Scandinavian Journal of Pain 17 (2017) 425–430

Contents lists available at ScienceDirect

Scandinavian Journal of Pain

journal homepage: www.ScandinavianJournalPain.com

Original experimental

Developing a model for measuring fear of pain in Norwegian samples: The Fear of Pain Questionnaire Norway

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HIGHLIGHTS

- A model for measurement of FOP in Norwegian samples is built and validated.
- The FPQ-NOR had better model fit than FPQ-III and FPQ-SF.
- FPQ-NOR is sex neutral.
- Cultural variations in FOP stress the need to explore FOP models in given country.
- Explorative analysis is important when applying FOP in new samples.

ARTICLE INFO

Article history:
Received 9 August 2017
Received in revised form 9 October 2017
Accepted 10 October 2017
Available online 10 November 2017

Keywords:
Fear of pain
FPQ-III
FPQ-SF
FPQ-NOR
Exploratory factor analysis
Pain assessment

ABSTRACT

Background: Fear of pain is highly correlated with pain report and physiological measures of arousal when pain is inflicted. The Fear of Pain Questionnaire III (FPQ-III) and The Fear of Pain Questionnaire Short Form (FPQ-SF) are self-report inventories developed for assessment of fear of pain (FOP). A previous study assessed the fit of the FPQ-III and the FPQ-SF in a Norwegian non-clinical sample and proved poor fit of both models. This inspired the idea of testing the possibility of a Norwegian FOP-model.
Aims and methods: A Norwegian FOP-model was examined by Exploratory Factor Analysis (EFA) in a sample of 1112 healthy volunteers. Then, the model fit of the FPQ-III, FPQ-SF and the Norwegian FOP-model (FPQ-NOR) were compared by Confirmatory Factor Analysis (CFA). Sex neutrality was explored by examining model fit, validity and reliability of the 3 models amongst male and female subgroups.
Results: The EFA suggested either a 4-, a 5- or a 6-factor Norwegian FOP model. The eigenvalue criterion supported the suggested 6-factor model, which also explained most of the variance and was most interpretable. A CFA confirmed that the 6-factor model was better than the two 4- and 5-factor models. Furthermore, the CFA used to test the fit of the FPQ-NOR, the FPQ-III and the FPQ-SF showed that the FPQ-NOR had the best fit of the 3 models, both in the whole sample and in sex sub-groups.
Conclusion: A 6-factor model for explaining and measuring FOP in Norwegian samples was identified and termed the FPQ-NOR. This new model constituted six factors and 27 items, conceptualized as Minor, Severe, Injection, Fracture, Dental, and Cut Pain. The FPQ-NOR had the best fit overall and in male- and female subgroups, probably due to cross-cultural differences in FOP.
Implications: This study highlights the importance on exploratory analysis of FOP-instruments when applied to different countries or cultures. As the FPQ-III is widely used in both research and clinical settings, it is important to ensure that the models construct validity is high. Country specific validation of FOP in both clinical and non-clinical samples is recommended.

1. Introduction

Measuring fear of pain (FOP) is challenging due to the multi-faceted and subjective nature of both fear and pain. Developing measurement inventories applicable across sex and cultures is

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https://doi.org/10.1016/j.sjpain.2017.10.009
1877-8860/

demanding due to psychosocial and cultural differences that can influence the understanding of and responses to FOP-items. This issue has shown to be salient in the cross-cultural application of the Fear of Pain Questionnaire III (FPQ-III) [1–7]. The current study therefore sought to test if revising current FOP-models could help explain FOP in the Norwegian population better than the existing FPQ-III and FPQ-SF.

The FPQ-III was developed by McNeil and Rainwater [2]. The questionnaire has become widely used, but studies show varying levels of validity and consistency. The Fear of Pain Questionnaire Short Form (FPQ-SF) was more recently suggested by Asmundson and colleagues [8], as an alternative and sex neutral questionnaire for FOP-measurements. The FPQ-SF has received little attention, and thus, little knowledge about the scale's reliability and validity exist. In a recent study the FPQ-III and the FPQ-SF were compared [6]. The data were derived from a Norwegian sample of healthy volunteers, and the results revealed that none of the models had good fit. However, the FPQ-SF had a better fit overall, compared to the FPQ-III. Comparison of the two models' applicability across sex revealed that the FPQ-III had a better fit for males, whereas the FPQ-SF had a better fit for females. Thus, questioning the two models' sex neutrality. Invariance across sex is recommended for optimizing measurement inventories [8]. The present study therefore aimed to: a) test the possibility of a Norwegian FOP-model (FPQ-NOR), b) compare the FPQ-NOR against the FPQ-III and the FPQ-SF, and c) evaluate the three models' fit amongst male and female subgroups. We hypothesized that the FPQ-Norway would have the best overall fit and display most sex neutrality amongst the three models. Furthermore, we hypothesized that the FPQ-SF would display more sex neutrality than the FPQ-III.

