Development and validation of the Occupational Back Pain Prevention Behaviors Questionnaire in nursing personnel

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Abstract

Background: Occupational back pain is the most prevalent health problem among nurses and needs to be assessed by a valid and multi-factorial questionnaire. The purpose of the present study was to design and develop an instrument based on the PRECEDE-PROCEED model for assessing job-related behaviors that cause low back pain. **Methods:** First an item pool of 49 items was generated. Then, content and face validity was carried out. Consequently, a cross-sectional study was conducted in Mazandaran, Iran. The questionnaire was distributed among a sample of nurses working in hospitals affiliated to Mazandaran University of Medical Sciences. Exploratory factor analysis was used to determine the factor structure of the questionnaire. The Cronbach's alpha was estimated to assess the reliability and the intraclass correlation coefficient was calculated to examine stability. **Results:** In all 155 nurses participated in the study. The mean age of respondents was 34.1 (SD = 7.66) years, and 83.2% were female. Six factors with 30 items emerged from the exploratory factor analysis: knowledge, attitude, self-efficacy, reinforcing factors, enabling factors and behavior that jointly accounted for %66.5 of behavior change variance observed. The Cronbach's alpha coefficient showed excellent internal consistency ($\alpha=0.92$). The intraclass correlation coefficient with 2-weeks interval also indicated that the questionnaire has satisfactory stability (ICC = 0.97). **Conclusions:** The findings showed that the Occupational Back Pain Prevention Behavior Questionnaire is a reliable and valid instrument for measuring occupational back pain and prevention behaviors among nurses. **Keywords:** Occupational Back Pain, Prevention behaviors, Psychometric evaluation, PRECEDE-PROCEED model, Nurse

Background

Low back pain is considered a major health problem in most countries. It leads to disability, absenteeism and considerable annual health costs (1). One major risk factor of low back pain is what people do as their professional job. Among professional jobs, nursing professions are experiencing a more considerable risk of low back pain, and it accounts for 60% of the reported occupational injuries among this population (2-4). Thus any interventions to promote preventive low back pain behaviors among nurses are worthwhile. In addition, any attempts to understand and measure preventive behaviors among nurses could be of prime importance.

There are a number of questionnaires that designed to understand how much low back pain has affected the ability to manage routine activities. For instance, The Quebec Back Pain Disability Scale, The Roland-Morris Disability Questionnaire, the Oswestry Low Back Pain Questionnaire, and the Short-Form McGill Pain Questionnaire-2 which examine the low back pain and its impact on the daily activities are just to name a few (5-8). However, these questionnaires do not examine the cause of pain and behaviors, which leads to back pain. Thus, for development of any interventions to tackle job-related back pain among different professions we need to understand main causes of low back pain in the first place, and

secondly, since the pain usually originates from behaviors during work-related activities it should be, to some extent, within a realm of educational planning models.

The PRECEDE-PROCEED model is the most popular and commonly used in health education planning programs. This model identifies behavioral, environmental, educational and ecological factors contributing to the problem (9). A behavior can be influenced by predisposing, reinforcing, and enabling factors and thus a design based on the PRECEDE-PROCEED model seeks to identify these three factors. The predisposing factors include knowledge, attitudes, beliefs, values, and self-efficacy. The reinforcing factors include attitudes and behaviors among those who are involved and enabling factors to include access to resources, availability of health services, policies and legislation, and existing regulations, and behavioral skills that affect the adoption of health behavior (9). Thus, as part of a study to develop an intervention for reducing low back pain in nursing personnel, the purpose of this study was to design an instrument based on the PRECEDE-PROCEED model.

Methods

Item generation

The initial questionnaire was developed through semi-structured interviews with nursing professionals. Participants were asked to explain about job-related low back pain and indicate the ways that could prevent low back pain in nursing personnel. The interviews were carried out by one of us (SSK) individually in the office of participants or the nursing office and in a quiet environment. Interviews continued until data saturation was achieved. As such 18 nurses, head nurses, educational supervisors, nursing managers, hospital managers, hospital affairs experts, quality improvement experts, and development and support managers were interviewed. For further certainty, two more interviews were conducted, but no new data was obtained. Accordingly, based on the interviews and literature review, the preliminary questionnaire containing 49 items was developed. Then the research team assessed the questionnaire and 9 items were deleted to ensure the clarity, objectivity and the ease of comprehension of the terms employed. Thus at this stage in all 38 items was remained.

