Vulnerability to physical inactivity: content validation of markers for adults

Vulnerabilidade à inatividade física: validação de conteúdo dos marcadores para adultos

Vulnerabilidad a la inactividad física: validación de contenido de los marcadores para adultos

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Abstract

Objective: To validate the content of markers of vulnerability to physical inactivity in adults.

Methods: This is a methodological study, based on psychometrics, which aims to develop constitutive and operational definitions of markers of vulnerability to physical inactivity in adults and content validation by experts. Data were analyzed by calculating Content Validity Index (CVI) and binomial test.

Results: Thirteen judges, health professionals, researchers with publications on the subject, from seven Brazilian states (Ceará, Pernambuco, Piauí, Bahia, Amazonas, Santa Catarina and Rio de Janeiro), participated in the validation. A total of 40 markers were validated, with 40 constitutive definitions and 133 operational definitions. These were grouped into two interrelated dimensions (subject and social) and 12 subdimensions (physical situation, psycho-emotional situation, behavior, functional literacy, interpersonal relationships, sociodemographic profile, environment, policies, institutional context, culture, fundamental rights). All had excellent CVI (≥ 0.78).

Conclusion: The proposed markers presented adequate parameters of validity and can be used to operationalize the measurement of vulnerability to physical inactivity phenomenon in the construction of instruments and strategies for patient care and coping with physical inactivity.

Resumo

Objetivo: Objetivou-se validar o conteúdo dos marcadores de vulnerabilidade à inatividade física em adultos.

Métodos: Estudo metodológico, fundamentado na Psicometria, que visa à elaboração das definições constitutivas e operacionais dos marcadores de vulnerabilidade à inatividade física em adultos e sua validação de conteúdo por especialistas. Os dados foram analisados mediante cálculo do Índice de Validade de Conteúdo (IVC) e Teste Binomial.

Resultados: Participaram da validação 13 juízes, profissionais da área da saúde, pesquisadores com publicações sobre o tema, provenientes de sete Estados brasileiros (Ceará, Pernambuco, Piauí, Bahia, Amazonas, Santa Catarina e Rio de Janeiro). Foram validados 40 marcadores, com 40 definições constitutivas e 133 definições operacionais. Esses foram agrupados em duas dimensões inter-relacionadas (Sujeito e Social) e 12 subdimensões (Situação Física, Situação Psicoemocional, Comportamento, Letramento Funcional, Relações Interpessoais, Perfil Sociodemográfico, Ambiente, Políticas, Contexto Institucional, Cultura, Direitos Fundamentais). Todos apresentaram IVC excelentes (≥ 0,78).

Conclusão: Os marcadores propostos apresentaram parâmetros adequados de validade e podem ser usados para operacionalizar a mensuração do fenômeno vulnerabilidade à inatividade física na construção de instrumentos e estratégias para o cuidado de pacientes e enfrentamento da inatividade física.

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Conflicts of interest: nothing to declare.

Resumen

Objetivo: Validar el contenido de los marcadores de vulnerabilidad a la inactividad física en adultos.

Métodos: Estudio metodológico, fundamentado en la psicometría, que busca elaborar las definiciones constitutivas y operativas de los marcadores de vulnerabilidad a la inactividad física en adultos y su validación de contenido por especialistas. Los datos fueron analizados mediante cálculo del Índice de Validez de Contenido (IVC) y prueba binominal.

Resultados: Participaron de la validación 13 jueces, profesionales del área de la salud, investigadores con publicaciones sobre el tema, provenientes de siete estados brasileños (Ceará, Pernambuco, Piauí, Bahia, Amazonas, Santa Catarina y Rio de Janeiro). Fueron validados 40 marcadores, con 40 definiciones constitutivas y 133 definiciones operativas. Fueron agrupados en dos dimensiones interrelacionadas (Sujeto y Social) y 12 subdimensiones (Situación física, Situación psicosocial, Comportamiento, Alfabetización funcional, Relaciones interpersonales, Perfil sociodemográfico, Ambiente, Políticas, Contexto institucional, Cultura, Derechos fundamentales). Todos presentaron IVC excelente (≥ 0,78).

Conclusión: Los marcadores propuestos presentan parámetros adecuados de validez y pueden ser usados para operacionalizar la medición del fenómeno vulnerabilidad a la inactividad física en la elaboración de instrumentos y estrategias para el cuidado de pacientes y afrontamiento de la inactividad física.

Introduction

Vulnerability is a construct that can be observed from different perspectives. One of the most advocated approaches reveals the dynamic way that cultural and social elements connect to individuals, to create and materialize conditions that increase the possibility of threats and dangers.[1] Its applications in the health area cover multiple themes at different levels of entanglement and complex health processes.[2,3]

Vulnerability in health is understood as a human condition that involves interaction between elements of a given health phenomenon, from the individual and sociopolitical perspective.[4-6] Several perspectives emerge, such as vulnerability to stress,[7,8] vulnerability to the use of alcohol and other drugs,[9] health vulnerability of people with heart failure,[10] vulnerability to risky sexual behavior,[11] clinical-functional vulnerability,[12] for sexually transmitted infections,[13,14] among others. In this understanding, elements such as socioeconomic status, demographic status, health behaviors, clinical profile, health services, social support, health status, emotional aspects, bonds, beliefs, perceptions, exposure and susceptibility are considered.

One of the important elements of health for the healthy development of people and populations is physical activity.[15] However, despite the evidence on the harm caused by physical inactivity, the frequency of people who are able to practice physical activity in sufficient quantity, intensity and duration to enjoy the protective effects of diseases and promote health is still low.[16-18] It is recognized that social inequalities influence adherence to physical activities, and put some population groups at a notable disadvantage.[19] Such inequalities associated with personal aspects and their intersubjective relationships can increase the chances of physical inactivity at an individual and collective level.[20]

Situations in which individual choice is difficult show weakening conditions and reactive impossibility, which affects the level of vulnerability.[19,20] These conditions of vulnerability of subjects and social need to be considered for the effective planning and development of strategies to face physical inactivity.

