



Questionnaire on teachers' physical self-perception during school activities (P&Hscreen): development, validation, and reliability

Questionário de autopercepção corporal de professores durante atividades escolares (P&Hscreen): desenvolvimento, validação e confiabilidade

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ABSTRACT

To construct and validate a questionnaire for assessing teachers' self-perception of their posture, and their perception of students' posture habits in different situations in the school environment. 7-step were performed for the construction of the questionnaire. The content validation strategy was judged by a panel of experts and the Validity Index (VI). Test-retest reliability was performed with teachers and measured by the Intraclass Correlation Coefficient (ICC) and Kappa Coefficient (KC). Eleven experts with a doctorate, experience in education, and the field of posture participated in content validation and 40 teachers participated in test-retest reliability. VI measurements were all above 0.81, and the overall mean of ICC and KC were 0.94 and 0.91, respectively. This questionnaire was considered valid, reliable, and feasible with language understandable to teachers. It can be recommended for research in schools, and posture education programs, contributing to the prevention of inadequate posture habits and their consequences.

Keywords: Self-perception. Posture. Teachers.

RESUMO

Construir e validar um questionário para avaliar a autopercepção de professores sobre sua postura e a percepção dos hábitos posturais dos alunos em diferentes situações no ambiente escolar. Foram realizadas 7 etapas para a construção do questionário. A estratégia de validação de conteúdo foi julgada por um painel de especialistas e pelo Índice de Validade (VI). A confiabilidade teste-reteste foi realizada com professores e medida pelo Coeficiente de Correlação Intraclasse (ICC) e Coeficiente Kappa (KC). 11 especialistas com doutorado, experiência em educação e na área de postura participaram da validação de conteúdo e 40 professores participaram da confiabilidade teste-reteste. As medidas de VI foram todas acima de 0,81, e a média geral de ICC e KC foi de 0,94 e 0,91, respectivamente. Este questionário foi considerado válido, confiável e viável com linguagem compreensível para os professores. Pode ser recomendado para pesquisas em escolas e programas de educação postural, contribuindo para a prevenção de hábitos posturais inadequados e suas consequências.

Palavras-chave: Autopercepção. Postura. Professores.



INTRODUCTION

Currently, self-administered questionnaires have been increasingly used to assess various health outcomes for both research and clinical practice, as they are easy-to-use, low-cost instruments that allow the possibility of the participants' self-report¹⁻³. However, the quality of information provided by these instruments is related to their measurement properties^{1,4}.

The process of constructing and developing a questionnaire must follow valid, consistent standards, providing accurate and interpretable data for the assessment of the target population^{2,5}. The most evaluated measurement properties are usually the instrument validity and reliability to minimize the possibility of subjective judgments^{4,6}.

Validity refers to the quality of an instrument measuring what it is supposed to measure; and reliability is the degree to which a measurement is free from random errors, being able to reproduce consistent results over time and space when administered in different occasions^{1,6-8}.

In the current literature, there are validated questionnaires to measure children and adolescents' physical self-perception in activities of daily living (ADLs) in school and home environments, such as posture when sitting to write or use a computer, carrying their school bags, and picking up objects from the floor⁹⁻¹³. Nevertheless, after an extensive literature review, no validated instruments were identified for teachers' physical self-perception in work activities or their perception of the students' posture and postural habits during school activities.

The school environment can contribute to the development of musculoskeletal pain and posture alterations in teachers and students; especially due to risk factors such as the teachers' work overload, incorrect posture when writing on the classroom board, use of nonergonomic school furniture, remaining in orthostatic posture and/or sitting for extended periods, and asymmetrically carrying heavy backpacks¹⁴⁻¹⁷.

Studies show that teachers who adopt ergonomically inappropriate postures during work activities harm parts of the body such as the lumbar spine, cervical spine, and upper limbs; even affecting the quality of voice performance, which can interfere with daily activities and result in increased absenteeism, and the use of analgesics^{15,18}.

