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# Effects of fear-avoidance beliefs on Chinese patients with neck pain

## Key Messages

1. The Chinese version of the Fear-Avoidance Beliefs Questionnaire (FABQ) has good content validity, test-retest reliability, internal consistency, construct validity, responsiveness, and factor structure. Thus, fear-avoidance beliefs can be used in Chinese patients with neck pain.
2. The validated FABQ facilitates future research on the effects of fear-avoidance behaviour on patients with neck pain and hence a better service for and evaluation of patients with neck pain can be provided. It may also facilitate cross-cultural studies on this common problem between western and Chinese populations.
3. The construct of fear-avoidance beliefs can be applied to patients with neck pain.
4. The fear-avoidance beliefs are an important psychosocial measure in predicting future disability level and return to complete work capacity (immediately and 3 months after physiotherapy).

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## Introduction

Neck pain is a common medical condition and of multifactorial origin. Psychosocial factors may contribute to its development.[1] Among them, the fear-avoidance beliefs are hypothesised as the most powerful cognitive variables in predicting disability and treatment outcomes of patients with low back pain.[2] There is no information about the effects of fear-avoidance beliefs in Chinese patients with neck pain. We hypothesised that the fear-avoidance beliefs may also affect disability and normal working in patients with neck pain.

## Aims and objectives

1. To translate and adapt the Fear-Avoidance Beliefs Questionnaire (FABQ) into Chinese (Cantonese) and assess its content validity, test-retest reliability, construct validity, factor structure, and responsiveness.
2. To assess the correction between fear-avoidance beliefs and future disability and work capacity in patients with neck pain.

## Methods

This study was conducted from February 2004 to January 2006.

### *Study design*

In phase I, the English version of the FABQ[3] was adapted and translated into Chinese (Cantonese) and then validated by different panels involving physiotherapists, psychiatrists, neck pain patients, and secondary school students. The validated Chinese version of FABQ was then tested for reliability and construct validity in four physiotherapy out-patient departments in different regions of Hong Kong. In phase II, the role of fear-avoidance beliefs in predicting future disability and work capacity of patients with neck pain who had 6 weeks of physiotherapy was prospectively studied.

### *Subjects and sample size*

Patients were recruited from physiotherapy out-patient departments of three public hospitals and one private clinic in Hong Kong. They were diagnosed with neck pain, with or without radiation symptoms, and were able to read and write Chinese. Patients who had other musculoskeletal problems, an infectious condition, previous brain surgery, congenital abnormality, or a history of malignancy or mental illness were excluded. A total of 476 patients were recruited for validation and 120 patients for 6 weeks of physiotherapy.

### *Outcome measures*

In the validation study, patients completed the FABQ, the Northwick Park Neck Pain Questionnaire (NPQ),[4] the medical outcomes 36-item Short-Form Health Survey (SF-36),[5] and the 11-point Numerical Rating Scale (NRS) when they attended for physiotherapy at weeks 1, 3, 6, and upon discharge.

In phase II, the neck active range of motion (AROM) and isometric neck muscle strength were measured by the computerised multi-cervical rehabilitation unit before and after physiotherapy. The questionnaires and work status evaluation were completed again after physiotherapy. A telephone follow-up on their work status was carried out 3 months after physiotherapy.