Thus, in order to understand how much personal aspects and the social context in which one is inserted favor or hinder physical activity, an analysis from the perspective of vulnerability is suggested. Thus, it is understood that the subject-social dimension elements interact, producing conditions of precariousness, which have repercussions on the adoption or not of behavior, i.e., physical inactivity is understood beyond the result of individuals' will. Such understanding problematizes the repercussion of health inequities and highlights the relevance of structural changes in different segments, such as environment, politics, culture, economy, and others.

Several aspects exacerbate vulnerability to physical inactivity, and because it is a latent trait, it is not directly observable, being represented by observable objective elements, which allow its measurement, the so-called attributes. Knowing the dimensionality and the constitutive and operational elements of this latent trait enables the construction of questionnaires that cover the different elements

that make up this construct, which allows for better monitoring and surveillance of vulnerability to physical inactivity in populations, as well as supporting strategies that promote physical activity and health in the most different contexts. However, to our knowledge, there are no instruments that measure the vulnerability to physical inactivity construct for the Brazilian adult population.

Considering the above, the present study aims to validate the content of markers of vulnerability to physical inactivity in adults.

Methods

This is a methodological study, based on psychometrics, which establishes specific procedures for the elaboration and validation of instruments[21] anchored in three poles (theoretical, empirical and analytical). The construction of this article refers to the theoretical pole, divided into phases: 1) investigation of the vulnerability to physical inactivity construct, its dimensionality, constitutive and operational elements; 2) mapping of markers of vulnerability to physical inactivity; 3) construction of constitutive and operational definitions of these markers; and 4) content validation of markers by experts. The fulfillment of the first three phases was based on the literature, with critical reflection and via scoping review.

In light of the theoretical contribution[1,5,22] on vulnerability in health, the construct addressed in this study was defined. Thus, vulnerability to physical inactivity is understood as a condition of human life produced in the interaction between elements of multiple dynamic relationships of subjects in their social context, which generate greater precariousness and exposure to factors that are unfavorable to physical activity for health, such as its damage and the unavailability of means of coping.

To help investigate its dimensionality and constitutive and operational elements, as well as its markers, a scoping review was carried out based on specific guidelines for this type of study.[23,24] The search for articles was carried out in five stages: guiding question identification; eligibility criteria establishment; information source definition; search and selection strategy development; analysis and synthesis of results. Further details on the method are available in the protocol registered in the Open Science Framework (DOI 10.17605/OSF.IO/KSA98).

To identify the elements that made up the vulnerability to physical inactivity construct in adults, considering the terminological and operational limits and possibilities of an innovative aspect of what is intended to be investigated, the following question was formulated: What are the predictors and determinants of physical inactivity in adults? The Population, Concept, Context (PCC) strategy adopted weaves: P (adults), C (predictors and/or determinants of physical activity/physical inactivity), C (physical activity/physical inactivity); and two search strategies were built using three controlled health vocabularies (MESH, DECS and EMTREE), together with natural language, to ensure greater sensitivity and expansion of search results (Appendix 1).

Original, observational or experimental studies, without language delimitation or publication year limit, published in journals, dissertations and theses defended, found in primary and secondary sources and gray literature were included: SPORTDiscus; Web of Science (WoS); National Library of Medicine (MEDLINE) via EBSCO; Scopus by Elsevier; Latin American and Caribbean Literature on Health Sciences (LILACS) via Virtual Health Library (VHL); BASE; Cochrane Library; Cumulative Index to Nursing and Allied Health Literature (CINAHL); Digital Library of Theses and Dissertations (BDTD), Google Scholar; and Open Gray.

Study selection was blinded and paired at all stages by two researchers and disagreements were resolved by consensus and with the participation of a third evaluator. An analysis of duplicate titles was performed initially, then, to exclude studies that did not meet the eligibility criteria, titles and abstracts were read, followed by reading the studies in full.

After selecting the studies, data were extracted: Population (number of participants, age, sex, characteristic and country of origin), Concept (predictors/

determinants of physical inactivity and categories of analysis), Context (approach and form of assessment of physical activity/physical inactivity, instrument used) and Design (type of study). It is noteworthy that, in these studies, the statistically significant variables associated with physical inactivity were extracted and that some data were interpreted to standardize terms and eliminate residual confusion. The main findings resulting from the studies were distributed and classified according to the conceptual model of Vulnerability in Health proposed by Florêncio and Moreira[5]. Thus, the findings were analyzed from the perspective of vulnerability, and adjustments were made to identify potential markers to operationalize the latent trait studied. All adjustments were based on a reflexive-interpretative process in order to favor the construction of constitutive and operational definitions of the construct.

The constitutive (concepts and definitions, established from abstract realities) and operational (concrete operations or physical behaviors) definitions[21] were built from analyzed articles and the conceptual model adopted, considering the predefined psychometric criteria, in an attempt to deliberate the behaviors and attitudes by which the construct is expressed.

The fourth phase comprised content validation of dimensionality and markers with experts. The choice of experts considered academic training, scientific production, knowledge of methodological studies and professional performance, which took place through consultation on the *Plataforma Lattes* (a platform where you find professionals' resumes) and the national database of the Coordination for the Improvement of Higher Education Personnel (CAPES - *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior*). Experts were contacted by e-mail and invited to participate in the study, and they could also indicate other professionals with the same profile. After acceptance, the Informed Consent Term (ICF), an instrument developed by the author and instructions for completion were sent.

Considering Pasquali's suggestions,[25] regarding the number of 06 to 20 participants, 25 experts were invited. The experts had 15 to 20 days to judge the relevance and pertinence of dimensions, subdimensions, constitutive and operational definitions of markers, in relation to the studied construct. To this end, a four-point ordinal scale was used: 1) non-indicative; 2) little indicative; 3) indicative; 4) very indicative.

