Psychometric properties of the Chinese version Fear of Cancer Recurrence Questionnaire-7 (FCR-7)

Running title: Psychometric properties of the Chinese FCR-7

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Public Significance Statement

The present study suggests that the Chinese version Fear of Cancer Recurrence Questionnaire-7 (FCR-7) is a reliable and valid measurement for assessing patient's recurrence fear. Additionally, patients with low income, family cancer history and those who had gone through chemotherapy are more likely to report higher fears. Therefore, specific and flexible psychological interventions are needed for these high-risk populations.

Compliance with Ethical Standards

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Conflict of interest

Authors declare that they have no conflict of interest.

Ethics Approval

The Southern Medical University Nanfang Hospital Research Ethics Committee examined and approved the study (ref No: NFEC-2018-038).

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Abstract

This paper investigates the reliability and validity of the Chinese version of the Fear of Cancer Recurrence Questionnaire-7 (FCR-7). A total of 1025 cancer patients were recruited and asked to complete the Chinese FCR-7, FoP-Q-SF, PHQ-9, and GAD-7. The internal consistency and test-retest reliabilities were examined. EFA and CFA was conducted on random split-half samples. Overall relationships of FCR-7 with other psychological constructs were examined. The Chinese FCR-7 showed good internal consistency (Cronbach's alpha = 0.87), test-retest reliability (r = 0.90), and item-total correlations (ranged from 0.583 to 0.872). The unitary factor structure was supported by the EFA and the CFA fit statistics (CFI = 0.99; RMSEA = 0.039, 95%CI: 0.01, 0.07). The total score of FCR-7 was positively associated with FoP-Q-SF (r = 0.756, *P* < .01), PHQ-9 (r = 0.522, *P* < .01), and GAD-7 (r = 0.553, *P* < .01). Patients with low monthly income (*P* < .001), family cancer history (*P* = .012), and those who had gone through chemotherapy (*P* = .001) tended to report higher FCR. The FCR-7 has been translated and successfully culturally adapted into a Chinese version. It is a reliable and valid measurement for assessing FCR.

Keywords: cancer, Chinese, Fear of recurrence, psychometric properties

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1. Introduction

In the recent decade, Fear of Cancer Recurrence (FCR) has received growing attention in research with many cancer survivors of various cancer diagnoses (Cohee et al., 2015). FCR is often defined as: *fear, worry, or concern relating to the possibility that cancer will come back or progress* (Lebel et al., 2016). Patients with high FCR often reported significant psychological distress (i.e. depression) as well as negative behavior change (i.e. avoidance, excessive self-examination) (Avis et al., 2005; Lasry & Margolese, 1992; Lebel, Rosberger, Edgar, & Devins, 2009; Simard, Savard, & Ivers, 2010). This concern may appear immediately after cancer diagnosis/treatment and has been shown to remain stable for years (Simard & Savard, 2009).

Recent study showed that about 24-40% of cancer patients reported moderate to high levels of need for help dealing with FCR (Hartl, 2003; Hodgkinson, Butow, Hunt, Pendlebury, Hobbs, Lo, et al., 2007; Hodgkinson, Butow, Hunt, Pendlebury, Hobbs, & Wain, 2007). A systematic review (Simard et al., 2013) of previous studies found that survivors diagnosed at a young age, female, and with higher education level were more likely to suffer FCR compared with their counterparts. Meta-analysis showed that having had a mastectomy (Koch, Jansen, Brenner, & Arndt, 2013), radiotherapy (Yang, Cameron, & Humphris, 2016) or chemotherapy (Yang, Wen, Bedi, & Humphris, 2017) were strong predictors of higher FCR. Other demographic and clinical factors, such as marital status, employment, cancer stage, and treatment type were still conflictive.

