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Functioning profile of people with persistent back pain based on International Classification of Functioning

Perfil funcional de pessoas com dores persistentes na coluna baseado na Classificação Internacional de Funcionalidade

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ABSTRACT
To outline the functional profiles of individuals with persistent back pain using the International Classification of Functioning, Disability, and Health (ICF). This cross-sectional study employed the Somatic, Cognition, Emotion, Behavior, and Social (SCEBS) method, the Pain Catastrophizing Scale, the Kinesiophobia Scale, and body perception measures. The participants' discourses were analyzed to identify the content related to the ICF. This study included 49 participants with an average age of 25 years. From the discourse analysis, 2,053 citations related to 108 ICF categories were identified. The most frequently identified categories were the lumbar vertebral column (s76002), functions related to emotional aspects (b1522 and b152), self-care (d570), and education (d838). Catastrophizing and kinesiophobia influenced participants' functional profiles. Individuals with persistent back pain experience impairments in body structure and function, limitations in activities and participation, and environmental and personal factors.

Keywords: Back pain. Chronic pain. Disability evaluation.

RESUMO
Traçar o perfil de funcionalidade de pessoas com dores persistentes na coluna por meio da Classificação Internacional de Funcionalidade, Incapacidade e Saúde (CIF). Trata-se de um estudo transversal com aplicação do método SCEBS (*Somatic, Cognition, Emotion, Behavior and Social*), Escala de catastrofização da dor, escala de cinesiofobia e percepção corporal. O discurso dos participantes foi analisado para identificação de conteúdos da CIF. O estudo incluiu 49 participantes com média de 25 anos. A partir do discurso foram identificadas 2.053 citações relacionadas a 108 diferentes categorias da CIF. As categorias mais identificadas foram: segmento vertebral lombar (s76002), funções relacionadas aos aspectos emocionais (b1522 e b152), cuidados da própria saúde (d570) e educação (d838). A catastrofização e cinesiofobia interferiram no perfil de funcionalidade dos participantes. As pessoas com dor persistente na coluna enfrentam prejuízos nas estruturas e funções corporais, limitação nas atividades e participação, fatores ambientais e pessoais.

Palavras-chave: Avaliação da deficiência. Dor crônica. Dor nas costas.

INTRODUCTION

Persistent back pain is one of the most prevalent types of pain worldwide and its impact leads to disabilities, worse perception of quality of life, early retirement, and increased healthcare costs.[1] Moreover, persistent low back pain is the fourth leading cause of disability among individuals aged between 25 and 49 years worldwide.[2]

The persistence of pain implies important changes in a person's life, as it affects emotional, cognitive, and social dimensions in addition to promoting structural changes.3 Such symptoms are related to multiple processing areas and cortical map remodeling, leading to the activation of areas related to affective-cognitive and emotional-behavioral aspects of pain, thus favoring the development of negative beliefs about it. Additionally, this process may lead to changes in attitudes that involve the biopsychosocial aspects of an individual's life, resulting in pain chronification, such as catastrophic thoughts, kinesiophobia, and changes in body perception.[3-5]

In view of this, the use of patient-centered biopsychosocial care models is the key point for the treatment of patients with persistent pain.[6] To aid in understanding such painful condition from a biopsychosocial perspective, the International Classification of Functioning, Disability and Health (ICF) has been used in several studies, allowing the creation of core sets, summarized lists and functionality profiles of this population.[7,8] This is because the ICF allows the operationalization of the health concept and the identification of the functioning profile, facilitating the establishment of priorities in therapeutic management.[9]

Despite advances in the use of ICF in patients with persistent pain, few studies have compared the functional profile and disability based on the presence of catastrophizing (negative thoughts and feelings related to pain) or kinesiophobia (fear of performing movements/reinjury) in this population10. Instead, studies have used the ICF content identification methodology based on routine clinical information.[10,11]

The ICF model is a well-established framework for understanding the functional profiles of patients with persistent pain. This can be useful for setting goals and recording functional data, thereby improving the management of persistent back pain complaints in a biopsychosocial model. However, this model is not often used to categorize health issues and identify differences in functioning profiles when kinesiophobia and catastrophizing are present. Therefore, the present study aimed to outline the functional profile of individuals with persistent back pain using the ICF.