Pasquali[21] recommends a minimum agreement of 80% among judges. Furthermore, cultural aspects and the relativity of content validity were also considered, according to Cohen, Swerdlik and Sturman.[26]

After experts' analysis, Content Validity Index (CVI) was calculated with the number of responses 3 and 4 divided by the total number of responses.[27] Those that received a score of 1 or 2 were revised or eliminated. The operational definitions were assessed individually, and then the average score of each marker and subdimension was calculated.

The CVI of items > 0.78 and average total CVI of > 0.90 were considered excellent. The variables were categorized to perform the exact test of binomial distribution for small samples, considering a significance level of 5% and a proportion of 0.80 of agreement to estimate CVI statistical reliability.

This study was approved by the Ethics Committee of the *Universidade Estadual do Ceará*, under Opinion 4,534,477/2021 and CAAE (*Certificado de Apresentação para Apreciação Ética* - Certificate of Presentation for Ethical Consideration) 37754720.4.0000.5534, and was carried out according to Resolution 466/2012 of the Brazilian National Health Council (*Conselho Nacional de Saúde*).[28]

Results

Of the 1,397 studies initially identified, after removing the duplicates, reading the titles and abstracts and reading in full, 89 studies resulted, with distinct populations over a wide geographic range. The detailed description of such studies and results will be available in a specific publication linked to the same protocol registered in the Open Science Framework.

Initially, 22 markers emerged, grouped within the dimensions and subdimensions of the health

vulnerability model. Some elements of such dimensions were not included in the articles, as the included studies did not investigate certain variables. Some markers found drove the addition of new elements to the model. After elucidating the dimensions, subdimensions and markers, the constitutive and operational definitions were elaborated. The theoretical model of vulnerability to initial physical inactivity had 02 dimensions, 13 subdimensions, 42 markers and 152 operational definitions.

Soon after, the content validation of these elements began. Of the 25 experts invited, 20 accepted to participate in the study and 13 responded to the instrument within the requested time. Thus, content analysis was carried out by 13 experts, health professionals with proven professional performance, researchers with publications on the subject, including physical education professionals and nurses, from seven Brazilian states (Ceará, Pernambuco, Piauí, Bahia, Amazonas, Santa Catarina and Rio de Janeiro).

As for dimensionality, some suggestions were analyzed and met, such as the recommendation to replace terms and expressions. As for markers, the main suggestions indicated that the initial markers health-disease situation, physical and functional limitation, and nutritional status should be grouped into a single marker that expressed individuals' general health status. The grouping of mental health and self-esteem markers was also suggested, with the replacement of the term for a marker that represented the psychological state and also the relocation of interpersonal violence and discrimination in the interpersonal relationships subdimension. It was then suggested the inclusion of sex, ethnicity and cultural formation markers. As CVI was < 0.80, three markers were excluded (marital status, cultural connection and cultural differences), in addition to 03 constitutive definitions and 19 operational definitions.

After making the changes, according to Table 1, the subject dimension encompassed 20 markers in four subdimensions. Dimensions and markers with CVI > 0.80 remained in the model.

Table 2 presents the social dimension, which encompassed 20 markers in eight subdimensions. Dimensions and markers with CVI > 0.80 remained in the model. The subject and social dimensions were validated with CVI 0.98.

Table 1. Judges' agreement in validating the constitutive and operational definitions of subject dimension markers

Subject				
Markers	Constitutive definition CVI	p-value*	Operational definition CVI	p-value*
Physical situation	1.0	0.055	0.90	0.055
Age	1.0	0.055	1.0	0.055
Sex	0.84	0.502	0.84	0.502
Race/skin color	1.0	0.055	0.92	0.234
Health status	1.0	0.055	0.91	0.234
Physical aptitude	0.92	0.234	0.84	0.502
Psycho-emotional situation	0.92	0.234	0.92	0.234
Beliefs	1.0	0.055	0.87	0.502
Feelings	0.92	0.234	0.96	0.055
Psychological state	1.0	0.055	0.94	0.055
Self-perceived health	0.92	0.234	0.92	0.234
Self-efficacy	0.92	0.234	0.96	0.234
Motivation	0.92	0.234	0.93	0.234
Sense of control	0.92	0.234	0.92	0.234
Behavior	1.0	0.055	0.90	0.055
Attitude	0.92	0.234	0.97	0.234
Routine	0.92	0.234	0.92	0.502
Previous experiences	0.92	0.234	0.90	0.234
Lifestyle	0.84	0.502	0.84	0.055
Functional literacy	1.0	0.055	0.91	0.055
Cognition	1.0	0.055	0.96	0.055
Learning	1.0	0.055	0.84	0.502
Knowledge	1.0	0.055	0.88	0.234
Education	1.0	0.055	0.88	0.502

CVI - Content Validity Index; * p >0.05 by the binomial test for one sample

In the end, the product of the dimensions, subdimensions and markers of vulnerability to physical inactivity was presented as follows: two interrelated dimensions, subject and social, being the subject dimension with 20 markers distributed in four subdimensions and the social dimension with 20 markers in eight subdimensions (Chart 1). The constitutive definitions of dimensions, subdimensions and essential elements/markers, as well as the 133 operational definitions are presented in Appendix 2.