Developing a preliminary questionnaire

At this stage, we assessed content and face validity. To determine the content validity, qualitative and quantitative methods were used (10). In the qualitative content method, 10 experts in health education, physiotherapy, educational management, and nursing were asked to check the quality of the questionnaire based on grammar, use of proper words, item allocation and scaling. Then the content validity ratio (CVR) and content validity index (CVI) was used to evaluate quantitative content validity. To determine the content validity ratio, the questionnaire was sent to 10 experts with different specialty

(including health education, physiotherapy, nursing, education management) and was asked to respond where the items are essential, useful but not essential and no essential. Then responses were calculated based on the formula and matched to the Lawshe's table (11). The same experts were asked to indicate whether items are simple, relevant and clear in order to calculate content validity index (12, 13). The CVR for the questionnaire was 0.84, which was well above the recommended value. The CVI for the questionnaire was 0.98. However, at this stage, 7 items were removed and the number of items was reduced to 31. Similarly, for face validity, qualitative and quantitative methods were used. The qualitative face validity determined by asking 10 nurses (the potential user of the questionnaire) to complete the questionnaire and to indicate whether any items were difficult, ambiguous or irrelevant. In the next step, Item Impact Score was calculated in order to assess the importance of each item indicated by the same nurses. For each item, a 5-point Likert scale was considered: strongly important, quite a lot important, moderately important, slightly important and not at all. The analysis showed that the impact score for all items was above 1.5 (the actual mean impact score was 3.73). There were no additional changes at this stage and thus the provisional version of the questionnaire with 31 items was subjected to psychometric evaluation (Additional file 1, and 2, 3).

Psychometric evaluation

A cross-sectional study was conducted to examine the psychometric properties of the questionnaire. The questionnaire was administered to a sample of nursing personnel recruited from teaching hospitals affiliated to Mazandaran University of Medical Sciences, Sari, Iran. Indeed, first we provided a list of all hospitals and three hospitals were randomly selected. Then in each hospital, individuals randomly selected based on a simple random number table and staff ID.

Statistical analysis

To assess construct validity, the exploratory factor analysis and item-scale correlation matrix were used. Indeed, the Kaiser-Meyer-Olkin (KMO) Index and Bartlett's Test of sphericity were used to assess sampling adequacy (14). The factor structure of the questionnaire was extracted using Varimax rotation. The presence of an item in a factor was determined as approximately 0.4 as recommended (15). For item-scale correlation matrix, the Pearson correlation coefficient was used and coefficient values of 0.4 or above were considered acceptable (15).

The reliability of the questionnaire was assessed using internal consistency and stability. To compute the internal consistency, the Cronbach's alpha coefficient was estimated. To demonstrate the stability of the questionnaire the Intraclass Correlation Coefficient (ICC) was calculated. For this purpose, a subsample of 20 nurses completed the questionnaire twice with a two week interval.

Results

The sample characteristics

In all, 155 nurses aged 24 to 55 years participated in the study. The mean age of respondents was 34.1 (SD = 7.66) years, and 83.2% were female. Participants were nurse, head nurse and educational supervisors from different units. The mean work experience of participants was 9.81 (SD = 7.0) years. The characteristics of participants are shown in Table 1.

Factor structure

After confirming the adequacy of the sampling based on the KMO and Bartlett's Test of Sphericity (KMO = 0.854 and $\chi^2 = 2426.236$, $p < 0.0001$), exploratory factor analysis performed and 8 factors emerged with eigenvalues of greater than 1, which accounted for 67.91% of the variance observed. Due to the low loading of some factors, and in accordance with the dimensions of the PRECEDE-PROCEED model, the number of factors was limited to 6, with a minimum factor loading of 0.4. Finally, 30 items were loaded in 6 factors representing the following dimensions: knowledge (4 items), attitude (5 items), self-efficacy (6 items), reinforcing factors (5 items), enabling factors (7 items), and behavior (3 items). The results are shown in Table 2.

Item-scale correlation matrix

The correlation between items and their own subscales are presented in Table 3. As expected items belonging to a given factor showed a significantly higher correlation compared to other subscales.

Reliability

The Cronbach's (alpha) coefficient for the entire scale was 0.92 and ranged from 0.49 to 0.87 for various domains. The intraclass correlation coefficient (ICC = 0.97) also indicated that the questionnaire has satisfactory stability (Table 4).