METHODS

This cross-sectional study included people with persistent back pain and was approved by the Ethics Committee on Research with Human Beings of the Center for Health Sciences (CCS) of *Universidade Federal de Pernambuco* (Approval number:4.499.197). All volunteers received information about the research objectives and provided consent to participate in the study by signing a Free and Informed Consent Form (ICF) in electronic format. The study was conducted in accordance with the principles in the Declaration of Helsinki.

This study was conducted at the Laboratory of *Recursos Cinesioterapêuticos e Recursos Terapêuticos Manuais (LACIRTEM*) from September 1, 2020, to August 31, 2021.

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PARTICIPANTS

Convenience sampling was adopted, and volunteers were recruited through online advertisements on social networks such as Facebook and Instagram as well as by sharing the survey form link among potential participants. Sample eligibility was assessed using an electronic questionnaire according to the following inclusion criteria: both men and women aged between 18 and 60 years who reported a complaint of persistent pain in the spine for a minimum period of three months in any segment of the spine.[12]

Exclusion criteria encompassed volunteers with neurological or rheumatological disease; history of spinal tumors, trauma, or surgery; presence of osteoarthritis; metallic implants in the spine; cardiorespiratory diseases; gait aid use; obesity (body mass index ≥ 30); pregnancy; diabetes mellitus; or any type of pain treatment ongoing during the research period.

PROCEDURES AND INSTRUMENTS FOR DATA COLLECTION

To understand the perspective of volunteers with persistent back pain regarding their own functional profiles, a methodology widely published in the literature was used[11,13]. Therefore, the study was divided into two stages.

Stage I - Sample characterization and biopsychosocial aspects of people living with persistent back pain.

Eligible participants answered a self-applicable electronic form via Google Forms, containing questions for sample characterization, assessment of the presence of kinesiophobia and catastrophizing, and body perception. It also asked questions using the SCEBS method (Somatic, Cognition, Emotion, Behavior and Social), a cross-culturally adapted version for the Brazilian population, to identify the participants' functioning profile.

The SCEBS method is one of the few instruments with a biopsychosocial approach developed for patients with pain.[14] This instrument encompasses 51 open-ended questions divided into three groups or dimensions: somatic, psychological, and social. The psychological dimension is subdivided into the following aspects: cognitive, emotional, and behavioral factors.[14] Participants were instructed to respond freely, and no character limits for responses were established.

The presence of kinesiophobia was assessed using the Tampa Scale for Kinesiophobia, which consists of 17 questions that address pain and symptom intensity to predict kinesiophobia.[15,16] The final score ranges from 17 to 68 points, and the higher the score, the greater the degree of kinesiophobia.[17] The result can also be dichotomized into a low kinesiophobia level, with a score ≤ 37 points, or a high level of kinesiophobia, for scores > 37 points.[15,16]

The evaluation of catastrophizing included the Pain Catastrophizing Scale (PCS), developed by Sullivan et al.[18] and validated for the Brazilian context by Sehn et al.[19] It encompasses 13 items in which patients report, through a scale from 0 to 4 points, the degree of feeling or thinking about their pain. The scale comprises three domains: helplessness, four items; magnification, three items; and rumination, six items. The overall score is achieved by the sum of all items, ranging from 0 to 52 points.[19] Furthermore, the result can be categorized into levels: high catastrophizing (30 points or more); intermediate catastrophizing (20-29 points); low catastrophizing (19 points or less).[20]

To assess body perception, the body image drawing test was adapted to an online Google form, in which participants chose the image that best represented them. The images in the body drawings contained figures representing a normal spine as well as spines presenting with changes. In addition, the participants reported whether the pain was predominant on the right, left, or both sides. Images of the body drawings were created based on previous studies.[21,22]

