Research Article

Development and Content Validation of Perceived Barriers to Exercise Questionnaire (PBEQ-I) for Indian Office Workers

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I N F O

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A B S T R A C T

Background: Physical inactivity worldwide is a major challenge in preventing various non-communicable diseases. In India, physical inactivity is observed in the average population, mostly in office workers involved with sitting or clerical jobs. Studies showed that there are different barriers, facilitators, and preferences for exercises that already exist for office workers. To our knowledge, no questionnaire currently addresses perceived barriers to exercise among Indian office workers.

Objective: To measure self-reported perceived barriers to exercise for the employees working in the office.

Methodology: This study has two essential components: domain and item development and content validation using the online Delphi method. The questionnaire was validated using the Content Validity Index (CVI) and modified Kappa, the most used quantitative method for calculating content validity. The questionnaire was validated by a panel of 13 experts in two rounds of validation.

Results: The initial testing revealed low content validity for individual items (I-CVI range: 0.50 to 1.00) and moderate agreement (Kappa range: 0.27 to 1). After modifying and replacing items, the second round achieved acceptable scores (CVI: 0.85-1 and Kappa: 0.84-1). The final instrument had five domains and twenty-five questions. The domains were as follows: (1) personal barrier; (2) professional barrier; (3) social and family barrier; (4) preferences; and (5) knowledge barrier domain.

Conclusions: Using an iterative methodology, the validation of the perceived barriers to exercise questionnaire (PBEQ-I) for Indian office workers revealed a high level of item-content validity for assessing the perceived barriers to exercise among office employees. Further reliability testing is required to validate this instrument's psychometric qualities.

Keywords: Barriers, Exercise, Physical Activity, Questionnaire, Content Validity

Introduction

Movement of the skeletal muscles that results in an increase in the amount of energy expended over the level determined, while at rest, is considered to be physical activity.[1] Exercise is a subpart of physical activity that is more planned and has to be repetitive to maintain physical fitness.[1,2] Physical inactivity and a sedentary lifestyle are major contributors to the development of various health conditions such as cardiovascular diseases, obesity, diabetes, and other non-communicable diseases (NCDs)[3-9] leading to 6% of heart diseases and 7% of diabetes worldwide.[10] To prevent inactivity-related NCDs by boosting the immune system, and type 2 diabetes by increasing insulin sensitivity, the World Health Organization (WHO) advises 150 minutes of a tolerable aerobic regime or 75 minutes of a high-intensity regime per week.[6,8,11]

In modern workplaces, physical labour has decreased, and sedentary time has increased significantly because of the demand for work patterns. Sedentary behaviour, which includes low energy expenditure, leads to different diseases affecting physical as well as mental health, further leading to decreased work productivity.[12-14] In India, eight to ten wake hours (60-75%) are spent at work, where the majority of the time is spent in sedentary activities such as long periods of sitting (more than 30 min).[15] Office workers' mental health and productivity are proven to suffer from excessive sitting (more than 6 hours per day).[14] Most office employees in India are classified as having abnormal Bone Mineral Density (BMD) (i.e., osteopenia or osteoporosis). Exercise is consistently cited as one of the most effective preventative measures to lower the risk of osteoporosis.[16]

The majority of the population is aware of the importance of physical activity, but many barriers lead to non-adherence.[17,18] Some of these barriers are lack of interest, transportation, pain, unsupportive social and family environment and responsibilities, and lack of time.[18-20] These factors are well-listed in many studies.[21-23] The inadequate adherence to advised levels of physical activity may increase the likelihood of more Indians developing or experiencing worsening of various NCDs. Promoting regular physical activity among adults may be more achievable by raising awareness of these advantages and removing obstacles.[24] There are various barriers reported for physical activity and exercise in previous studies across the world for the general population,[18,25,26-42] but there is less data available in the context of perceived barriers among Indian office workers, so in order to better understand exercise adherence among office professionals, we developed a perceived barriers to exercise questionnaire for Indian office workers (PBEQ-I), which may collect data on self-reported barriers and preferences to exercise.