Several measurements have been developed and utilized to assess FCR. Thewes and

colleagues (Thewes et al., 2012) completed a review of existing FCR measurements in 2012, ranging from 2-item questionnaires to a 43-item questionnaire, and eventually they found 20 unique self-reported FCR assessment tools. Fear of Cancer Recurrence Inventory (FCRI) (Simard & Savard, 2009) was one of the commonly used questionnaires. This multi-item scale has the strength of evaluating a variety of qualities/features of FCR. However, it can be burdensome to complete, time-consuming and challenging to score and interpret (Humphris, Watson, Sharpe, & Ozakinci, 2018). On the contrary, brief FCR questionnaire, such as the 2-item Fear of Recurrence Index (FRI) (Lasry & Margolese, 1992), even though was very easy to administer, it showed serious psychometrical weakness. Thus, researchers argued that short uni-dimensional FCR measure could be considered as the main instrument for assessing and screening patients (Humphris et al., 2018).

In mainland China, only one FCR related scale has been translated and proved to be valid, that is, the Chinese version of the Fear of Progression Questionnaire-Short Form (FoP-Q-SF). In 2015, Wu *et al.* (Wu, 2015) investigated the reliability and validity of the Chinese FoP-Q-SF in 1031 liver cancer patients and confirmed that the scale was suitable for assessing FoP in Chinese cancer patients. However, no specific FCR instrument has been introduced in mainland China.

The main purpose of this study is to translate and evaluate the psychometric properties of the 7-item Fear of Cancer Recurrence (FCR-7) questionnaire. This scale is based upon a set of 7 questions that have been selected from extant measures within the literature to assess directly FCR (Humphris et al., 2018). It has already

been utilized in numerous specific cancer populations, specifically in the UK (Rogers, Cross, Talwar, Lowe, & Humphris, 2016). The Flesch readability index test showed that the FCR-7 was equivalent to 'Plain English, easily understood by thirteen- to fifteen-year-old students' (Humphris et al., 2018). In the current study, we aimed to: 1) translate the FCR-7 into Chinese and evaluate both the linguistic and cultural equivalence of the scale; 2) test its psychometric properties in a mixed group of Chinese cancer patients; 3) investigate the association of sociodemographic and clinical variables to FCR.

2. Methods

2.1 Participants and settings

A cross-sectional study was used. All participants were consecutively recruited from the department of Radiotherapy and Oncology (Nanfang Hospital, Level III tertiary hospital) and Guangdong Cancer Center (Guangdong General Hospital, Level III tertiary hospital). Data were collected from 1st January to 30th July 2018. Patients were eligible if they were: a) adults (above 18 years old); b) able to read, write and understand Mandarin or Cantonese; and c) with a cancer diagnosis. Excluded criteria were: a) patients who were blind/deaf; b) patients who had serious mental illness (i.e. schizophrenia); c) patients who received palliative treatment; or d) patients who had disturbance of consciousness.

Overall, 1153 eligible patients were invited to participate, and 1025 of them agreed (response rate 89%). Of the 1025 participants, about 90% of the subjects were female and ranged in age from 20 to 90 years old (Mean = 48.29). Most of the patients were married, living with family members, and with low education background and monthly income. Nearly 80% of the patients had been diagnosed with breast cancer and many of them had received surgery (91.3%), chemotherapy (88.1%) and radiotherapy (87.5%).

2.2 Instruments

2.2.1 Personal Information Sheet

A study specific set of questions (demographic/clinical sheet) were formulated to assess patient's gender, age, marital, education, monthly income, employment

status, cancer stage, treatment type, family cancer history, and self-rated physical morbidity. The last three were measured by simple 'Yes/No' questions: 1) Did you received surgery/chemotherapy/radiotherapy? 2) Do you have a family cancer history? 3) Do you suffer from any other physical comorbidity, such as diabetes, hypertension, musculo-skeletal, etc.? For those who were uncertain about their cancer stage/treatment type, data were recollected from their medical records.