Stage II - Identification of the ICF content in participants' responses

The second step encompasses ICF linkage rules, a method proposed and updated by Cieza et al.[23], to distinguish ICF content from other sources of health information. Initially, significant concepts were identified from participants' responses to the SCEBS method. Then, the possibility of linking significant concepts to at least one ICF category was analyzed. The choice of the ICF category was based on the decision model proposed by Cieza et al.[23] and involved four steps: (i) analysis of whether the significant concept was included in the ICF structure, (ii) identification of the ICF component that encompassed the significant concept (body structures, body functions, activities, participation, and environmental factors), (iii) identification of the related ICF domain (first-level category), and (iv) identification of the second-level category that included the significant concept. When possible, the third-level categories were considered for greater information accuracy.

Moreover, because the ICF does not have categories for personal factors, the list proposed by Geyh et al.[24] was used to code the information for this component.

Two researchers who were previously trained in this method performed all stages of stage II. After finalizing the identification of meaningful concepts and linking them to ICF categories, a consensus meeting was held, and differences were resolved by two researchers with experience in studying the ICF-linking method. Inter-rater agreement was measured by the Kappa coefficient and k values ≥ 0.60 were interpreted as good agreement.[25]

DATA ANALYSIS

Data were tabulated in a Microsoft Excel® spreadsheet and quantitative variables were expressed as median, mean, minimum and maximum values, absolute and relative frequencies.

Regarding the ICF content, the citation frequency of each category was calculated, as well as the relative frequency of the categories by ICF components: body structures (s), body functions (b), activities and participation (d), environmental factors (e), and personal factors (i).

RESULTS

A flowchart of the sample recruitment process is shown in Figure 1. Overall, 96 participants were screened and 60 of them were eligible for the study (39 women), with a mean age of 25.18±7.9 years old.