## Results

The content validity of FABQ as determined by the panels was satisfactory. The mean scores of the patient and student groups for each question ranged from 3.2 (good) to 3.6 (good). The mean scores of the expert panels for each question ranged from 3.5 (good) to 4.8 (very good). The mean interval for the test-retest reliability was 12.5±7.8 days and the mean time to complete the FABQ questionnaire was 5±3 minutes. The FABQ had very good test-retest reliability (ICC=0.81) and internal consistency (Cronbach's alpha=0.90). The correlation coefficients at entry into physiotherapy were 0.56 for the NPQ, 0.34 for NRS, -0.45 for SF-36 physical subscale, and -0.36 for SF-36 mental subscale. At discharge from physiotherapy the respective correlation coefficients were 0.53, 0.33, -0.64, and -0.43 (all P<0.001). The correlation between the change of the FABQ scores at weeks 3 and 6 of physiotherapy and the corresponding changes of the NPQ scores were fair ($r_s$=0.32 at week 3 and 0.38 at week 6) and highly significant. The correlations between changes in pain intensity scored by NRS ($r_s$=0.19 at week 3 and 0.18 at week 6) and changes in SF-36 scores ($r_s$=-0.18 at week 3 and -0.27 at week 6 for SF-36 physical subscale and $r_s$=-0.26 at week 3 and -0.24 at week 6 for SF-36 mental subscale) were weak (P=0.065-0.006). For the pre- and post-test comparison, the paired *t* test showed a significant difference between the FABQ scores before treatment (47.80±16.93) and upon discharge from physiotherapy (43.95±18.11, P<0.001). For responsiveness of the FABQ from the beginning to the end of physiotherapy, the standardised response mean and effect size were 0.38 and 0.32, respectively. Factor analysis showed that the three-factor solution produced a more reliable and interpretable solution with the total variance explained by the factors being 61.6% (Table 1). The three factors were labelled as prognosis work (FABQ_PW), work as a cause (FABQ_W), and physical activity (FABQ_PA).

**Table 1. Factor analysis with the factor loadings of the 16 items related to the Fear-Avoidance Beliefs Questionnaire (FABQ) after Varimax Rotation**

| FABQ items* | Factor loadings | | |
|---|---|---|---|
| | Prognosis work | Work as a cause | Physical activity |
| 15 | **0.84** | 0.11 | 0.15 |
| 14 | **0.84** | 0.22 | 0.18 |
| 13 | **0.82** | 0.22 | 0.21 |
| 12 | **0.77** | 0.34 | 0.15 |
| 16 | **0.75** | 0.14 | 0.03 |
| 8 | **0.46** | 0.34 | 0.21 |
| 7 | 0.23 | **0.81** | 0.07 |
| 10 | 0.30 | **0.77** | 0.18 |
| 11 | 0.30 | **0.76** | 0.07 |
| 6 | 0.06 | **0.75** | 0.09 |
| 9 | 0.24 | **0.71** | 0.13 |
| 1 | 0.05 | 0.42 | **0.40** |
| 4 | 0.07 | -0.03 | **0.77** |
| 3 | 0.11 | 0.25 | **0.70** |
| 5 | 0.30 | -0.02 | **0.69** |
| 2 | 0.13 | 0.30 | **0.68** |

* 1 denotes pain caused by physical activity, 2 physical activity worsens pain, 3 physical activity might harm, 4 should not do physical activity, 5 cannot do physical activity, 6 pain caused by work, 7 work aggravated pain, 8 claim for compensation, 9 work too heavy, 10 work makes pain worse, 11 work might harm, 12 should not do work, 13 cannot do work, 14 wait until pain is treated, 15 no return to work within 3 months, and 16 never return to work

For phase II, linear regression analysis of the correlation between initial neck disability score (dependant variable) and fear-avoidance beliefs score showed that none of the added FABQ subscale scores improved the fit of the model after controlling for pain intensity, physical impairment (neck AROM and strength), and general health measures. For the 6-week disability score, the change in the $R^2$ with the addition of the treatment group was not significant in the second step, but did attain significance with the addition of the FABQ_W and FABQ_PW in the third step (Table 2). The $R^2$ value reflects the goodness of fit of the linear model adjusted for the number of independent variables in the equation.

After 6 weeks of physiotherapy, 73 (61%) of the subjects had complete return of work capacity and 47 (39%) remained to have incomplete work capacity. Hierarchical logistic regression analysis of return to complete work capacity showed that, after controlling for the pain intensity, physical impairments, general health status, and initial neck disability level, adding a treatment group in the second step significantly improved the fit of the model, and adding the FABQ_W and FABQ_PW in the third step further improved the fit significantly.