2.2.2 Fear of Cancer Recurrence (FCR-7) questionnaire

The 7-item FCR was developed at the University of St Andrews, Scotland by Professor Humphris and his colleagues. It is used to assess patient's recurrence fears and has been used with patients with breast, colorectal and head and neck cancer in a variety of clinical centers in the UK (Rogers et al., 2016). The reliability of the questionnaire is good with an internal consistency of 0.92 (95%CI: 0.90, 0.94) and evidence for validity (Humphris et al., 2018). No cut-off has been reported other than the statistical 60^{th} (score = 17) and 90^{th} (score = 27) percentiles which have been regarded as levels for 'moderate' and 'high' reports of patient's FCR respectively.

2.2.3 Fear of Progression Questionnaire-Short Form (FoP-Q-SF)

The 12-item FoP-Q-SF is a short form of the original Fear of Progression Questionnaire (FoP-Q) (Herschbach et al., 2005). It has been utilized to samples of various cancer patients by many countries (Mehnert, Berg, Henrich, & Herschbach, 2009; Mehnert, Herschbach, Berg, Henrich, & Koch, 2006; Melchior et al., 2013). The items are scored on a 5-point Likert scale (from 1 = never, to 5 = very often). The total score of the scale ranges from 12 to 60, and higher total score indicates higher FoP. A

score of 34 or above indicates a dysfunctional level of FoP (Herschbach et al., 2010). The psychometric properties of the Chinese FoP-Q-SF has been tested by Wu and her colleagues (Cronbach's alpha = 0.88) (Wu, 2015), but no cut-offs for dysfunctional has been provided in the Chinese version scale.

2.2.4 Patient Health Questionnaire (PHQ-9)

The 9-item Patient Health Questionnaire is a commonly used screening tool for depression in medical settings. It evaluates the degree of depressive symptoms, and the items range from 0 to 3 (0 = not at all, and 3 = nearly everyday) (Herschbach et al., 2010). A total score of 5 or more indicates depressive symptoms, and higher total score indicates higher depression level. The Chinese PHQ-9 shows satisfactory psychometric properties (internal consistency = 0.89) (Chen, 2015).

2.2.5 General Anxiety Disorder Questionnaire (GAD-7)

The 7-item General Anxiety Disorder Questionnaire is a brief self-report measurement used to evaluate person's anxiety symptoms. Response options are not at all, several days, more than half the days, and nearly every day, rated as 0, 1, 2, and 3, respectively (Spitzer, Kroenke, Williams, & Lowe, 2006). A total score of 5 or more indicates anxiety symptoms, and higher total score indicates higher anxiety level. The internal consistency of the Chinese GAD-7 is 0.91 (Zheng, 2013).

2.3 Procedure

2.3.1 Translation

The FCR-7 was translated according to the recommendations suggested by Bracken

and Barona (Bracken BA, 1991). In this study, the first author (YY) translated the FCR-7 from English to Chinese, then two bilingual translators (professors working at the Southern Medical University, both had experience of translating and validating instruments) who blinded to the FCR-7 were asked to complete the back-translation. To make sure the meaning of each item was kept, a comparison was made between the original and the re-translated English versions. Disagreements were discussed and agreed upon by the researcher and both the back-translators.

2.3.2 Data collection

Approval for the study was obtained from the hospital Research Ethics Committee (ref No: NFEC-2018-038). Patients were approached by three co-authors (SHW, WHM, and LWJ) who are all chief physicians. After patients who showed interest in participating were told about the purpose of the study, a written informed consent form was provided. All patients were given the option of allowing or refusing their involvement in the study and then were asked to complete a personal information sheet, the FCR-7, FoP-Q-SF, PHQ-9, GAD-7 and returned to the research staff immediately. The whole procedure was supervised by the last author (ZB) who is an experienced licensed psychiatrist.