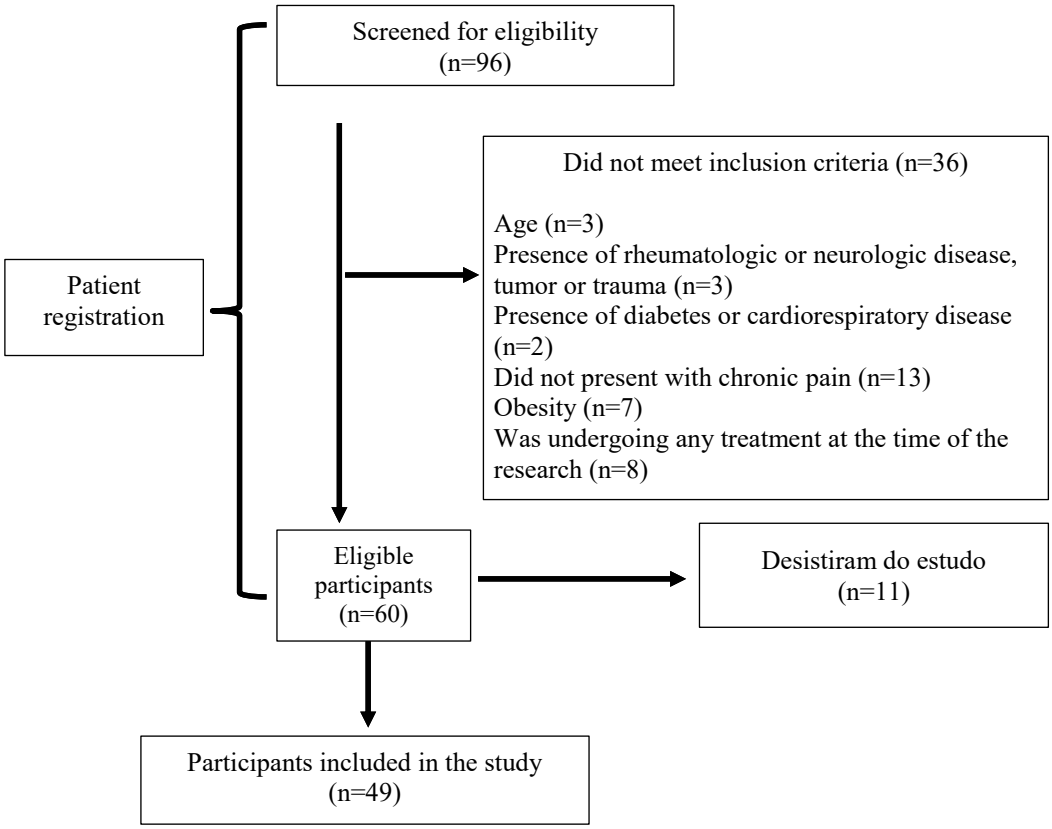

Figure 1. Flowchart of sample recruitment.

Table 1 presents the general characteristics of participants. Most participants (46.9 %) experienced pain in more than one segment of the spine. Among the participants, 18.4% tested positive for COVID-19 and 8.2% reported worsening of pain perception as a result of social isolation.

All participants had kinesiophobia (n = 49) and were divided into low (53.1%) and high (46.9 %) levels. Almost all participants (98%) presented with catastrophizing, of which 45.8%, 29.2%, and 25% were classified as low, moderate, and high degrees, respectively.

Table 1. Sample characteristics

Variables	Participants (n=49)
Age (years) M±SD	25.18±7.9
Sex *n (%)*	
Female	39 (79.6)
Male	10 (20.4)
Weight (kg) M±SD	59.96±14.67
Height (m) M±SD	1.65±0.14
Body mass index (kg/m^2) M±DP	21.57±4.2
Time presenting with back pain (months)	34.39±29.61
Pain region *n (%)*	
Cervical column	3 (6.1)
Thoracic column	8 (16.3)
Lumbar column	14 (28.6)
Sacral column	1 (2)
More than one column region	23 (46.9)
Tested positive for COVID-19 *n (%)*	9 (18.4)
Did the pain get worse during social isolation? *n (%)*	4 (8.2)
Kinesiophobia (TAMPA) M±SD	35.22±6.25
Catastrophizing (B-PCS) M±SD	20.61±10.29
Change in body perception *n (%)*	41(83.7%)

Data were presented as mean ± standard deviation (M±SD) or n (%). Number (n) and body mass index (BMI). B-PCS, Brazilian version of Pain Catastrophizing Scale; TAMPA, Tampa Scale for Kinesiophobia

Figure 2 presents a synthesized overview of the functional profiles of individuals with persistent back pain. Overall, 2.053 citations were linked to 108 different ICF categories, of which 10 were related to body structures, 39 to body functions, 44 to activities and participation, seven to environmental factors, seven to personal factors, and one was related to a health condition not covered by the ICF structure. The inter-rater reliability of the ICF linking process demonstrated good agreement (k = 0.614). Considering ICF components, agreement was good only in component "body function – b" (k = 0.617), being considered regular in components "body structure – s" (k = 0.569), "activity and participation – d" (k = 0.509); and weak in the e (k=0.361) component and personal factors (k=0.357).

