases and cultural backgrounds in these studies. Overall, the DS is reliable in measuring demoralization, but we should be careful to generalize the results of its different versions. Further studies are required before we are confident to use these subscales in studies on cancer patients' demoralization.

In terms of concurrent validity, we examined the relationship between demoralization, quality of life, despair and depression. The total score of the DS-C was significantly related to the MQOL score, while the "loss of meaning and purpose" subscale score was most highly correlated with the MQOL score. Two items in this subscale are closest to suicidal ideation in content, "life is no longer with living (item 14)" and "I would rather not be alive (item 20)", and have been significantly associated with depression (Lee et al., 2012). Given that the significant association between depression and quality of life in breast cancer patients has already been proven (Li et al., 2016), our findings can be explained along these lines. Another notable finding is that regarding relationship between demoralization and despair, while all five subscales of DS were significantly related to the BHS score in a Taiwanese study (Lee et al., 2012), we found only the "sense of failure" subscale was associated with the BHS. Given the theoretical statement that "hopelessness" is the key component of demoralization (Tecuta et al., 2015), our findings do not fully support this hypothesis. Consequently, more in-depth research in this area is warranted.

With respect to divergent validity between demoralization and depression, the differences between respondents with depression on the PHQ (24.14% in our sample) and demoralization were examined. In the present study, 29.6% of our respondents had low demoralization, a higher percentage compared with studies by Mullane et al. (2009) and Grassi et al. (2017), who found 14.4% and 22.1% of cancer patients with low demoralization. Based on this cutoff, we identified 57.6% patients with moderate/high demoralization but not clinically depressed at the PHQ (cutoff ≥10). We also found that moderate/high demoralization and depression existed co-morbidly in 12.81% of our sample, and there were significant correlations between the DS and PHQ (r from 0.481 to 0.562). These results are consistent with previous studies performed in cancer survivors (Mullane et al., 2009; Grassi et al., 2017; Kissane et al., 2004) indicating that demoralization and depression are two different constructs, although there is some overlap in their connotations (Robinson et al., 2015).

About the association of demoralization with demographic and illness-related variables, previous studies conducted in different countries stated that marital status, employment status, income, physical problems, social/family support and academic level (Mehnert et al., 2011; Vehling et al., 2012; Lee et al., 2012; Vehling et al., 2013; Robinson et al., 2015; Li et al., 2017) were significantly correlated with demoralization in cancer patients. Our results partially confirmed these above-mentioned studies in that income and academic level were significantly associated with demoralization in breast cancer survivors. However, we could not confirm the association between marital status and demoralization. This may be because the majority of our respondents were married. Although this relationship was not significant, single/divorced people reported higher demoralization scores than their counterparts. These inconsistent findings on the correlation between marital status and demoralization need to be further validated. Our results highlight the importance of healthcare providers' attention to disadvantaged breast cancer survivors, especially those who have lower academic levels and lower income. Moreover, our findings can provide a theoretical basis for healthcare authorities and medical institutions on the necessity of reinforcing social welfare to the benefit of breast cancer survivors.

5. Limitations

As limitations, our sample originated from a specific health service establishment, which can make the external validity of our findings to be restricted. Additionally, test-retest reliability and criterion-related validity testing were not conducted because of the cross-sectional

design and the scarcity of a gold-standard criterion measurement. Future research should explore the stability of the DS-C through test-retest reliability and further validate the DS-C using criterion-related validity. The last limitation concerns the factor structure of the DS-C in the present study. Instead of replicating the results of previous studies, we found a new four-factor structure. Although both the total DS-C and its 4 subscales appeared to have good reliability, we recommend that future studies should further validate this factor structure using confirmatory factor analysis.

6. Conclusion

Taken together, our results demonstrated evidence of several valuable psychometric properties of the DS-C. This study established a four-factor structure in a reduced 23-item version. High internal consistency for both the total DS-C and its 4 subscales was proved through Cronbach's α coefficients calculating. Correlation coefficients estimates of demoralization with depression, quality of life and despair showed good concurrent validity and divergent validity. Hence, our study preliminary supported that the DS-C is a reliable and valid instrument for assessing demoralization among mainland Chinese breast cancer survivors, and the factor structure of this measurement needs to be further addressed in future studies. By applying this measurement in clinical practice, health professionals can help demoralized patients to access resources and support in a timely and appropriate manner. Moreover, the research indicates that demoralization among Chinese breast cancer survivors is associated with several demographic and illness-related factors, a finding which warrants further research.

Conflicts of interest

The authors declare they have no potential conflict of interest.

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