2.4 Data analysis

All statistical analyses were calculated with SPSS v16 and STATA 15. Normal distribution of all item scores and the total score was tested using the Kolmogorov–Smirnow test. Item analysis was performed with calculation of means (M), standard deviations (SD), floor and ceiling effects. The items of the FCR-7 were tested with

part-whole correlated Pearson correlations between item and scale value. Content equivalence was established by an expert panel. Internal consistency was determined with Cronbach's alpha, and bivariate correlations (Pearson's r) with the FoP-Q-SF, PHQ-9, and GAD-7 were used to investigate convergent validity. Descriptive statistics were used to analyze the demographic/clinical data. Difference in means were investigated using a t test for independent samples. Analysis of variance were used to identify group effects.

Item analysis

Floor and ceiling effects were indicated when one fourth (25%)of the participants reported experiencing 'not at all' (floor effect) or 'all the time' (ceiling effect) (Fidika, Herle, Herschbach, & Goldbeck, 2015). The item-scale value correlations were calculated using Pearson's correlation coefficients. Correlations above 0.40 are recommended, but correlations below 0.30 are usually considered unacceptably low (D. F. Polit & Beck, 2009).

Content equivalence

Content equivalence implies that each item in the instrument has consistent cultural relevance (Flaherty et al., 1988). Content equivalence of the Chinese FCR-7 was examined by a panel of experts. The panel included three oncologists (WHM, LWJ, and SHW), two clinical psychologists (ZJY, ZB) and a psychology nurse specialist (LT). A four-point scale (from 1=not relevant at all, to 4=very relevant) was completed by the experts to measure the relevancy of each item to the concept of FCR. The Content Validity Index (CVI), which indicates the percentage of the total items rated as either

three or four, was calculated. A CVI score of 80% or higher is considered to indicate good content validity (Waltz, 1988).

Validity Test

Convergent validity was measured by Pearson's correlation to examine the association between scores on the FoP-Q-SF, PHQ-9, GAD-7 and FCR-7. The Kaiser-Meyer-Olkin test was conducted. The total sample was split randomly into two samples and EFA (using Horn's parallel analysis: 'paran' command in STATA) was performed on one sample, and CFA was performed on the remaining sample. The goodness-of-fit indexes used included: X^2/degrees of freedom (df) ratio, Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA). The criteria for goodness-of-fit indexes are as followed: $X^2/d.f \leq 3$, CFI ≥ 0.95, RMSEA ≤ 0.08 (Li, Chung, Ho, Chiu, & Lopez, 2013).

Reliability Test

Internal consistency reliability of the Chinese version FCR-7 was assessed by calculating the Cronbach's alpha. Internal consistency reliability is acceptable with a Cronbach's alpha above 0.70, correlations of 0.80 and higher are highly desirable (D. F. Polit & Beck, 2009). A third of the participants were randomly selected (using a random number generator) to respond to the FCR-7 again by telephone after 1 month, and test-retest reliability was assessed using Pearson's r between the FCR-7 total score at initial assessment and 1-month reassessment.

3. Results

3.1 Participant Characteristics

Patients who were older ($P < .001$), full-time employed ($P = .005$) and had been diagnosed with breast cancer ($P < .001$) tended to report lower FCR. On the contrary, patients with low monthly salary ($P < .001$), family cancer history ($P = .012$), and those who had gone through chemotherapy ($P = .001$) were more likely to experience higher FCR (table 1). One month later, 350 participants were invited by telephone to rate their FCR levels again and 285 of them completed the measurement (response rate 81%). Table 2 shows the comparison of demographic and clinical characteristics between patients of the initial assessment and retest measurement. Significant group difference was found in age ($P = .037$).

3.2 Item Characteristics

In the current study, floor effect was found for item 4 (33.4%), and no ceiling effects were found. The item-total scale correlations ranged from 0.583 to 0.872, which were all acceptable. Five out of seven items had high correlation (coefficients higher than 0.80, table 3).

3.3 Content Equivalence

The total CVI was 88% (ranged from 63 to 100%). The majority of the items were rated as quite or very relevant (score = 3 or 4), with the exception of item 6. Omitting item 6 the CVI was recalculated at 94% (ranged from 88 to 100%), which indicated that the content of most items reflected the underlying construct.