Method

The following procedures were finalised for the validity process in accordance with various guidelines:[43-47]

Domain and Item Generation

Literature Search

The Literature was searched in PubMed/ Medline, Scopus, Cochrane Library, Physiotherapy Evidence Database (PEDro), CINAHL, and EBSCO. Items were generated and retrieved from these databases. The following medical subject headings (MeSH) terms were used to conduct a thorough electronic search: exercise, physical activity, perceived obstacle, office employees, and survey. Boolean operators like "AND," "OR," and "NOT" were used in conjunction with these MeSH names. The questionnaire and scales were restricted to those over the age of 19 years using age filters. We gathered the pertinent elements from various sources, including literature reviews and physical activity barrier questionnaires that already existed. Through this procedure, we could cut out any overlaps and redundant items. In the preliminary version, 40 questions and 7 domains were finalised.

Expert Review

An expert committee (a team of three experts with extensive experience in addressing health concerns specific to office workers, familiarity with the methodological processes employed in conducting similar studies, and a minimum of five years of clinical practice experience) received the preliminary version of the tool and provided inputs.[48] The committee assessed the questionnaire's overall structure, domains, and items. A physician, a healthcare academician, and a physiotherapist specialising in physical activity made up the committee. Iterative revisions based on feedback resulted in a final questionnaire with twenty-five questions categorised into five domains (Personal barrier, Professional barrier, Social and Family barrier, Environmental barrier, and Knowledge barrier).

Content Validity Index Online Delphi Method (CVI Score)

The validity of an instrument refers to the extent to which it accurately measures what it is intended to assess.[49] According to Saw et al., questionnaire development involves several steps, therefore, numerous iterations were performed during the development of the PBEQ-I so that it was phrased correctly, was adequately explainable, and included aspects crucial to the people it was applied to.[50]

As it permits experts to work independently, the online Delphi technique was utilised to get a consensus.[51] Each item of every domain was examined for consistency,

representativeness, relevance, and clarity. Duplicate questions were removed, and inappropriate language was changed.

The tools used for testing content validity are:

Content Validity Index (CVI)

The Item-CVI (I-CVI) can be used to calculate CVI and is determined by dividing the total number of experts who marked a certain item as "extremely relevant" by the total number of experts. Values ranged between 0 and 1. A CVI score of 0.83 is recommended when six to eight experts are involved in the evaluation process.[52,53]

Kappa Value

Wynd et al. recommended that a Kappa value can be generated along with CVI. Kappa offers the agreement that is more than chance, as determined using the following formula:

$$K = (I\text{-}CVI - Pc)/ (1- Pc),$$

Where $Pc = [N!/A!(N\text{-}A)!]* 0.5^{N}$,[45] Pc: the probability of chance agreement; N: number of experts; and A: experts mentioning items that are relevant.[47]

Kappa values from 0.40 to 0.59 are rated as fair, 0.60 to 0.74 as good, and above 0.74 as excellent.[45,54]

Procedure

The content validity of the PBEQ-I was assessed in two stages due to an unacceptable CVI score obtained in the first round. Thirteen experts, who had previously agreed to participate, received a cover letter detailing the reasons for their inclusion in the study, along with clear instructions on how to evaluate and score each question in both the initial and second rounds of the assessment.[55-60]

Statistical Analysis

A Content Validity Index was used to statistically examine the produced instrument's content validity.[45,60] Each item was given a rating of three points (1: agree, 2: disagree, 3: neutral) to determine the CVI, only the items that received an agreement score of 1 (i.e., "agree") were included, option 2 (disagree) and 3 (neutral) were considered non-congruent and scored as zero. Its value for each item was determined by the ratio of the number of experts in all divided by the number of experts who agreed with the question. The Kappa-modified coefficient determined the CVI's level of relevant agreement.