Discussion

In the different fields of knowledge and in the different applications in life sciences, vulnerability is a notion in permanent construction. In this way, the polysemy of its concept is a challenge that encourages dialogue and the conception of new conceptual

Table 2. Judges' agreement in validating constitutive and operational definitions of social dimension markers

Social				
Markers	**Constitutive definition CVI**	**p-value***	**Operational definition CVI**	**p-value***
Interpersonal relationships	1.0	0.055	0.94	0.055
Social support	1.0	0.055	0.89	0.234
Family structure and dynamics	1.0	0.055	1.0	0.055
Interpersonal violence	1.0	0.055	0.92	0.234
Discrimination	0.92	0.234	0.92	0.234
Sociodemographic profile	0.92	0.234	0.94	0.234
Migration	0.84	0.502	0.84	0.502
Ethnicity	1.0	0.055	1.0	0.055
Sex	1.0	0.055	1.0	0.055
Socioeconomic context	1.0	0.055	0.93	0.055
Material resources and housing	0.92	0.234	0.96	0.055
Income	1.0	0.055	0.92	0.055
Social class	1.0	0.055	0.92	0.234
Work	1.0	0.055	0.94	0.055
Environment	1.0	0.055	0.94	0.055
Climate	0.84	0.502	0.84	0.502
Safety	1.0	0.055	1.0	0.055
Environmental structure	1.0	0.055	0.96	0.055
Active structure	1.0	0.055	1.0	0.055
Attractiveness	1.0	0.055	0.94	0.055
Culture	1.0	0.055	0.92	0.234
Cultural formation	1.0	0.234	0.92	0.234
Policies	1.0	0.055	0.92	0.055
Public policies to promote physical activity/body practices	1.0	0.055	0.92	0.055
Institutional context	1.0	0.055	0.92	0.234
Actions to promote physical activity	1.0	0.055	0.92	0.234
Fundamental rights	0.92	0.234	0.90	0.234
Access to individual and collective rights	0.92	0.234	0.90	0.234

CVI - Content Validity Index; *p > 0.05 by binomial test for one sample

Chart 1. Theoretical dimensionality and subdimensionality and constitutive elements (markers) of the Vulnerability to Physical Inactivity Construct afte rcontent validation with experts

Vulnerability to physical inactivity		
Dimensions	**Subdimensions**	**Constituent elements (Markers)**
Subject	Physical situation	Age. Sex. Race/skin color. Health status. Physical aptitude.
	Psycho-emotional situation.	Beliefs. Feelings. Psychological state. Self-perceived health. Self-efficacy. Motivation. Sense of control.
	Behavior	Attitude. Routine. Previous experiences. Lifestyle.
	Functional literacy	Cognition. Learning. Knowledge. Education.
Social	Interpersonal relationships	Social support. Structure. Family dynamics. Interpersonal violence. Discrimination.
	Sociodemographic profile	Migration. Ethnicity. Sex.
	Socioeconomic context	Material resources and housing. Income. Social class. Work.
	Environment	Climate. Safety. Environmental structure. Active structure. Attractiveness.
	Policies	Public policies to promote physical activity/body practices.
	Institutional context	Actions to promote physical activity.
	Culture	Cultural formation.
	Fundamental rights	Access to individual and collective rights

ramifications to assist in the understanding of the complex health-disease-care process of populations.[29,30] In general, the concept of vulnerability is related to greater or lesser availability of resources, possibilities of choices, social justice and other factors of an individual, collective and contextual nature.[22, 31]

In the context of physical inactivity, vulnerability analysis makes it possible to broaden the understanding of the phenomenon as a result of the intertwining of subjects' behavior and experiences with their subjectivities, social, cultural and political conditions allied to actions that promote physical activity for health. Thus, physical activity interventions can be more effective and comprehensive, by strengthening the positive influences of the various components of the dimensions and subdimensions of vulnerability to physical inactivity.

This is a conceptual model, which considers the determinants of physical activity, but is not restricted to probabilities, by proposing the perspective of a conceptual basis that analyzes the interaction between the dimensions involved, pointing out indicators of weaknesses, health inequities and inequalities social,[22] providing, in addition to indicators of interventions, a programmatic framework for militancy related to the promotion of physical activity for the population's health.

Studying health issues from the perspective of vulnerability involves the search for a way to better understand and understand the health-disease process.[6,10] Analyzing physical inactivity and its aggravations from the dimension of vulnerability makes it possible to analyze social inequalities, which place certain population groups at a disadvantage in terms of chances of having an active lifestyle, because, ddeprived of resources to guide a genuine choice, subjects are not always to blame for their physical inactivity.[19]

The pandemic situation that is currently plaguing the world has emphasized how much the social inequality of populations has an impact on limiting the possibilities of practicing physical activities. Most people who continued to practice physical ac-

tivity during leisure time had more opportunities and had a higher level of education. In this way, we propose the discussion of sociocultural aspects and a humanized and attentive look at social inequalities to promote equal physical activities.[32]

The elucidation of markers of vulnerability to physical inactivity and their definitions were based on knowledge from the compilation of national and international studies, which investigated the phenomenon of physical inactivity in adults from several countries, in the light of a two-dimensional conceptual model, developed from conceptual clarification, similarity analysis and critical reflection on the ideas of Michel Foucault and Judith Butler on the social-subject.[5] These definitions were complemented by the knowledge of expert researchers, working in different regions of Brazil, who generated evidence of content validity, to enable a representative instrument of the latent trait, with comprehensive aspects and language, and considering the Brazilian cultural diversity. We chose to use the term markers with the possibility of denoting a fixed condition, but also situational and subject to transformation.

The validation process is relevant, as it is an estimate (judgment) as to the congruence between the latent trait and its physical representation. It refers to a measure based on the assessment of topics, subjects and content covered in the items, in the case of instrument construction.[26]

The results from the validation of the constitutive and operational definitions of the essential elements of vulnerability to physical inactivity showed satisfactory and reliable CVI. It is noteworthy that such elements are dynamic and interrelated, which allows the production of new configurations and incorporation of new elements, evidencing the power relations identified in subjects' vulnerability and in social vulnerability.