Discussion

The purpose of this study was to design and psychometric appraise the tool to measure occupational low back pain preventive behaviors among nurses. The initial items were originated and developed based on data from a qualitative study and literature on studies of job-related low back pain in nursing personnel (16-19). The statements for this instrument were prepared through literature review and biopsychosocial characteristics for low back pain among the nursing professionals. It has been revealed that individuals, who experienced a problem, are the best ones to provide input on factors, which might be effective (20). In the investigation, we asked the nurses about the related factors, which might affect their low back pain in the framework of the PRECEDE-PROCEED model.

There were two concepts of enabling factors and administrative policy diagnosis in the PRECEDE-PROCEED model. They refer to characteristics of the environment that assist the action and any skill or resource required to achieve specific behavior. Also, this could hamper or facilitate the development of the health program (9, 21). In the present study, both concepts were grouped into one category and named 'enabling factors. Green and Kreuter (9) believe these are important items and can lead to behavior change.

The findings indicated that this questionnaire has appropriate validity and reliability and one of the features of this questionnaire is that additionally to assessing knowledge it encompasses other dimensional including attitude and self-efficacy. In fact, this questionnaire now could measure knowledge, attitude, self-efficacy, reinforcing factors, enabling factors, and behaviors that all are theory-driven constructs for this instrument. For instance, exploratory factor analysis showed that attitude had satisfactory loading. This, in fact, indicates that Iranian nurses believed that the prevention of low back pain is a value (9). Interestingly most participants completed the questionnaire without any hardness since they received it user-friendly.

It is argued that in general there are three categories of risk factors for low back pain: personal, psychological and occupational factors (22). Thus the intricate nature and causes of low back pain necessitate using a multidimensional instrument when assessing low back pain. Indeed, the Occupational Back Pain Prevention Behaviors Questionnaire is a multidimensional instrument containing a set of constructs that collectively could indicate reasons for doing or not doing preventive behaviors as relating to occupational low back pain. These reasons are very important in improving health among different occupational groups, especially nursing personnel. Without understanding such reasons development of educational interventions almost is impossible.

Although this study had several strengths, there were some limitations. The most important limitation was the fact nurses responded to the questionnaire at their worksite, so this might have affected their answers. Despite this limitation, the instrument had the optimal statistical properties regarding predictors for low back pain among the Iranian nursing staff.

Conclusion

The Occupational Back Pain Prevention Behaviors Questionnaire is a valid and reliable instrument and now may be used for future studies.

List Of Abbreviations

PRECEDE: Predisposing, Reinforcing, and Enabling Constructs in Educational/ Environmental Diagnosis and Evaluation.

PROCEED: Policy, Regulatory, and Organizational Constructs in Educational and Environmental Development.

SSK: Seyedeh-Somayeh Kazemi

CVR: Content Validity Ratio

CVI: Content Validity Index

KMO: Kaiser-Meyer-Olkin

ICC: Intraclass Correlation Coefficient

Declarations

Trial registration number: [IRCT20170313033054N2](#).

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Authors' contributions

All authors contributed in the design of this study. SSK and AM have written the text on the homepage and had responsible for the analysis. All authors have read and approved the final manuscript.

SSK: Collection, analysis, interpretation of data, writing the manuscript, read and approved the final version.

SST: Read and approved the final version.

AH: Read and approved the final version.

AM: Analysis, interpretation of data, writing the manuscript, read and approved the final version.

Availability of data and materials

The data set analyzed during the current study will be available from the corresponding author on reasonable request. After study completion, data will be kept with full availability for all authors.

Consent for publication

Not applicable

Ethics approval and consent to participate

The Ethics Committee of Tarbiat Modares University approved the study. All participants completed a written consent form. They were ensured that their name and information would be kept confidential and they were told that they were free to leave the study if they did not wish to do so.

Competing interests

The authors declare that they have no competing interests.

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Additional Files

Additional file 1: The Occupational Back Pain Prevention Behaviors in English (doc)

Additional file 2: The Occupational Back Pain Prevention Behaviors in Persian (doc)

Additional file 3: a Scoring manual for the questionnaire (doc)

Tables

Due to technical limitations, tables are only available as a download in the supplemental files section.

Supplementary Files

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