CVI and Kappa

The CVI ratings of the items in the initial content validation phase ranged between 0.50 and 1 and Kappa ranged from 0.27 to 1.

Personal Barrier (Item No. 1-5)

We modified the personal barrier (1-5) domain: item number 2 for less consistency (CVI and Kappa), item numbers 2 and 4 for less relevance (CVI and Kappa), item numbers 1 and 3 for less clarity (CVI and Kappa) and item numbers 2 and 4 for representativeness score. Only item number 5 was validated since we received an acceptable score in the 1st round.

Professional Barrier (Item No. 6-10)

This domain's entire contents were updated. Item number 7 was replaced because it received a low score across the board for consistency and clarity. Item number 8 was replaced due to low scores in consistency, and item no 9 was replaced due to low scores in consistency and clarity. Based on the expert committee's recommendation, we replaced item numbers 6 and 10 since they shared the same concept and reflected identical notions.

Social and Family Barrier Domain (Item No. 11-15)

We amended item numbers 11, 12, 13, and 14 due to low consistency, representativeness, relevance, and clarity score in Kappa and CVI and we eliminated and replaced item number 15 due to low scores across all dimensions.

Environmental Barrier Domain (Item No. 16-20)

Items 16, 17, 18, and 19 were validated, but as per experts' opinion, item number 16 was modified, and item numbers 18 and 20 were replaced because the clarity scores were not acceptable.

Knowledge Barrier Domain (Item No. 21-25)

Items 21, 22, 24, and 25 were validated, but we changed items 24 and 25 based on Delphi's expert opinion. Due to a low score on representativeness and relevance, item number 23 was corrected. We changed the term "physical activity" to "exercise" to improve clarity in the questionnaire.

Results

The PBEQ-I underwent two rounds of validation by different experts due to the unacceptable scores of multiple items in the first round. We modified, replaced, and corrected all items with low scores before sending them to seven experts for round 2 validation. Table 1 shows the significant changes made in items in the first round. In the second round, all items received satisfactory ratings. The final edition of the instrument included a total of 25 items, which were divided into five domains: personal barriers, professional barriers, social & family barriers, environmental barriers, and knowledge barriers. There were five items in each domain, and during various phases of content validation, the items were evaluated independently.

Table 1.Important Changes in Items in the First Round

Items	Consistency		Representativeness		Relevance		Clarity		Result
	CVI	Kappa	CVI	Kappa	CVI	Kappa	CVI	Kappa	
Personal barrier									
Item 1	0.830	0.810	1.000	1.000	1.000	1.000	0.660	0.560	**Modified**
Item 2	0.660	0.560	0.660	0.5650	0.660	0.5650	0.830	0.810	**Modified**
Item 3	0.830	0.810	1.000	1.000	1.000	1.000	0.500	0.560	**Modified**
Item 4	0.830	0.810	0.660	0.560	0.660	0.560	0.830	0.810	**Modified**
Item 5	0.830	0.810	1.000	1.000	0.830	0.810	0.830	0.810	**Validated**
Professional barrier									
Item 6	0.830	0.810	0.830	0.816	0.830	0.816	0.830	0.810	**Replaced**
Item 7	0.660	0.560	0.660	0.560	0.660	0.560	0.660	0.560	**Replaced**
Item 8	0.660	0.560	0.830	0.816	1.000	1.000	0.830	0.810	**Replaced**
Item 9	0.500	0.270	0.830	0.816	0.830	0.816	0.660	0.560	**Replaced**
Item 10	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	**Replaced**
Social and family barrier									
Item 11	0.500	0.270	0.660	0.560	0.660	0.560	0.830	0.810	**Modified**
Item 12	0.660	0.560	0.660	0.560	0.500	0.273	0.830	0.810	**Modified**
Item 13	0.660	0.560	0.660	0.560	0.660	0.560	0.830	0.810	**Corrected**
Item 14	0.500	0.27	0.660	0.560	0.660	0.560	0.660	0.560	**Corrected**
Item 15	0.500	0.270	0.500	0.270	0.660	0.560	0.660	0.560	**Replaced**
Environmental barrier									
Item 16	1.000	1.000	1.000	1.000	1.000	1.000	0.083	0.810	**Modified**
Item 17	0.830	0.810	1.000	1.000	0.830	0.810	1.000	1.000	**Validated**
Item 18	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	**Replaced**
Item 19	0.830	0.810	0.830	0.810	0.830	0.810	0.830	0.810	**Validated**
Item 20	0.830	0.810	0.830	0.810	0.830	0.810	0.660	0.560	**Replaced**
Knowledge barrier									
Item 21	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	**Validated**
Item 22	0.830	0.810	1.000	1.000	1.000	1.000	1.000	1.000	**Validated**
Item 23	0.830	0.810	0.660	0.560	0.660	0.560	0.830	0.810	**Corrected**
Item 24	0.830	0.810	0.830	0.810	0.830	0.810	0.830	0.810	**Validated**
Item 25	1.000	1.000	1.000	1.000	1.000	1.000	0.830	0.810	**Validated**