The findings of this study can helpto better understand and apply the nursing diagnosis Sedentary lifestyle, included in NANDA – international in 2004,[33] with possibilities for improvement, review and accurate identification of its indicators and nomenclatures,[34] for better diagnostic accuracy and development of strategies for patient care and promotion of physical activity for health. Moreover, in light of the International Classification for Nursing Practice (ICNP®),[35] it can contribute to the elaboration of other statements of nursing diagnoses and interventions that seek to develop care based on scientific knowledge and according to patients' needs, with the practice of regular physical activities being one of these needs.

It is known that several terms related to exercise are linked to different ICNP axes, such as adherence to exercise regime (diagnoses/outcomes), non adherence to exercise regime (diagnoses/outcpmes), lack of knowledge about exercise (diagnoses/outcomes), exercise promoting (interventions), etc. However, specific terms of physical activity/physical inactivity still need to be worked out. In addition to this theoretical contribution to the new construction evidenced here, nurses can identify existing terms that are close to what has been validated and build terminological subsets within the perspective of vulnerability.

This study has limitations, such as the restriction of the results to the theoretical aspect, without details about the construction and validation of items that can constitute an instrument for measuring vulnerability to physical inactivity. However, the elucidation of its dimensionality and its constitutive elements provides a substantial theoretical framework to enable the construction of questionnaires that analyze the phenomenon.

Therefore, further studies are suggested to expand the understanding of the phenomenon of physical inactivity in a broader perspective, as well as research oriented towards the development and validation of instruments for its assessment.

Conclusion

The proposed markers presented adequate parameters of validity and can be used to operationalize the measurement of the vulnerability to physical inactivity phenomenon and support the construction of assessment instruments for the diagnosis of the population, the development of care strategies and the confrontation of physical inactivity. Understanding physical

inactivity based on vulnerability allows a reading of reality in its diversity and specificity, thus a condition is conceived that manifests itself in different ways in subjects' vulnerability and in social vulnerability, and coping with it requires inter and multidisciplinary interventions as well as inter and multisectoral.

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Collaborations

Pereira DS, Florêncio RS, Barbosa Filho VC and Moreira TMM participated in design, data analysis and interpretation, article writing, relevant critical review of intellectual content and final approval of the version to be published.

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Appendix 1. Search strategy

1. Standard strategy

ECU MODEL - PCC Strategy

Objective/Problem	What are the predictors and determinants of physical inactivity in adults?		
	P	C	C
Extration	adults	predictors/determinants of physical inactivity	physical activity
Conversion	adult	no descriptor	physical activity
Combination	adult; man; men; woman; women; young adult; middle aged	risk predictors; risk predictor; level predictors; predictors of physical inactivity; predictor of physical inactivity; physical inactivity predictor; physical inactivity predictors; predict physical inactivity; determinant of physical activity; determinant of physical inactivity; predictors of physical activity; predictor of physical activity; physical activity predictor; physical activity predictors; predict physical activity	physical inactivity; physical activity; physical activities; physical exercise; physical exercises
Construction	(adult OR man OR men OR woman OR women OR "young adult" OR "middle aged")	("risk predictors" OR "risk predictor" OR "level predictors" OR "predictors of physical inactivity" OR "predictor of physical inactivity" OR "physical inactivity predictor" OR "physical inactivity predictors" OR "predict physical inactivity" OR "determinant of physical activity" OR "determinant of physical inactivity" OR "predictors of physical activity" OR "predictor of physical activity" OR "physical activity predictor" OR "physical activity predictors" OR "predict physical activity")	("physical inactivity" OR "physical activity" OR "physical activities" OR "physical exercise" OR "physical exercises")
Use	(adult OR man OR men OR woman OR women OR "young adult" OR "middle aged") AND ("risk predictors" OR "risk predictor" OR "level predictors" OR "predictors of physical inactivity" OR "predictor of physical inactivity" OR "physical inactivity predictor" OR "physical inactivity predictors" OR "predict physical inactivity" OR "determinant of physical activity" OR "determinant of physical inactivity" OR "predictors of physical activity" OR "predictor of physical activity" OR "physical activity predictor" OR "physical activity predictors" OR "predict physical activity") AND ("physical inactivity" OR "physical activity" OR "physical activities" OR "physical exercise" OR "physical exercises")		

2. Alternative strategy

("risk predictors" OR "risk predictor" OR "level predictors" OR predictors OR predictor OR predict OR determinant OR determinants) AND ("physical inactivity" OR "physical activity" OR "physical activities" OR "physical exercise" OR "physical exercises") AND (adult OR man OR men OR woman OR women OR "Young Adult" OR "middle aged")

3. Grey literature strategies

Google Academic and *Open Grey*

("predictors of physical inactivity" OR "determinants of physical inactivity" OR "predictors of physical activity" OR "determinants of physical activity") AND adults

BDTD

(preditor OR determinante) AND ("inatividade física" OR "atividade física")

Appendix 2. Theoretical dimensionality and subdimensionality and constitutive and operational definitions of the constitutive elements (markers) of vulnerability to physical inactivity