2. Methods

2.1. Participants

In total 1112 healthy respondents were included in this study (485 males, 18–40 years (M_{age} = 23.5, SD = 4.1) and 627 females, 18–40 years (M_{age} = 22.3, SD = 3.6). The subjects were screened for medical history of serious diseases or injuries prior to inclusion. Somatic and psychiatric disorders, medication use and pregnancy led to exclusion. The respondents had to speak Norwegian due to use of Norwegian questionnaires, instructions and consent form. Data from 10 different study-samples were pooled. All participants filled in the FPQ-III and an informed consent form. The studies were approved by the Regional Committee for Medical Research Ethics North Norway (project numbers: 2013/966; 2012/1888; 2610.00001; 49/2005; 5.2006.2452; 20277; 17/2006; 30/2008; 31/2008).

SPSS version 24 was used to randomly divide the whole sample into two samples by random split, in preparation of the factor analysis. Sample 1 included 570 participants [255 males, 18–40 years (M_{age} = 23.3; SD = 4.0) and 315 females, 18–40 years (M_{age} = 22.2; SD = 3.7)], and this sub-sample was applied in the EFA. Sample 2 included 542 participants [230 males, 18–40 years (M_{age} = 23.8; SD = 4.3) and 312 females, 18–40 years (M_{age} = 22.4; SD = 3.4)], and this sub-sample provided an independent sample for confirming proposed factor structures revealed by the EFA as well as testing the model fit of the newly developed FPQ-NOR, the FPQ-III and the FPQ-SF.

2.2. Measures

The Fear of Pain Questionnaire III assesses fear related to pain, and is used in both basic [9] and applied research [10]. The scale has 30 items, each presenting a situation involving pain. Responders score their FOP for each item on a 5-point Likert scale (1 = not afraid at all, 5 = extremely afraid). The FPQ-III has three factorially derived subscales: Severe pain (having a terminal illness that causes you daily pain), Minor pain (burning your fingers) and Medical pain (receiving an injection in your arm). Each of the subscales has 10 items. A Norwegian version of the FPQ-III, translated into Norwegian by Lyby and colleagues [9], was administered to the participants included in the present study.

The Fear of Pain Questionnaire Short Form is a revised version of the FPQ-III, reduced to 20 items, and extended to 4 subscales: Severe, Minor, Injection (having an injection in the hip) and Dental pain (having a tooth drilled). The Severe pain subscale has 6 items, the Minor pain subscale has 8 items, and the Injection and Dental pain subscales both have 3 items. Similarly to the FPQ-III, scores on the FPQ-SF are indicated on a 5-point Likert scale.

2.3. Procedure

Responders were undergraduate students recruited from the University of Tromsø, The Arctic University of Norway, UiT. Responders had all participated in various pain studies and filled in the FPQ-III and a written informed consent form as part of the experimental procedure, prior to pain testing. Pain data obtained from the experiments are published elsewhere [9,11–16].

2.4. Statistical analyses

EFA was performed using SPSS version 24. CFA was performed using AMOS 21. Sample 1 was applied in the EFA. Sample 2 was applied in the CFA. EFA with Direct oblim (oblique) rotation was used to explore the Norwegian FOP model. CFA (maximum likelihood estimation) were applied to confirm the model revealed in the EFA and test the fit of the FPQ-III, FOP-SF and the Norwegian FOP model. Furthermore, CFA was also applied to test the fit among male and female sub-groups in Sample 2. The fit of these models was evaluated by the χ^2/degrees of freedom ratio, the root mean square error of approximation (RMSEA), the goodness-of-fit index (GFI), and the comparative fit index (CFI). Traditionally, a good fit model should have 2:1 or 5:1 χ^2/degrees of freedom ratio, GFI > .90, CFI > .90 (preferably > .95), and RMSEA < .08 or .10 (preferably < .05) indices [17,18]. Lastly, Cronbach's alpha values for the factors in the Norwegian FOP model were calculated, as well as the correlation between sum-scores of factors in the Norwegian FOP model.

3. Results

3.1. Factor structure in the Norwegian sample

Direct oblimin (oblique) rotation was used since the correlation between the factors ranged from 0.150 to 0.486. The Kaiser-Meyer-Olkin measure verified that the sample was adequate for the analysis (.886). Bartlett's test of sphericity $x^2(435) = 6975.157$, $P > .001$ indicated that the correlations between the FPQ items were sufficiently high for an EFA. Initial factor structure was assessed with eigenvalues > 1 and Catell's scree test. The screeplot was slightly ambiguous and revealed either a 4-, a 5- or a 6-factor Norwegian FOP model. Eigenvalue > 1 supported the 6-factor model, however a Parallel Analysis supported the 4-factor model. The 6-factor structure was found most interpretable, however to confirm the model, a CFA on Sample 2 was performed to test model fit of the 4-, the 5- and the 6-factor models. The 6-factor model had the best fit (6-factor: χ^2/df = 692.178/194, GFI = .898, CFI = .887, RMSEA = .069 (.063–.074), ECVI = 1.498 (1.356–1.653); 5-factor: χ^2/df = 1509.34/340, GFI = .826, CFI = .790, RMSEA = .080 (.076–.084), ECVI = 3.034 (2.818–3.263); 4-factor: χ^2/df = 1168.055/293, GFI = .854, CFI = .830, RMSEA = .074