Physical self-perception questionnaires stimulate and assess the person's awareness of their body, allowing the individual to reflect on their posture habits in ADLs¹⁰. Adopting an adequate posture is associated with sensory stimuli, correct posture habits,

knowledge; and the person's relationship with their own body, that is, the image that each one has of themselves, at each moment¹⁹. Therefore, teachers should be able to look at their bodies and recognize risk factors during daily actions to minimize posture and pain complaints¹⁵.

In addition, literature shows that students' behaviors are mostly guided by teachers' actions, with causality between teachers' and students' postures, thus, teachers must promote and encourage more dynamic habits²⁰. Thus, studies on teachers' physical perception can provide self-education, allowing the person to reflect on their posture habits and generate new movements, in addition to developing monitoring and guidance on the posture of their students in the classroom, preventing the emergence of early posture alterations^{21,22}.

In this context, the present study is justified by the need to validate a body posture perception questionnaire aimed at teachers that allows understanding the level of awareness they have of their postures and those of their students, adopted in a school environment; as well as analyzing the quality of posture habits and their possible association with musculoskeletal pain complaints and postural alterations. Thus, the objective of this study was to construct and validate a questionnaire to assess teachers' posture self-perception and their perception of their students' posture habits in different situations in the school environment.

METHOD

This is a methodological study of construction and validation of the "Questionnaire on teachers' physical self-perception and perception of their students' posture and posture habits" (P&Hscreen). The present study was approved by the Human Research Ethics Committee of the Santa Catarina State University – CEPESH/UEDESC, under protocol number 46019921.3.0000.0118. This study was conducted in two main stages: Questionnaire construction, and validation. Moreover, three main measurement properties were performed for validation: Content validation, reliability (test-retest), and feasibility.

STUDY SAMPLE

For the content validation stage, Brazilian health professionals with a doctorate were invited to compose the panel of experts. These professionals were chosen owing to their experience in education, and/or posture assessment, and/or biomechanics of human movement, and/or child and adolescent health. For the test-retest reliability stage, elementary and/or high school teachers from public and/or private schools from all regions of Brazil were contacted through social media and invited to participate in the present study. Teachers from daycare centers, pre-schools, and Brazilian universities were not included in the study.

QUESTIONNAIRE CONSTRUCTION PROTOCOL

For the construction of the questionnaire, a systematic design process including seven steps was conducted; as proposed by Artino et al., (2014)⁵: 1 - Conduction of a literature review, 2 - Conduction of interviews and/or focus groups, 3 - Synthesis and discussion, 4 - Item development, 5 - Expert validation', 6 - Cognitive interview, and 7 - Conduction of pilot testing.

First, a literature review was conducted in important databases to ensure that the questionnaire was developed with a high-quality theoretical base and evidence. It also included the verification of validated questionnaires related to the concerned topic, which were not found. This encouraged the construction of this questionnaire.

The literature review was performed on the Latin American and Caribbean Health Sciences Information Literature (LILACS), Scientific Electronic Library Online (SCIELO), PubMed, Cochrane Library, Physiotherapy Evidence Database (PEDro) electronic databases using the following descriptors: "Self-perception", "Physical self-perception", "Posture", "Posture habits", "Spine", "Teacher", "Scholar", "Child", "Adolescent", "School", "Back school" in combination with the keywords "Evaluation", "Measurement properties", "Construction", "Validation" and the respective terms in Portuguese. The search included articles published from January 2010 to March 2021, in English and Portuguese, excluding doctorate theses, dissertations, case studies, case series, and books.

Subsequently, teachers were interviewed remotely to improve the construction of the instrument based on their perspective and understanding of the construct of interest.

Then, synthesis and discussion of the literature were developed by two researchers to ensure that the construction of the questionnaire presented theoretical evidence for experts in the field and that the language used was easily understandable to the target population. Thus, 108 items were developed for the first version of the questionnaire.