Dimensions	Subdimensions	Constituent elements (markers) (constitutive definition)	Constituent elements (markers) (operational definition)
Subject: Human life constituted from intersubjective relationships in which there is room for the manifestation of freedom in the tension between knowledge and power, enabling the recreation of oneself.	Physical status: Characteristics of subjects in relation to their biological and morphofunctional attributes.	Age: Time (in years, months and days) elapsed from birth to the time of speaking.	Being older than 18 years.
		Sex: A set of biological, functional and structural characteristics according to which the human being is classified as male or female.	Being female (physical inactivity during leisure time).
		Race/skin color: Physical characteristics that are considered socially significant, such as white, black, indigenous, yellow, brown and other body and facial features.	Being indigenous or being black, brown or yellow (physical inactivity at leisure).
		Health status: Characteristics related to the current health condition, contemplating the health-disease process, within the scope of signs and symptoms, physical and functional aspects of the body, diagnosis, comorbidities, treatment and prognosis.	Presenting chronic conditions such as hypertension, diabetes mellitus, heart disease, autoimmune disease, obesity, peripheral and autonomic neuropathy (numbness/pain), chronic musculoskeletal conditions, endocrine disorders, asthma, bronchitis. Presenting sleep disorders and disorders. Presenting a higher frequency of hospital admissions, medical consultations and other health services. Being overweight, indicated by a higher body mass index, high waist circumference or high fat percentage. Underweight or malnourished status indicated by lower body mass index, low waist circumference, or compromised lean body mass. Presenting fatigue, lack of energy and/or physical malaise. Presenting difficulty in performing basic and instrumental activities of daily living. Occurrence of injury due to trauma, injuries or accidents. Presence and intensity of body pain, joint stiffness and/or severe sarcopenia. Having amputations or physical-motor disability of the lower or upper limbs. Impaired vision or hearing.
		Physical aptitude: Condition of performing physical activities, and includes components associated with motor performance and health status.	Presenting low physical fitness related to performance (components that contribute to better performance in the practice of physical activities – balance, agility, speed, reaction time). Presenting low health-related physical fitness (components that enable more energy for the practice of physical activities – cardiorespiratory resistance, muscle strength/endurance, body composition, flexibility).
	Psychoemotional situation: Condition of subjective experience in a specific context that involves mental health in general, including from feelings, self-esteem, beliefs, values, perceptions, sense of control to motivational aspects.	Beliefs: Formed opinion or conviction about what is considered true, i.e., believing in the truth or the possibility of something.	Discredit on the benefits of physical activities for health at levels of prevention, protection, promotion and rehabilitation. Discredit on the results of the practice of physical activities in weight loss or strength gain and muscle mass. Belief in greater disadvantages with the practice of physical activities. Having low expectation of results with the practice of physical activities. Disbelief that physical inactivity can cause negative changes in health.
		Feelings: Action of feeling or reactions that the human being expresses in the face of experienced events, positive or negative.	Feeling afraid of being hurt/injured while practicing physical activities. Not feeling affection or pleasure in the practice of walking, sports or other physical activities. Not feeling cheerful/happy while practicing physical activities. Not feeling satisfied after practicing physical activities. Presenting excessive shyness or introspection when starting the practice of physical activities. Feeling body shame or concern about appearance while practicing physical activities. Feeling too old or unsuitable for physical activity.
		Psychological state: Characteristics related to phenomena that occur in the mental and behavioral scope of an individual.	Presenting symptoms of depression. Present with symptoms of anxiety or other psychological disorders. Feeling uncomfortable/distress related to the physical sensations of exercise (tachycardia, sweating, shortness of breath, dizziness, tightness in the chest, nervousness, lack of concentration). Presenting high levels of stress or greater exposure to psychosocial stressors. Presenting dissatisfaction with self-image. Present low self-confidence in personal presentation. Having a perspective of pessimistic, negative or unhappy life.
		Self-perceived health: Personal assessment, based on subjective and objective aspects, through which subjects attribute meanings to their state, sensation and feelings in relation to their own health.	Presenting negative self-rated health.
		Self-efficacy: A person's level of confidence in the ability to perform a given action overcoming barriers of various natures, such as unfavorable environmental, physical, emotional and/or circumstantial conditions.	Not feeling able to exercise in the presence of negative circumstantial conditions (such as lack of time, lack of support, under pressure). Not feeling able to perform exercises in the presence of negative emotional states (such as worry, depressed mood, nervousness, bad mood, fear and shame). Not feeling able to exercise in the presence of contrary environmental conditions (such as unfavorable climate, inadequate environmental structure and lack of safety). Not feeling able to perform exercises in the presence of unfavorable physical sensations (such as tiredness, pain and discomfort).
		Motivation: It concerns the impulse, of an internal or external nature to individuals, that leads them to initiate and maintain a certain action or behavior.	Presenting low desire to be physically active. Presenting lack of interest, will or intention to practice any physical activity. Feeling discouraged or discouraged for physical activity. Feeling lazy to practice physical activities. Identifying few reasons for exercising and other physical activities (health, aesthetic, performance/physical conditioning, social and reward reasons).
		Sense of control: Expectation or belief in the ability and personal control for behavioral regulation in order to achieve a certain goal.	Presenting little ability to change behaviorally. Presenting low perception of autonomy to engage in the practice of physical activities. Presenting low perception of self-control to engage and remain in the practice of physical activities. Admitting the highest probability of discontinuation/discontinuity of practice over time.

Continue...

Continuation.