3.4 Validity Test

The Kaiser-Meyer-Olkin test gave satisfactory high values of 0.91 for FCR-7, which meant sufficient variance to perform factor analysis. The EFA revealed single factor structure (eigenvalue for first factor = 4.26). The second factor adjusted eigenvalue was 0.037 which was below the random derived parallel eigenvalue of 0.19 which was averaged over 50 replications (see Supplementary file). This demonstrated that there was no evidence for a substantial second factor that comprised sufficient meaningful variance over the calculated random variation. The factor loadings for all items were high (> 0.7) with the exception of item 6 which was 0.578 (see table 3). The convergent validity of FCR-7 was assessed by calculating the correlations between FCR-7 total scores and the scores of FoP-Q-SF, PHQ-9 and GAD-7. Table 4 shows that the FCR-7 total score was significantly associated with the other three instruments (r ranged from 0.522 to 0.756). The fit indices for the CFA were supportive of a single unidimensional scale. The fit was demonstrated by a X^2/df fit index that was 1.79 and below recommended level of 3.0, CFI = 0.996; RMSEA = 0.039 (95%CI: 0.01, 0.07). These numerical values provided reassurance that the items behaved psychometrically as expected.

3.5 Reliability Test

The Cronbach's alpha of the scale was 0.87. Deletion of any item would not have indicated any improvements to internal consistency. As for the test-retest reliability, the Pearson's correlation coefficient between initial and one-month reassessment was 0.90.

4. Discussion

The main aim of this study was to translate a valid and reliable self-report scale for cancer recurrence fear, the FCR-7. Our results indicated that the Chinese version of the FCR-7 had satisfactory psychometric properties in Chinese cancer patients.

Reliability, which refers to the consistency between independent measurements of the same concept/phenomenon, was a prerequisite for a valid scale (D. E. Polit, 1997). Cronbach's alpha is commonly used to evaluate an instrument's reliability (Salkind, 2000). This study found that the Chinese FCR-7 scale has good internal consistency, with the Cronbach's alpha = 0.87, which is slightly lower than the original scale that had been reported a coefficient of 0.92 (Humphris et al., 2018). Test-retest reliability with one-month interval was also assessed and considered satisfactory. However, we found that patients who completed reassessment were significantly younger than those at initial assessment. One possible reason is that younger participants were easier and more likely to be successfully reached by research staff because they used/answered their cell phones more frequently than older patients. Similar to earlier findings (Humphris et al., 2018), high item-total scale correlations (coefficients greater than 0.7) were found except for item 6. It is probably because item 6 focuses more on the behavioral response (self-examination behavior) to FCR while other items are describing the cognitive processing of FCR.

Construct validity was supported by correlations observed between total scores on the Chinese FCR-7 and other three relevant instruments (FoP-Q-SF, PHQ-9, and GAD-7). Our study found a significant positive relationship between FCR-7, FoP, anxiety

and depression scores. This finding is consistent with previous studies as researchers indicated that people with high levels of recurrence fears would tend to report more depressive, anxiety symptoms and psychological distress (Llewellyn, Weinman, McGurk, & Humphris, 2008; Thewes et al., 2013). In addition, positive association between FCR and HADS (Hospital Anxiety and Depression Scale) was also found by previous reports (Hinz, Mehnert, Ernst, Herschbach, & Schulte, 2015; Humphris et al., 2018; Simard, Savard, Gonthier, Tremblay, & Maheux, 2005; Simard et al., 2013). In accordance with the original scale (Humphris et al., 2018), the EFA revealed single factor structure and the factor loadings for most items were satisfactory (greater than 0.7). CFA was conducted on the remaining half sample to examine the scale's factor structure more precisely, and the outcomes of the evaluation fit were all convincing, which confirmed a satisfactory fit between the hypothesized model and the data (Chan, Chow, & Lo, 2005).