After the completion of the first version of the questionnaire in Brazilian Portuguese, it was exported to the Google® Forms online digital platform (Google®, USA). Two experts in the field then conducted a pilot study to investigate language errors; and a few corrections were suggested, such as the replacement of the words “electronic equipment” with “electronic devices,” and the inclusion of one item in section 3 (question B) of the questionnaire, totaling 109 items (Table 1). In addition to assessing physical perception, the instrument also measures sociodemographic aspects, musculoskeletal pain complaints, planning of activities, and educating students about posture and behavior in the classroom.

Table 1. Characterization by sections of questions from the “Questionnaire on teachers’ physical self-perception and perception of their students’ posture and posture habits” (P&Hscreen)

Sections	Items	Measurements	Types of questions
I	13	Sociodemographics and development of occupational activity	Open and closed
II	46	Postural self-perception	Likert scale
III	4	Musculoskeletal pain level	Closed
IV	35	Student’s postural perception	Likert scale
V	5	Permanent education and practice of postural education strategies	Likert scale and closed
VI	6	Level of knowledge about posture and movement practice in the classroom	Likert scale

Subtitle: I: Sample characterization; II: Physical self-perception of posture and postural habit during school activities; III: Complaints of work-related musculoskeletal pain; IV: Teachers’ perception of posture and postural habits of their students; V: Permanent education and teaching-learning strategies on posture and postural habits; VI: Knowledge, stimuli, and guidance of teachers on posture and postural habits.

The second version of the questionnaire was submitted to a panel of 11 experts in the field through the Google® Forms online digital platform for content validation analysis. Figure 1 shows the selection of items and validation of the questionnaire.

Cognitive interviews were conducted remotely with a few participants to verify the feasibility of the questionnaire and ensure that the target population could correctly interpret what was proposed in this updated version.