Dimensions	Subdimensions	Constituent elements (markers) (constitutive definition)	Constituent elements (markers) (operational definition)
	Behavior: Procedure or set of actions of subjects related to their social environment or feelings and personal needs.	Attitude: Conduct or inner predisposition, learned or acquired, to issue judgment and respond consistently to a social scene.	Presenting negative instrumental attitude towards the practice of physical activities (consider as harmful, useless, foolish activity). Presenting negative affective attitude towards the practice of physical activities (consider as boring, unpleasant, stressful activity). Presenting an attitude of resignation in situations and circumstances harmful to health and quality of life.
		Routine: Sequence of procedures or systematic way in which the activities are carried out on a daily life.	Experiencing daily routine with restrictions of leisure time or free time (not having time off work, etc.). Presenting density of daily activities that results in the need for rest in free time (extensive study day, high working hours/heavy physical work, greater occupation in household tasks, longer active/passive commuting time) (leisure-time physical inactivity). Greater occupation in household chores (physical inactivity during leisure time). Longer locomotion/active displacement time (leisure-time physical inactivity). Longer time of heavy physical work (physical inactivity during leisure time).
		Previous experiences: Experiences of certain practices in the previous stage of their life cycle, including the period of childhood, adolescence or adultlife.	Not having a history of participation in exercises and other physical activities in the past. Not having experience of participation in recreational/competitive sport at the time of childhood or adolescence. No participation in practical physical education classes in childhood and youth. Occurrence of injury or other negative experiences during the practice of physical activities in the past.
		Lifestyle: Way of living that characterizes subjects, involving the adoption of attitudes and behaviors related to health.	Not presenting preventive behavior regarding the modifiable negative factors of lifestyle (smoking, alcohol, illicit drugs, stress, inadequate diet, social isolation, sedentary lifestyle, insufficient sleep, intense and repetitive efforts).
	Functional literacy: Knowledge and competencies of subjects to access, understand, apply and assess the information, making judgments and making decisions, incorporated by cognitive means, learning, knowledge and even level of education.	Cognition: Mental function or capacity required to acquire knowledge, processing and seizure of information, reading, perception, recall, thinking and problem-solving.	Presenting intellectual disability. Presenting a decrease in cognition (lack of understanding of reality, difficulty in the elaboration of information and its practical application, forgetfulness) in specific contexts.
		Learning: Process of acquiring new skills and information related to various aspects.	Presenting learning difficulties that can interfere in the practice of physical activities.
		Knowledge: Set of information stored through subjects' reason or experience.	Lack of information and guidance on the modalities of physical activities. Lack of knowledge about benefits of regular physical activity and the risks of physical inactivity for health.
		Education: Period of education, cycle of studies or learning of subjects in school environment.	Having a low level of education or lower level of education (physical inactivity during leisure time). Higher education/education (physical inactivity at work).
Social: Scene of appearance of subjects tensioned by different elements that shape expression, being, (self) recognition, and forms of interaction with other subjects.	Interpersonal relationships: Interactions or associations between subjects who communicate, in a movement of responses to certain forms of power in the context of friendship, work, community, family, affective-sexual or other configurations.	Social support: Interpersonal relationships in which it is perceived the availability of diverse resources to a subject through behavioral, psychological and social interactions between family members, friends, co-workers and professionals, in a context of social support.	Low frequency with which friends, colleagues and/or family members invite, encourage, accompany or offer help in the practice of physical activities. Having reduced social circle. Lack of support/guidance from health or physical education professionals regarding the practice of physical activities for health.
		Family structure and dynamics: Contexts experienced by a family regarding the composition, organization, and attributes of members, and their behavioral, social and psychological interactions in a relationship of care and care.	Responsibility to family members who require specific care, such as frail older adults and/or young children. Responsibility with a family member who has some disability, or behavioral, psychological, health, communication, learning or social functioning difficulties. Experiencing conflicting family relationships (neglect, abuse, mistrust, hostility, disqualification, rejection). Extended family, with a high proportion of residents in the household.
		Interpersonal violence: Conduct that involves the intentional use of physical force, abuse or mistreatment against a person or against a group, aiming to hurt, label, increase the feeling of helplessness, cause emotional harm or kill.	Experiencing situations of physical violence, such as aggression, punching, kicking, or using artifacts to injure, in everyday events. Experiencing situations of verbal violence, such as offensive verbalization with screams, swearing and similar in daily events. Experiencing situations of psychological violence, such as intimidation, abuse, bullying, harassment and the like, in daily events.
		Discrimination: Unfair and unfounded conduct or action based on prejudice that distinguishes a person or group from others in a pejorative way.	Experiencing situations of ethnic-racial discrimination (racism) in a family environment, at work, in commerce, in places of leisure or physical activity. Experiencing situations of religious discrimination in a family environment, at work, in commerce, in places of leisure or practice of physical activities. Experiencing situations of discrimination arising from sex and sexuality issues, such as machismo or prejudice in relation to motherhood, sexuality, sexual orientation or sex identities, in a family environment, at work, in commerce, in places of leisure or practice of physical activities. Experiencing situations of discrimination resulting from physical appearance or from some disease or physical and intellectual disability in a family environment, at work, in commerce, in places of leisure or practice of physical activities.

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Continuation.