Three months after the physiotherapy, telephone follow-up on their work status showed that 88 (82%) of the subjects had complete work capacity and 20 (19%) remained to have incomplete work capacity. Twelve (10%) of the subjects could not be contacted. For those with complete return to work capacity at 18 weeks, after controlling for the pain intensity, physical impairments, general health status, and initial neck disability level, adding a treatment group in the second step significantly improved the fit of the model and adding the FABQ_W and FABQ_PW in the third step further improved the fit significantly (Table 3).

## Discussion

This is the first study to adapt, translate and validate the FABQ questionnaire for Chinese patients with neck pain. The Chinese version of the FABQ is practical and shows good reliability, validity, and consistent factor structures compared to the original version. The responsiveness of the FABQ assessed by standardised response mean and effect size is low (0.38 and 0.32 respectively) compared to that of the NPQ (0.73 and 0.62 respectively) and pain measured by the NRS (0.83 and 1.0 respectively). The low responsiveness of the FABQ may be because the follow-up period was not long enough to allow adequate detectable change in the effects of fear-avoidance beliefs in patients with neck pain. However, the standardised response mean and effect size of

**Table 2. Hierarchical linear regression analysis (n=120) of the correlation* between 6-week Northwick Park Neck Pain Questionnaire (NPQ) score (dependent variable) and fear-avoidance beliefs about physical activity, work as a cause, and prognosis work after controlling for pain, active range of motion (AROM), strength, SF-36 score (physical and mental component scores, PCS and MCS), initial NPQ score and treatment group**

| Variables of fear-avoidance beliefs | | Adjusted $R^2$ | Significance of $R^2$ change | Standardised beta coefficient (final model) | Significance of beta coefficient |
|---|---|---|---|---|---|
| Physical activity | | | | | |
| Step 1 | Pain rating | | | -0.059 | 0.516 |
| | AROM index | | | -0.049 | 0.582 |
| | Strength index | | | 0.004 | 0.967 |
| | PCS | | | -0.008 | 0.935 |
| | MCS | | | -0.007 | 0.927 |
| | Initial NPQ | 0.408 | <0.001 | 0.634 | <0.001 |
| Step 2 | Treatment group | 0.403 | 0.993 | -0.003 | 0.965 |
| Step 3 | FABQ physical activity | 0.409 | 0.154 | 0.116 | 0.154 |
| Work as a cause | | | | | |
| Step 1 | Pain rating | | | -0.100 | 0.273 |
| | AROM index | | | -0.029 | 0.736 |
| | Strength index | | | -0.014 | 0.874 |
| | PCS | | | 0.005 | 0.953 |
| | MCS | | | 0.049 | 0.521 |
| | Initial NPQ | 0.408 | <0.001 | 0.624 | <0.001 |
| Step 2 | Treatment group | 0.403 | 0.993 | -0.041 | 0.571 |
| Step 3 | FABQ work as a cause | 0.431 | 0.012 | 0.224 | 0.012 |
| Prognosis work | | | | | |
| Step 1 | Pain rating | | | -0.072 | 0.424 |
| | AROM index | | | -0.046 | 0.601 |
| | Strength index | | | <0.001 | 0.996 |
| | PCS | | | 0.013 | 0.883 |
| | MCS | | | 0.027 | 0.717 |
| | Initial NPQ | 0.408 | <0.001 | 0.617 | <0.001 |
| Step 2 | Treatment group | 0.403 | 0.993 | -0.031 | 0.670 |
| Step 3 | FABQ prognosis work | 0.424 | 0.027 | 0.194 | 0.027 |