When compared with the Chinese FoP-Q-SF instrument, which is the only validated instrument measuring cancer patient's recurrence fear in mainland China, the Chinese version of FCR-7 demonstrated similar internal consistency (0.87 in FCR-7 versus 0.88 in FoP-Q- SF), better construct validity (CFI = 0.996, RMSEA = 0.039 in FCR-7 versus CFI = 0.902, RMSEA = 0.052 in FoP-Q- SF), satisfactory content validity, and appropriate convergent validity.

In this study, we found that patients who were older and full-time employed tended to report lower FCR. These findings were consistent with several other FCR studies (Crist & Grunfeld, 2013; Hartl, 2003; Simard et al., 2013). It is reasonable to assume

that younger patients may consider their cancer as more unexpected (Simard et al., 2013) and patients who are unemployed/part-time employed are under greater economic burdens compared to those who have stable monthly income (Skaali et al., 2009). We also found that patients with a family cancer history were more likely to experience higher FCR. To our best knowledge, only one study reported family cancer history factor as a significant predictor of FCR (Dumalaon-Canaria, Prichard, Hutchinson, & Wilson, 2016). Thus, the link between family history and FCR is still weak and further investigations are needed. Our result showed that breast cancer patients tended to have less fear. However, conflictive evidences were reported, for example, Simard (Simard et al., 2010) and Kornblith (Kornblith et al., 2007) observed higher FCR among breast cancer women, while others found no significant association between cancer site and FCR (Simard et al., 2013). The inconsistent result we found in this investigation might be explained by the uneven samples of the study – nearly 80% of participants were female breast cancer patients. Another possible reason is the 'cultural difference' between the eastern and western patients since an individual's illness perception might be influenced by the cultural system where they are located. Further studies with more male and mixed samples are needed.

The strengths of this study are the relatively large sample size and inclusion of different cancer diagnoses. However, there are a number of limitations that should be acknowledged. First, nearly 80% of the participants are breast cancer patients and about 90% of them are female. A potential sample bias may exist because of the over-representation of female breast cancer patients and the small subsample of male participants may limit representativeness of our results. Second, only 2

southern hospitals were involved in this study, cancer centers in the middle and northern part of China were not included. The psychometric testing may be limited by the use of convenience sampling and the fact that the data recruitment sites are located in only one single city. Third, discriminant validity of the scale has not been examined in the current study. Further studies may consider investigating the correlations between scores on FCR-7 and health-related quality of life, psychological/social functioning, or overall well-being. A negative correlation may support the discriminant validity of the FCR-7. Fourth, many other important variables, such as time since cancer diagnosis, and surgery type were not examined in this study. Last but not least, cut-offs for dysfunctional/clinical significance of the Chinese FCR-7 have not been defined yet.

Conclusion

The FCR-7 has been translated and successfully culturally adapted into a Chinese version. The scale demonstrated robust psychometric properties, suggesting that it is a reliable and valid measurement for assessing patient's recurrence fear and may be considered to widely use in clinical service in mainland China. More validated Chinese instruments of FCR with clear cut-off values should be introduced and utilized in the future.

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Table 1: Characteristics of Participants at Initial Assessment (n=1025)