Dimensions	Subdimensions	Constituent elements (markers) (constitutive definition)	Constituent elements (markers) (operational definition)
	Sociodemographic profile: Characteristics of a social group, living in a certain territory, including its dynamics and movement in this space.	Migration: Displacement or movement (temporary or permanent) of people within a geographical space.	Being an immigrant or being in a situation of refuge. Experiencing barriers of social integration after immigration, such as lack of welcome for themselves and the family. Adopting habits and customs different from the country of origin that cause health impairment.
		Ethnicity: Group characterized by the same origin and cultural and linguistic affinities.	Belonging to ethnic minority groups.
		Sex: Socially constructed identity category, which does not result exclusively from biological sex, but from social constructions linked to sex, constituting a performative and intentional gesture that produces meanings.	Experiencing inequalities generated by the social roles attributed to men and women. Experiencing sex inequalities that involve the subjective identities of men and women.
	Socioeconomic context: A set of sociological, economic, educational and labor characteristics that qualifies a subject and a specific group as the family, within a social hierarchy.	Material resources and housing: Tangible goods and everything that has concrete form and some utility, which can satisfy a need, including housing, which can be materialized as home or residence.	Deprivation of resources and various material assets. Deprivation of material resources that enable the practice of regular physical activity (appropriate clothing and footwear, bicycle and/or home training equipment such as shin guards, weights, straps, etc.) Low quality of housing (precariousness, small number of rooms), which make it impossible to develop physical activities inside. No fixed residence. Possession of motor vehicle (car/motorcycle) (physical inactivity on travel).
		Income: Source of money or remuneration received after working period, provision of services or inclusion in social programs.	Low family income. Financial problems caused by the inability to generate income or allocation of finances for health treatment. Income from receiving sickness benefits or welfare/social benefit subsidies from the government.
		Social class: Classification that characterizes a group of people with similar attributes from the behavioral, economic and ideological representation point of view of the world, in a hierarchical relationship with other groups.	Being in poverty. Having low purchasing power. Falling into low social class. Higher family wealth and high socioeconomic status (physical inactivity in commuting, work and domestic activities).
		Work: A set of activities in which the human beings employ their intellectual or physical strength to produce means of sustenance.	Unemployment. Informal occupation. Experiencing unsafe, unhealthy and/or precarious work context.
	Environment: Social and physical space (natural and built), existing and perceived, where people and other living beings live and interact.	Climate: Different atmospheric conditions that are repeated and succeed throughout the year in a given region, consisting of elements such as temperature, humidity, winds, air pressure, rain, snow and hail.	Presenting high potential for exposure to adverse climatic factors, such as rainfall incidence, very hot or very cold temperature, absent or insufficient natural ventilation, or other elements.
		Safety: Condition related to the feeling that one is away from risks, losses and damages, in the surroundings of the community environment and spaces for the practice of physical activities, in relation to traffic, crime, violence, disorders, incivilities and dangers from the neighborhood and from loose animals.	The neighborhood where they live and the surroundings do not have traffic regulations that facilitate walking/crossing streets with heavy traffic, such as traffic lights, crosswalks, footbridges, speed limit signs and radar/speed reducer. The neighborhood where they live and the surroundings have a high occurrence of violence and crimes, such as fights, homicides, robberies, kidnappings and/or drug trafficking. In the neighborhood where they live and in the surroundings, it is possible to notice the presence of disorders and incivilities that cause insecurity and fear in the neighborhood, such as abandoned cars on the streets, unoccupied houses, vandals, smokers, drunks and drug users in open places, loose animals. Absence/insufficiency of public safety in the neighborhood, nearby and in places of practice of physical activities. Lack of safety for walking, cycling or visiting squares and parks during the day and at night.
		Environmental structure: Structural aspects of the environment, such as city architecture, urban development, transport system, neighborhood characteristics, street connectivity, residential density.	The neighborhood where they live and the surroundings have poorly structured streets with little connectivity (mountainous, sloping, dead-end, without maintenance or without interconnection) (physical inactivity when commuting). The neighborhood where they live and the surroundings have low residential density (number of residences per unit of territory), i.e., few single-storey houses, townhouses, buildings or condominiums in a small area (physical inactivity when commuting). The neighborhood where they live and the surroundings have absent or insufficient lighting at night (physical inactivity during commuting and leisure). The neighborhood where they live and the surroundings have few establishments that provide essential and non-essential services to the community (shopping centers, agencies, markets, offices, health units/posts, banks, restaurants, pharmacies, cinema, religious temples, factories, beauty centers, shopping center, schools and others similar), (physical inactivity in commuting).
		Active structure: Existence and availability of spaces, equipment and facilities, public and private, which provide the practice of physical activities.	Absence/unavailability, in the public sphere, of squares, parks, woods, gardens, lakes, trails, beaches, outdoor gyms or exercise stations in and around the neighborhood where they live. Absence/unavailability, in the public or private sphere, of walking trails, bike paths, soccer fields, gyms/sports or skate courts, in the neighborhood where they live and in the surroundings. Absence/unavailability, in the private sphere, of gyms, fights and dances, swimming pools, clubs, active leisure centers and similar establishments in the neighborhood where they live and the surroundings. Equipment and facilities spaces of physical activity distant from the neighborhood where they live.
		Attractiveness: Aspects of quality, aesthetics and diverse stimuli that can attract people to active environments.	Not seeing other people being active in the neighborhood where they live and in the surroundings of the neighborhood where they live and the surroundings have low aesthetic and contemplative potential (no beauty and architecture, presence of garbage and open sewage, air pollution and graffiti). Lack of maintenance in public facilities and equipment of physical activities. Lack of availability of posters/information boards on the practice of physical activities in public places.

Continue...

Continuation.

Dimensions	Subdimensions	Constituent elements (markers) (constitutive definition)	Constituent elements (markers) (operational definition)
	Policies: Set of initiatives, actions and decisions that organize, direct and manage social situations envisioning communities' well-being.	Public policies to promote physical activity/ body practices: It refers to the set of principles and guidelines and strategic actions developed by public bodies that aim to promote physical activity in the scope of health, sport or leisure, guaranteeing access and democratic participation of the population, at national and local levels.	Lack or insufficient scope of public health, sports and leisure policies involving the practice of physical activities/body practices. Absent, insufficient or inadequate health coverage in the provision of essential and quality services.
	Institutional context: Processes and characteristics of institutions that provide various types of services to the population, especially those related to the practice of physical activities.	Actions to promote physical activity: It refers to initiatives developed by institutions/ entities, which aim to encourage and practice physical exercises for health, recreational or competitive participation in sports, and/or offering other body practices.	Absence or insufficiency of actions to promote physical activities in the work and educational environment. Absence or insufficiency of actions to promote physical activities in the work and educational environment.
	Culture: Manifestations of the organization of a people, their customs, beliefs, behaviors and traditions learned and transformed from generation to generation that, from a common experience, present themselves as the identity of this people.	Cultural formation: Process by which the culture originated and established its elements in a specific group.	Incoherent cultural formation regarding the elements of body culture of movement. Experiencing cultural differences that limit participation in individual and collective physical activities in public places.
	Fundamental rights: Inalienable protective rights guaranteed by the Brazilian Constitution, based on the principle of human dignity.	Access to individual and collective rights: Possibility for subjects to enjoy in a dignified and full manner their rights and guarantees guaranteed by the Brazilian Constitution, including social, economic and cultural rights, and those related to freedom, information and communication.	Lack/absence of access to information, the internet and other media. Missing or inadequate physical accessibility. Lack/absence of access to social, economic and cultural rights, such as health services, social assistance, justice, culture, leisure, lighting, social and symbolic goods, job opportunities. Experiencing violation of fundamental, individual and collective rights.