Readability Testing (Flesch Reading Ease Score, SMOG Index)

Levels of readability were determined for the ninth iteration of this survey. The Flesch-Kincaid Grade Level and SMOG Index determined the readability and comprehension of each sentence inside the tool. A typical seventh-grade student would find it simple to read and understand because it had a Flesch-Kincaid grade level of 7. The eighth-grade reading level was indicated by the SMOG Index, which was 8.2.

Discussion

The PBEQ-I questionnaire, which evaluates various domains related to the barrier, was developed in this study, and its content was validated. The robustness of an instrument's score interpretations and the degree to which these scores accurately reflect the variables they are intended to assess are connected to content validity.[59] The final questionnaire draft was subjected to two validation rounds for experts to establish a consensus. Benson and Clark[46] contend that when complete agreement cannot be obtained on the items, the items must be altered until a consensus is reached. Nevertheless, despite numerous updates, certain items could not meet this criterion and were taken out of the questionnaire. Twenty items were updated, replaced, or corrected, eight were eliminated and twelve were either corrected or amended as a result of the first round of validation in this study. This allowed for considerable improvements in the instrument. Necessary revisions were made to the item wordings for clarity during the initial phase, and as a result, the instrument's content validity was reevaluated. The CVI and Modified Kappa Coefficient were used to determine the outcomes of the content validation procedure. Polit et al. reported that questions with CVI and modified Kappa values more than 0.70 were rated as excellent.[57,60] During the validation process, five out of twenty-five items were initially accepted after their validation in the first round, and the remaining twenty were successfully validated in the second round. The questionnaire was verified once we obtained satisfactory values in the second round.

The PBEQ-I final version had the same domain and number. Each question was answered with a yes or no response. The instrument had a 0-25 overall score, with a distinct score of 0-5 for each domain.

The resulting instrument's 25 items provide sufficient content validity for performing the qualitative analysis of the perceived barriers to exercise among Indian office workers. Other psychometric properties, such as criteria validity, construct validity, internal consistency, and inter- and intra-examiner reliability, must be the subject of additional analytic research.

Limitation

In order to spare the reader's time and effort, we only included five domains and five questions per domain that are pertinent to office workers. Therefore, this questionnaire is applicable solely to office workers with sedentary jobs.

Conclusion

The Perceived Barriers to Exercise Questionnaire (PBEQ-I) provides a valuable tool to understand and address the barriers faced by Indian office workers in engaging in exercise. Identifying these barriers can help develop targeted interventions to promote physical activity and improve the overall health and well-being of office workers in India and other similar settings. However, additional research is necessary to explore the questionnaire's broader applicability and assess its reliability and validity in different populations.

Ethical Approval

The ethical clearance was obtained from the Institutional Ethics Committee of Jayoti Vidyapeeth Women's University, Jaipur, India.

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Conflicts of Interest: None

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