Sociodemographic	n (%)	FCR (M±SD)	Statistics	*P* value
Gender				
Male	106 (10.3)	20.8±7.4		
Female	919 (89.7)	20.0±6.3	t=1.13	.259
Age				
Age below 35	146 (14.2)	20.6±6.5		
Age between 35-60	675 (65.9)	21.8±7.0		
Age above 60	204 (19.9)	19.4±6.1	F=12.21	**<.001**
Marital Status				
Single	72 (7.0)	20.6±6.6		
Married	879 (85.8)	20.1±6.4		
Divorced	40 (3.9)	18.3±6.5		
Widowed	34 (3.3)	20.1±6.9	F=1.16	.324
Education Level				
High School or below	682 (66.5)	20.2±6.6		
Undergraduate	261 (25.5)	19.6±5.9		
Postgraduate or above	82 (8.0)	20.5±6.8	F=1.07	.342
Living Arrangement				
Living alone	46 (4.5)	20.7±7.0		
Living with Family	955 (93.2)	20.1±6.4		
Living with Friends	24 (2.3)	17.5±6.1	F=2.12	.120
Monthly Salary (Yuan)				
Less than 3000	474 (46.2)	21.1±6.7		
3000-5000	267 (26.0)	19.4±6.1		
5000-10000	202 (19.7)	18.9±6.0		
More than 10000	82 (8.0)	19.1±5.6	F=8.02	**<.001**
Employment				
Full time	376 (36.7)	19.1±5.7		
Part time	55 (5.4)	20.0±5.8		
Unemployment	306 (29.9)	20.8±6.8		
Retired	288 (28.1)	20.4±6.7	F=4.29	**.005**
Cancer Site				
Breast Cancer	803 (78.3)	19.8±6.2		
Lung Cancer	109 (10.6)	20.0±7.1		
Colorectal Cancer	84 (8.2)	21.5±6.7		
Nasopharynx Cancer	29 (2.8)	24.2±7.1	F=6.35	**<.001**
Cancer Stage				
Stage 1	69 (6.7)	20.1±6.4		
Stage 2	352 (34.3)	20.5±6.7		
Stage 3	524 (51.1)	19.7±6.2		
Stage 4	80 (7.8)	20.1±6.8	F=1.03	.380
Chemotherapy				
Yes	903 (88.1)	20.3±6.3		
No	122 (11.9)	18.2±6.7	t=-3.36	**.001**
Radiotherapy				

Yes	897 (87.5)	20.2±6.3		
No	128 (12.5)	19.3±6.6	t=-1.47	.142
Surgery				
Yes	936 (91.3)	20.1±6.5		
No	89 (8.7)	19.1±5.4	t=-1.78	.078
Cancer Family History				
Yes	260 (25.4)	20.9±6.3		
No	765 (74.6)	19.8±6.3	t=-2.53	**.012**
Physical Comorbidity				
Yes	671 (65.5)	19.6±6.3		
No	354 (34.5)	20.8±6.6	t=2.77	**.006**

Abbreviation: M: mean; SD: standard deviation;

Table 2: Comparison of Subjects at Initial and Retest Assessment

Characteristics	Initial test (n=1025)	Re-test (n=285)	t/x^2	*P*
Age (year)	48.29±11.88	46.7±11.1	2.09	**.037**
Gender (male/female) %	10.3/89.7	7.0/93.0	2.83	.092
Marital State (single/married /divorced/widowed) %	7.0/85.8/3.9/3.3	6.0/87.4/2.8/3.9	1.36	.716
Education (high school and below /Undergraduate/Postgraduate and above) %	66.5/25.5/8.0	63.9/30.1/6.0	3.33	.189
Living arrangement (alone/family/friend) %	4.5/93.2/2.3	5.6/89.5/4.9	6.01	.051
Employment (full time/part time/unemployed/retired) %	36.7/5.4/29.9/28.1	39.6/6.7/28.8/24.9	2.11	.550
Cancer site (breast/lung/colorectal /nasopharynx) %	78.3/10.6/8.2/2.8	80.4/9.8/5.3/4.6	4.88	.181
Surgery (Yes/no) %	91.3/8.7	90.5/9.5	0.17	.678
Chemotherapy (Yes/no) %	88.1/11.9	84.9/15.1	2.06	.152
Radiotherapy (Yes/no) %	87.5/12.5	85.6/14.4	0.72	.398
Comorbidity (Yes/no) %	65.5/34.5	67.0/33.0	0.24	.625
Family Cancer History (Yes/no) %	25.4/74.6	25.6/74.4	0.01	.932