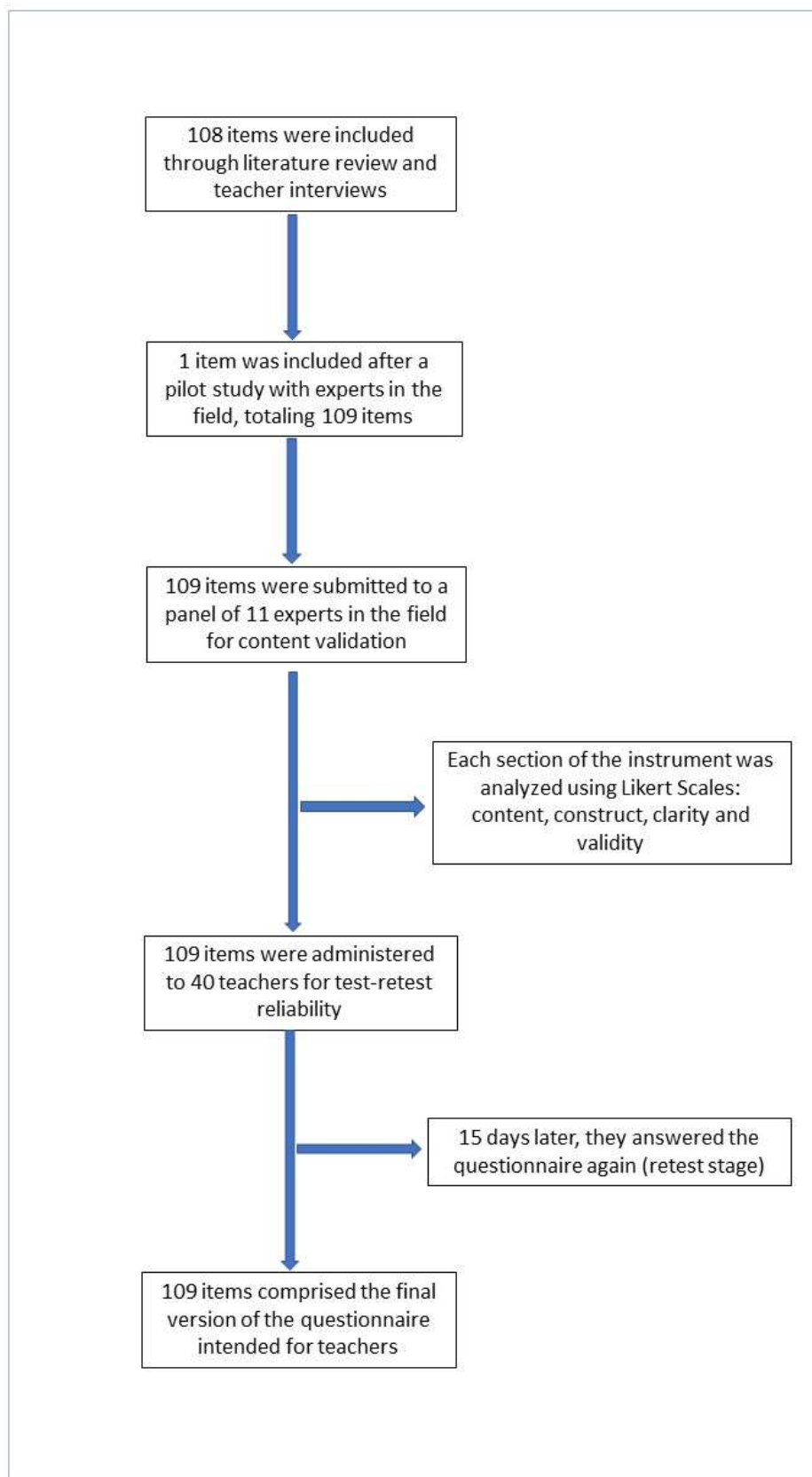


Figure 1. Flowchart of the selection, validation, and reliability of the questionnaire items

EVALUATION OF MEASUREMENT PROPERTIES

Content Validation

After defining the construct and writing the items, an important step in developing a new questionnaire is to start collecting validity evidence based on the research content⁵. This stage is based on the judgment of a panel of experts in a specific area of interest^{1,23}. The high levels of content validity are related to the clarity and representativeness of each item^{23,24}.

The instrument sent to the expert panel was divided into six sections, and each of them was evaluated with respect to content, construct, clarity, and validity. The answers to the questions followed a Likert scale format in which each evaluator assigned a score to each question from 1 to 10 (1-3 = non-significant / incomplete / unclear / non-relevant content; 4-6 = partially significant / partially well-constructed / partially clear / partially relevant content; 7 -8 = suitable / well-constructed / clear / relevant content; 9-10 = extremely suitable for the purpose / extremely well-constructed / extremely clear / extremely relevant content)²⁵. The Validity Index (VI) for content, construct, clarity, and validity was composed based on the expert panel scores²⁶.

Reliability (Test-retest)

Test-retest reliability is used to check if an instrument is capable of consistently measuring a variable⁷. The use of this method requires that both tests consistently reproduce the same result for the factor being measured, and any change in the results can be caused by random errors².

This study followed the guideline for reporting reliability and agreement studies (GRRAS)²⁷. Thus, the test-retest reliability test was performed considering the specificities of the questionnaire. In this analysis, the Intraclass Correlation Coefficient (ICC) is used to estimate the stability of continuous variables, and the Kappa Coefficient (KC) quantifies the level of agreement of the categorical variables⁷.

Based on the inclusion criteria, teachers were invited to answer the questionnaire validated by the panel of experts through an online digital platform (Google® Forms). To avoid memory interference, the teachers were invited to answer the questionnaire again

after a time interval of 15 days. Data from the first and second sets of answers were used to calculate the ICC and KC, depending on the nature of the questions.

Feasibility Analysis

Firstly, a panel of experts evaluated the feasibility of the questionnaire. For each section of the instrument, they were able to analyze the clarity of the questions using Likert scales.

Subsequently, the feasibility was also verified based on the guidelines proposed by Artino et al. (2014)⁵, in which online cognitive interviews were conducted with five teachers to verify if they understood and were adequately interpreting what was proposed in the questions, in addition to recording the time taken to answer the questionnaire.

DATA ANALYSIS

After the analysis of the panel of experts, a VI was calculated per section for content validation. The VI was calculated by dividing the number of experts who scored above 8 on the Likert scale (score between 1 and 10) by the total number of participating experts. The results are expressed as follows: VI: ≥ 0.78 valid; ≤ 0.60 medium validity, and ≤ 0.40 low validity²⁵.