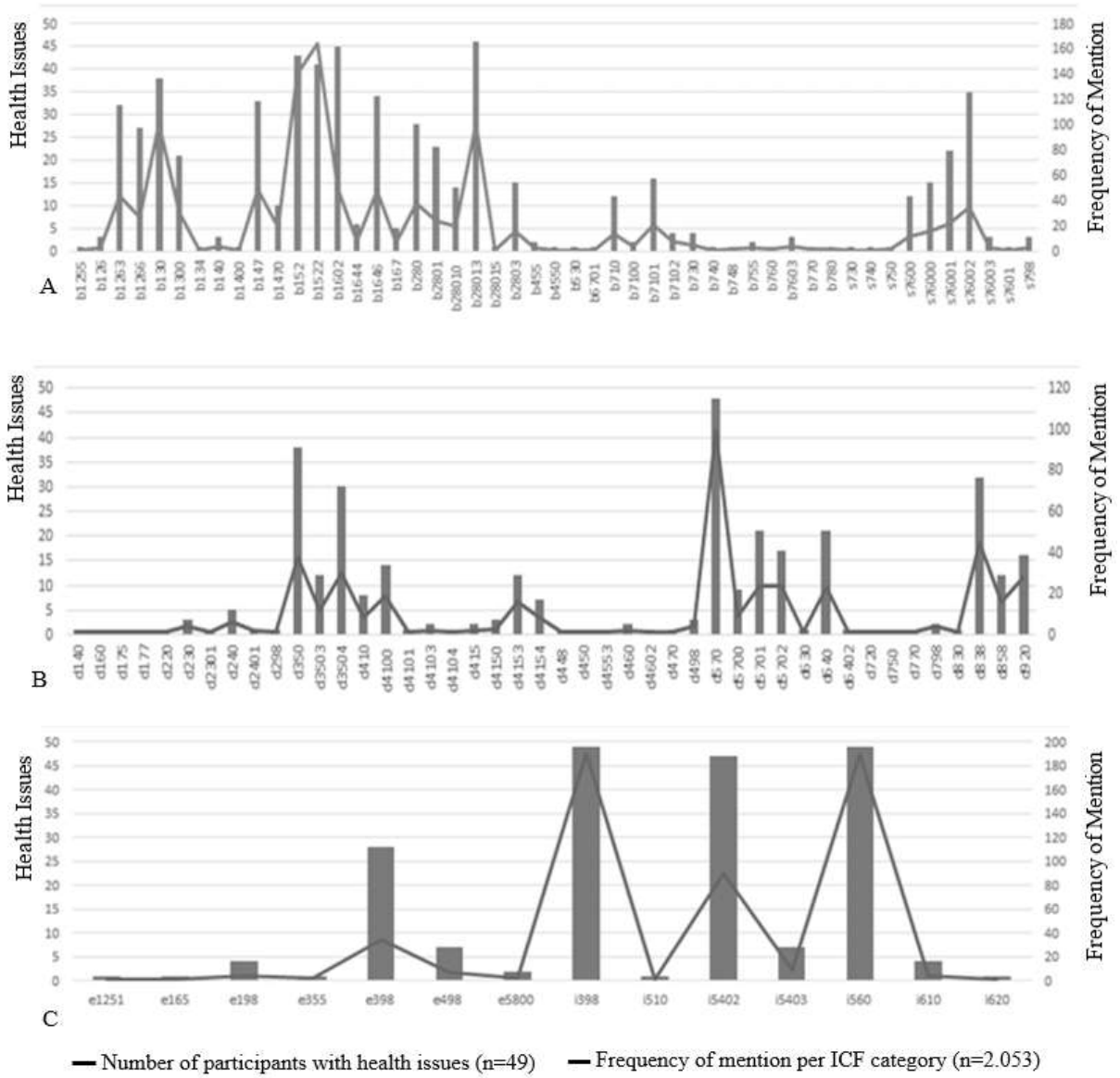

Figure 2. Functioning profile of individuals with persistent back pain (n=49). The columns represent the number of participants with health issues, according to ICF category, while the rows indicate how many times the ICF category was mentioned in participants' discourse. A = Body Functions and Body Structures categories, B = Activity and Participation category, C = Environmental Factors and Personal Factors categories.

Regarding the most cited categories in each component, body function components were mostly linked to vertebral column structures, especially the lumbar vertebral column (s76002), followed by the thoracic vertebral column (s76001) and cervical vertebral column (s76000). The body function categories encompassed emotional issues (b152: emotional function and b1522: range of emotion). The most reported limitations and restrictions in the activities and participation component were related to looking after one's health (d570), education (d838), and conversation (d350), in that order. Furthermore, the majority of the environmental factor categories were related to support and relationships (e398) and attitudes (e498). Finally, the

following personal factors were identified: personal history and biography (i398) and personal evaluation (i560).