Table 3. Item Characteristics of the Chinese version FCR-7 (N=1025)

Items	M	SD	% Not at all	% All the time	r [a]	loadings
Q1: I am afraid that my cancer may recur	2.97	1.06	8.8%	10.9%	.843**	.868
Q2: I am worried or anxious about the possibility of cancer recurrence	2.79	1.01	9.6%	7.1%	.872**	.896
Q3: How often have you worried about the possibility of getting cancer again	2.70	0.88	6.5%	3.8%	.846**	.890
Q4: I get waves of strong feelings about the cancer coming back	2.04	0.97	33.4%	2.7%	.774**	.775
Q5: I think about the cancer returning when I didn't mean to	2.44	0.91	15.3%	2.6%	.804**	.820
Q6: I examine myself to see if I have physical signs of cancer	2.93	0.95	7.1%	4.1%	.583**	.578
Q7: To what extent does worry about getting cancer again spill over or intrude on your thoughts and activities	4.19	2.23	12.7%	1.0%	.829**	.749

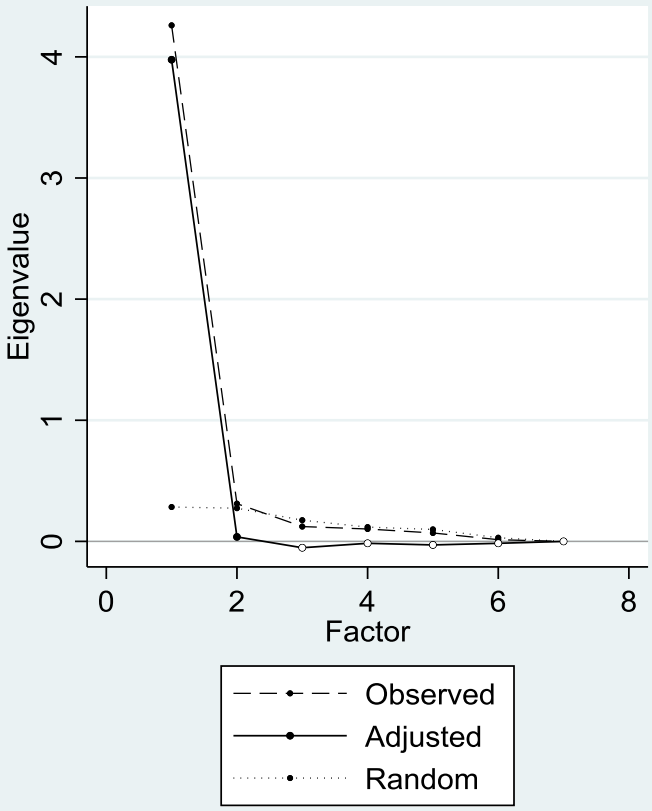
Note: validation data is based on scale in Chinese. **P< .01; a: item-total scale correlation;

Table 4. Correlations of the FCR-7 Total Score with FoP-Q-SF, PHQ-9 and GAD-7.

	M±SD	FCR-7	FoP-Q-SF	PHQ-9	GAD-7
FCR-7	20.05±6.41	1	.756**	.522**	.553**
FoP-Q-SF	29.78±7.93		1	.573**	.551**
PHQ-9	5.13±4.92			1	.811**
GAD-7	3.82±4.29				1

***P* < .01, M: mean; SD: standard deviation; FoP-Q-SF: Fear of Progression Questionnaire-Short Form; PHQ-9: Patient Health Questionnaire; GAD-7: General Anxiety Disorder Questionnaire;

Supplementary File: Horn's Parallel Analysis



Note: The Horn's Parallel Analysis showing eigenvalues for the 7 potential factors in the the FCR-7 with the random data points plotted in comparison with the adjusted. The crossover of the adjusted values between factors 1 and 2 and the randomly derived values from 50 averaged replications provides evidence of a strong uni-dimensional measurement structure for the Chinese FCR-7 scale.