Test-retest reliability was measured using the ICC and KC. To calculate the ICC and KC values, we used the Statistical Package for the Social Sciences 20.0 (SPSS®). For continuous variables, ICC below 0.40 means the reliability is low; it is considered reasonable between 0.40 and 0.59; between 0.60 and 0.74, the reliability is good; and when between 0.75 and 1.00, it is excellent²⁸. For categorical variables, KC below 0 means the reliability is poor; between 0.10 and 0.20, it is slight; between 0.21 and 0.40, regular; between 0.41 and 0.60, moderate; between 0.61 and 0.80, significant; and between 0.81 and 1.00, it is considered almost perfect⁸.

RESULTS

The definitive version of the questionnaire (Supplementary material) aimed at teachers presented clear and accessible language to the public of interest, and it is composed of open and closed questions and Likert scales, divided into six sections.

For content validation, eleven health professionals, with a doctorate and experience in education and the field of posture to participate in the panel of experts. Ten professionals were physical therapists, and one physician, 54.54% women, and 45.45% men. Table 2 shows the results of the VI calculated from the scores of the Likert scales by section.

Table 2 also shows the measurement of feasibility that verified the clarity of the questions. Feasibility was also measured through an online cognitive interview with five elementary school teachers from a private school in Southern Brazil; in which the participants ensured that the questions had an adequate vocabulary and were easy to understand, even though some questions were related to the perception of their bodies and those of their students, which provided reflection and questions on the knowledge of their posture habits and those of their students. The mean time to complete the questionnaire was 15 minutes.

Table 2. Final scores of the validity indices scored by the experts for content, construct, clarity, and validity of the six sections of the questionnaire (n=11)

	I	II	III	IV	V	VI
Content	1.00	1.00	0.81	1.00	1.00	1.00
Construct	1.00	1.00	0.81	1.00	1.00	1.00
Clarity	1.00	0.90	0.81	0.90	1.00	1.00
Validity	1.00	1.00	0.90	1.00	1.00	1.00

Subtitle: I: Sample characterization; II: Physical self-perception of posture and postural habits during school activities; III: Complaints of work-related musculoskeletal pain; IV: Teachers' perception of posture and postural habits of their students; V: Permanent education and teaching-learning strategies on posture and posture habits; VI: Knowledge, stimuli, and guidance of teachers on posture and posture habits.

A total of 40 teachers participated in the test-retest reliability. They were all Brazilians, with a mean age of 39 ± 9 years, 26 (65%) were women and 14 (35%) were men, 2 (5%) had a doctorate, 8 (20%) had a master's degree, 18 (45%) had a specialization degree, and 12 (30%) had an undergraduate degree. They were teachers of elementary and/or high school in public and/or private schools, teaching different curricular subjects in the states of Rio Grande do Sul, Santa Catarina, and São Paulo, Brazil. Table 3 shows the ICC and KC values for the six sections. It should be noted that 106 items of the questionnaire are categorical, and three items are ordinal. The overall mean of ICC measurements was 0.94 and KC was 0.91, thus, the six sections of the questionnaire were considered reliable.

Table 3. Final scores of the values of the Kappa Coefficient of the Intraclass Correlation Coefficient for the six sections of the questionnaire (n=40)

	I	II	III	IV	V	VI
KC	1.00	0.90	0.96	0.89	0.91	0.91
ICC	1.00	-	0.82	-	-	-

Abbreviations: KC: Kappa Coefficient; ICC: Intraclass Correlation Coefficient.

Subtitle: I: Sample characterization; II: Physical self-perception of posture and postural habits during school activities; III: Complaints of work-related musculoskeletal pain; IV: Teachers' perception of posture and postural habits of their students; V: Permanent education and teaching-learning strategies on posture and postural habits; VI: Knowledge, stimuli, and guidance of teachers on posture and postural habits (-): Sections without questions with quantitative variables.