* Interaction between treatment and fear-avoidance beliefs was not significant

**Table 3. Hierarchical logistic regression analysis (n=108) of the correlation* between return to work capacity after 18 weeks and fear-avoidance beliefs about physical activity, work as a cause, and prognosis work**

| Variables of fear-avoidance beliefs† | | Step Chi-square | Nagelkerke's $R^2$ | Odds ratio (95% CI) |
|---|---|---|---|---|
| Physical activity | | | | |
| Step 1 | Pain rating | | | 0.825 (0.553, 1.231) |
| | AROM index | | | 0.969 (0.905, 1.037) |
| | Strength index | | | 1.264 (1.034, 1.546) |
| | PCS | | | 0.949 (0.877, 1.026) |
| | MCS | | | 0.923 (0.864, 0.986) |
| | Initial NPQ | $\chi^2$=23.769, df=6, P=0.001 | 0.320 | 1.045 (0.985, 1.109) |
| Step 2 | Treatment group | $\chi^2$=3.106, df=1, P=0.078 | 0.357 | 2.984 (0.831, 10.720) |
| Step 3 | FABQ physical activity | $\chi^2$=3.517, df=1, P=0.061 | 0.398 | 1.115 (0.989, 1.258) |
| Work as a cause | | | | |
| Step 1 | Pain rating | | | 0.756 (0.496, 1.153) |
| | AROM index | | | 0.980 (0.917, 1.047) |
| | Strength index | | | 1.242 (1.003, 1.538) |
| | PCS | | | 0.946 (0.873, 1.024) |
| | MCS | | | 0.938 (0.875, 1.006) |
| | Initial NPQ | $\chi^2$=23.769, df=6, P=0.001 | 0.320 | 1.041 (0.982, 1.104) |
| Step 2 | Treatment group | $\chi^2$=3.106, df=1, P=0.078 | 0.357 | 1.999 (0.543, 7.355) |
| Step 3 | FABQ work as a cause | $\chi^2$=5.831, df=1, P=0.016 | 0.424 | 1.198 (1.025, 1.399) |
| Prognosis work | | | | |
| Step 1 | Pain rating | | | 0.785 (0.502, 1.228) |
| | AROM index | | | 0.960 (0.891, 1.034) |
| | Strength index | | | 1.332 (1.039, 1.708) |
| | PCS | | | 0.966 (0.885, 1.055) |
| | MCS | | | 0.938 (0.866, 1.016) |
| | Initial NPQ | $\chi^2$=23.769, df=6, P=0.001 | 0.320 | 1.031 (0.969, 1.097) |
| Step 2 | Treatment group | $\chi^2$=3.106, df=1, P=0.078 | 0.357 | 2.377 (0.563, 10.038) |
| Step 3 | FABQ prognosis work | $\chi^2$=15.778, df=1, P<0.001 | 0.529 | 1.191 (1.077, 1.317) |

* Interaction between treatment and fear-avoidance beliefs was not significant

† AROM denotes active range of motion, PCS physical component score, MCS mental component score, NPQ Northwick Park Neck Pain Questionnaire, FABQ Fear-Avoidance Beliefs Questionnaire

our study were similar to those of the French version of the FABQ (0.31 and 0.30 respectively). Furthermore, the three-factor structure solution resulting from the factor analysis is consistent with the German version of the FABQ in patients with low back pain. It provided evidence that the construct of the fear-avoidance beliefs could apply to the patients with neck pain.

Linear regression analysis of phase II also showed that in patients with neck pain, fear-avoidance beliefs play an important role even after controlling for factors related to pain intensity, physical impairments, general health measures, initial disability level, and type of treatment in affecting disability and normal working capacity. The level of future disability and, more importantly, the likelihood of return to complete work capacity (immediately and 3 months after physiotherapy) could be predicted by the FABQ at the earlier phase of physiotherapy. Therefore, the validated FABQ facilitates future research on the effects of fear-avoidance behaviour on patients with neck pain, and hence a better service for and evaluation of patients with neck pain.

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