Table 2 shows the discrepancies in the citation frequency of the ICF chapters according to the presence of kinesiophobia, catastrophizing, and altered body perception. Participants presenting with high kinesiophobia levels had an increased citation frequency of the body structures component, when compared to participants with low kinesiophobia. The same pattern was observed in body functions "mental functions," as well as in activities and participation "domestic life." In contrast, "self-care" was mostly identified in the participants with low kinesiophobia. Moreover, patients with a low level of catastrophizing demonstrated a higher citation frequency of mental functions when compared to those with other levels. Regarding individuals with alterations in body perception, the body structures component was frequently mentioned.

Table 2. Distribution of citation frequencies of representative ICF chapters related to the functioning profile of individuals with persistent back pain (n=49), according to levels of kinesiophobia (low and high levels), catastrophization (low, intermediate, and high levels), and the presence of body perception change.

ICF Chapter	**Kinesiophobia**		**Catastrophizing**			**Altered body perception**	
	Low level (53.1%)	**High level (46.9%)**	**Low level (45.8%)**	**Intermediate level (29.2%)**	**High level (25%)**	**yes**	**no**
Body Structures							
s7(n=96)	45	51	48	23	24	87	9
Body Functions							
b1(n=698)	330	368	278	223	186	602	96
b2(n=200)	106	94	86	55	54	171	29
b4(n=4)	3	1	3	1	0	2	2
b5(n=1)	0	1	0	1	0	0	1
b6(n=1)	1	0	0	1	0	1	0
b7(n=68)	49	19	36	21	10	48	20
Activity and participation							
d1(n=4)	2	2	2	1	1	4	0
d2(n=15)	6	9	5	4	6	15	0
d3(n=80)	43	37	35	24	19	66	14
d4(n=71)	44	27	40	12	18	62	9
d5(n=156)	91	65	71	45	36	132	24
d6(n=25)	7	18	9	7	9	21	4
d7(n=7)	4	3	1	6	0	6	1
d8(n=62)	26	36	23	17	22	52	10
d9(n=28)	13	15	17	3	8	26	2
Environmental Factors							
e1(n=6)	4	2	4	2	0	5	1
e3(n=36)	23	13	18	12	5	29	7
e4(n=7)	3	4	4	3	0	6	1
e5(n=2)	0	2	1	0	1	2	0
Personal Factors							
i3(n=191)	102	89	86	53	48	163	28
i5(n=290)	150	140	125	81	78	246	44
i6(n=5)	2	3	3	2	0	5	0

ICF chapters listed above: Body Structures: s7–Structures related to movement. **Body Functions**: b1 - Mental functions; b2 - Sensory functions and pain; b4 - Functions of the cardiovascular, hematological, immunological, and respiratory systems; b5 - Functions of the digestive, metabolic, and endocrine systems; b6 - Genitourinary and reproductive functions; b7 - Neuromusculoskeletal and movement-related functions. **Activity and Participation:** d1, Learning and applying knowledge; d2, General tasks and demands; d3, Communication; d4, Mobility; d5, Self-care; d6, Domestic life; d7, Interpersonal interactions and relationships; d8, Major life areas; and d9, Community, social, and civic life. **Environmental Factors:** e1 - Products and technology; e3 - Support and relationships; e4 - Attitudes; e5 - Services, systems, and policies. **Personal Factors:** i3: Personal history and biography; i5: Thoughts and beliefs; i6: Motives.

DISCUSSION

This study identified the most cited domains and categories in the participants' speech. These findings may reflect the functional profiles of patients with persistent back pain, an issue not hitherto addressed in the literature and which can be useful in improving the direction of actions aimed at a biopsychosocial approach.