DISCUSSION

This study described the phases of development, evaluation of content validity, test-retest reliability, and feasibility of a self-administered questionnaire aimed at evaluating teachers' physical self-perception, as well as their perception of their students' posture during school activities. It is noteworthy that, in addition to evaluating and stimulating the teachers' self-awareness of the body, this instrument may help in planning strategies for posture education programs in the school environment.

From the perspective of posture education programs, when adopting a posture habit, the person must be able to understand and perceive their movement, since the posture is also determined by the individual's motivations and the way they perceive it¹¹. Posture perception is a subjective view, and there may be differences between the individual's perception and the image observed by the researcher, but this analysis constitutes important information and can demonstrate the knowledge and care that the person has for their own body, in addition to allowing analysis of incorrect posture habits and posture deviations^{10,11}.

Teachers' work activities involve a wide variety of responsibilities and functions that may require prolonged exposure to unfavorable working conditions^{14,29}. The authors Erick and Smith (2011)¹⁴, when developing a systematic review, found that the prevalence of self-reported musculoskeletal pain among teachers varies between 39% and 95% and that factors such as being a woman, older age, inadequate posture, physical effort, and long working time have been associated with higher prevalence rates of teachers' musculoskeletal complaints. According to Rantala et al. (2018)¹⁸, maintaining incorrect postures, such as trunk flexion and rotation, and elevation of the upper limbs when performing work tasks, also affect the performance of teachers' voices and can be

harmful to vocal health in the long term. In this context, it is important to conduct research that encourages physical perception for the proper execution of ADLs for the benefit of the kinetic-functional health of teachers³⁰.

The role of preventing possible postural deviations in students may be related to the teachers' perception, as they spend several hours of the day together, enough for the teachers to be able to contribute to the identification of posture deviations in their students^{31,32}. Such information should be considered as relevant factors during the assessment of possible posture alterations in students³². Therefore, the construction and validation of this questionnaire are important to serve as a contribution to future research because no valid instruments with this theme have been found to date.

The present study followed the guidelines recommended by Artino et al. (2014)⁵. The questionnaire was elaborated through a cohesive process, which optimizes the chances of collecting high-quality survey data. Both in the development stage and in the evaluation of the measurement properties, Google® Forms online digital platform was used. This tool enables the development of various types of research, access, and analysis of data in real time, and recording them in spreadsheets free of charge and safely³³. This strategy has been used in other recent research^{1,34-36}.

The P&Hscreen was considered valid concerning its content, and reliable by test-retest. Measuring validity and reliability is essential to know the accuracy of an instrument and whether similar results are reproduced under the same methodological conditions¹.

This instrument presented high VI scores in the analysis of content, construct, clarity, and validity evaluated by a panel of experts, demonstrating that the questionnaire presents the relevance of content, representativeness, and technical quality. According to Pedreira et al. (2016)³⁷, high levels of validity show that the questionnaire can be used at different social, cultural, and economic levels of the target population.

The reliability of a questionnaire is related to the degree to which an instrument allows reproduction and consistency of results when administered on different occasions^{4,6}. Considering the relevant results in the test-retest reliability using the KC and ICC analysis, this instrument is consistent and technically ready to be used for its proposed objectives.

Other self-administered questionnaires were developed and validated to identify young people's awareness of their posture in the school environment⁹⁻¹³, however, they did not include teachers, whose perspective and self-perception are the focus of this study.

A limitation of this study was the fact that the answers given in the reliability test (retest stage) may be conditioned to memory, interfering with independence. In addition, the self-perception of postural habit may also be different from the habit observed by the researcher, and it should be considered for prevention and treatment measures.

CONCLUSION

The “Questionnaire on teachers’ physical self-perception and perception of their students’ posture and posture habits” (P&Hscreen) was considered valid, reliable, and feasible, with language understandable to the target population. This study followed a systematic 7-step design process to substantially improve the overall quality of the instrument. It can be recommended for research in schools, clinics, and posture education programs, and can contribute to the prevention and treatment of inadequate posture habits and their consequences.

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