Individuals are complex systems that interact through multiple factors. The biomedical model has not been sufficient to explain many symptoms and pain conditions, which has led researchers and health professionals to use instruments based on the biopsychosocial model.[14] In this sense, the SCEBS assessment method was developed to be a guide for assessing patients with pain, to facilitate a patient-centered approach based on the biopsychosocial model.[14]

As noted, persistent back pain is a highly disabling condition that causes considerable health damage.[26] This morbidity impacts individuals' lives across various emotional, cognitive, clinical, and even behavioral aspects, as evidenced in the current research, necessitating a comprehensive approach.[26,27]

Regarding the ICF components concerning body structure, greater impairments were found in categories related to the lumbar vertebral column (s76002), thoracic vertebral column (s76001), and cervical vertebral column (s76000). This finding was related to the prevalence of pain in each spinal segment. In addition to being highly prevalent, such symptoms trigger financial impacts, decrease work productivity, and direct health-related expenditures.[15,16]

In turn, the impairment of functions related to emotional aspects (b1522 – range of emotion and b152 – emotional functions) corroborates previous findings. This suggests that beliefs, cognition, fear, anxiety, kinesiophobic behavior, and catastrophizing are associated with increased disability, resulting in a greater perception of pain intensity. On the other hand, positive pain behaviors could be strongly associated with better functional results and better adherence to treatment.[28,29] Thus, psychological impairment reinforces the need for a global assessment, as such factors could contribute to a change in or worsening of pain perception.

Furthermore, activities such as looking after one’s health (d570), education (d838), and conversation (d350) were frequently observed, which may be explained by the fact that persistent pain affects one’s ability to exercise, walk, perform household activities, participate in social activities, and maintain an independent lifestyle.[11,27]

In addition, every person is inserted into a socio-environmental context, and its characteristics may influence pain effects, manifestation and exacerbation.[14] The presence of a

social network, including family, friends, co-workers, and others, also modifies the pain context, as patients with high levels of social support usually report less distress and pain. Thus, environmental conditions should be considered when providing patient support.[29] In this study, the most reported category related to environmental factors was precise support and relationships (e398). The most cited personal factors were personal history, biography (i398), and personal evaluation (i560).

When verifying the citation frequency of the ICF chapters, the results indicated that the answers obtained through the SCEBS method contemplated a biopsychosocial model. Among the responses obtained, statements related to mental functions, self-care, and domestic life were identified, which are not always included in a conventional assessment centered on the biomedical model. In this sense, the present study reinforces the need to carry out assessments that consider not only body structure and functions, including tissue damage and structural abnormalities, but also aspects related to activities and participation levels, with an emphasis on health rather than disease.

Regarding the citation frequency of ICF chapters, chapter b1 (mental functions) was the most cited, indicating that many people with persistent pain have fear, frequent psychological problems, and pain catastrophizing.[4] In addition, chapters i5 (thoughts and beliefs) and b2 (sensory functions and pain) were also frequently identified, indicating that many people with persistent pain have fears, beliefs, and pre-established conceptions, which make the recovery process even more difficult, and such persistence of pain may be related to changes in the cortical map.[30]

Overall, persistent back pain often has poor prognosis and represents a complex biopsychosocial phenomenon in terms of evaluation approaches and treatments. Thus, a biopsychosocial assessment is useful as it provides important information to help health professionals in decision-making for better treatment of patients with musculoskeletal pain.

In this study, all ICF domains were covered and a correlation with the SCEBS method was performed. This study has limitations owing to its small sample size and the adoption of a survey method with many questions, which did not limit the use of its data and information.

CONCLUSION

These findings suggest that individuals with persistent low back experience impairments in body structure and function, limitations in activities and participation, and in environmental and personal factors. This study can contribute to clinical practice as a care

guide, with the awareness that the health needs of individuals with persistent low back pain are diverse and require a broad biopsychosocial model of adequate care.

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