ORIGINAL ARTICLE

# Development of an evaluation instrument for the Pilates method based on the International Classification of Functioning, Disability and Health

## *Desenvolvimento de um instrumento de avaliação para o método Pilates baseado na Classificação Internacional de Funcionalidade, Incapacidade e Saúde*

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**ABSTRACT**

There is a lack of scientific evidence on validated and standardized evaluation instruments applied to Pilates. Given the importance of an individualized and holistic analysis of each patient/client for a better application of the method, it is necessary to build instruments that have a bio-psychosocial approach. **Objective:** To develop an evaluation instrument for Pilates, based on the International Classification of Functioning, Disability and Health (ICF). **Methods:** The research was carried out in four stages. This is a survey of information about the assessment in the Pilates method, association of information with ICF categories, Delphi study, construction of the instrument. The information was obtained through a scoping review and interviews with physical therapists who work with Pilates. For the construction of the instrument, the information obtained was independently linked to the ICF categories by two researchers, and in case of disagreement a third party would judge the most pertinent. Next, a Delphi study was carried out to select the most relevant categories to compose the instrument; finally, the construction of the instrument by three researchers with knowledge about Pilates and ICF. **Results:** The instrument was made up of 49 ICF categories, distributed among 33 questions, being ten of body functions, two of body structures, 16 of activity and participation, and five of environmental factors. **Conclusion:** The study allowed the construction of an instrument that aims to facilitate the understanding of the patient's health status from an evaluation already performed in each service and, at the end, will provide a common language.

**Keywords:** International Classification of Functioning, Disability and Health, Exercise Movement Techniques, Physical Therapy Modalities

**RESUMO**

Há uma escassez em evidências científicas acerca de instrumentos de avaliação validados e padronizados aplicados ao Pilates. Diante da importância de uma análise individualizada e holística de cada paciente/cliente para melhor aplicação do método, faz-se necessário a construção de instrumentos que possuam uma abordagem biopsicossocial. **Objetivo:** Desenvolver um instrumento de avaliação para o Pilates, baseado na da Classificação Internacional de Funcionalidade, Incapacidade e Saúde (CIF). **Métodos:** A pesquisa foi realizada em quatro etapas. Levantamentos de informações sobre a avaliação no método Pilates, associação das informações com categorias da CIF, estudo Delphi, construção do instrumento. As informações foram obtidas por meio de um a scoping review e entrevistas com fisioterapeutas que trabalham com o Pilates, para construção as informações obtidas foram vinculadas com as categorias da CIF por dois pesquisadores de forma independente, em caso de discordância um terceiro julgaria a mais pertinente. Em seguida, foi realizado um estudo Delphi, para selecionar as categorias mais relevantes para compor o instrumento. Por fim, a construção do instrumento por três pesquisadores com conhecimento em Pilates e CIF. **Resultados:** O instrumento foi constituído por 49 categorias da CIF, distribuídas em 33 questões, sendo, 10 de funções do corpo, duas de estruturas do corpo, 16 de atividade e participação e, cinco dos fatores ambientais. **Conclusão:** O estudo possibilitou a construção de um instrumento que visa facilitar a compreensão do estado de saúde do paciente a partir de uma avaliação já realizada em cada serviço e, ao final será proporcionado uma linguagem comum.

**Palavras-chaves:** Classificação Internacional de Funcionalidade, Incapacidade e Saúde, Técnicas de Exercício e de Movimento, Modalidades de Fisioterapia

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## INTRODUCTION

It is notorious that in recent years the Pilates method has been gaining visibility, especially in the context of rehabilitation, since it presents a holistic approach. The correct execution of its six fundamental principles (breathing, center of strength, precision, fluid movements, posture, and concentration),[1,2] aims to reduce pain and disability, improve posture,[3] muscle strength, flexibility, balance,[4] joint mobilization. The method also stimulates blood circulation, proprioception, motor coordination, body awareness, and improves cardiorespiratory capacity, among others.[5,6]

In the Pilates method, the kinetic functional assessment is used as a way to investigate the patient's health condition. However, there is a scarcity of scientific evidence about validated and standardized assessment instruments to be used. There is also a consensual limitation of which aspects are important to describe the subjects' health status, especially about their functionality. Therefore, the need for an instrument with a biopsychosocial approach arises, as a way to guide the assessment, since each care must be individualized and based on the particular conditions of each client/patient, at the same time that this instrument must provide professionals with a universal/standardized technical language, from different assessment tools.

A tool with a biopsychosocial approach is the Classification of Functioning, Disability and Health (ICF) proposed by the World Health Organization (WHO), which aims to fill the gap of the linear model by replacing it with the multidirectional model. It takes into account function, structure, activity, and participation, as well as environmental factors.[7] However, the practical application of the ICF has shown important challenges. The main one is the extension of the classification, with more than 1,400 categories. To address this challenge, it was agreed in the international literature to create strategies to facilitate its use.[8-11]

An assessment instrument for the Pilates method based on the ICF will serve as a tool to guide strategic actions to improve the productivity and efficiency of the interventions. It will help health professionals to identify the dysfunctions and disabilities of the patients through a standard language,[12] since, even with the use of different instruments and evaluation resources, at the end, after the classification, a universal and standardized language would be obtained.

## OBJECTIVE

Therefore, the present study aims at developing an assessment instrument for the Pilates method based on the ICF.

## METHOD

This is a methodological study to develop an assessment instrument for the Pilates method, based on the ICF. The research was conducted in four stages.

(1) Survey of information about assessment in the Pilates method;

(2) Association of the information obtained with ICF categories;

(3) Delphi study;

(4) Construction of the assessment instrument for the Pilates method based on the ICF.

### Survey of information about the evaluation in the Pilates method

This step was carried out through a *scoping review* and open interviews with physical therapists who work with the Pilates method.

To gather information from the literature, a scoping review was conducted, which consists of identifying relevant concepts on a given topic.[13] It was conducted in October 2019 based on the guiding question: What are the variables assessed and instruments used by the physical therapist in the evaluation within the Pilates method?

The search was conducted systematically using the PubMed, SCOPUS and Web of Science databases and the first 100 results of the Google Scholar search engine in order to allow the inclusion of gray literature. The strategy used was the combination of the descriptors "Disability Evaluation" AND Pilates.

The eligibility criteria consisted of studies that approached evaluation in the Pilates method, published in English, Portuguese, or Spanish, with no limit to the date of publication. Reviews, protocols, articles that did not include Pilates as the investigated technique, and those that did not have an abstract available were excluded.

The selection took place in two stages. In the first, titles and abstracts were read and analyzed to identify potentially eligible articles. In the second step, the previously selected articles were read in their entirety to determine which articles met the eligibility criteria.

To gather information about the evaluation in Pilates from the perspective of professionals, a qualitative research was conducted using open interviews as a strategy. A script was prepared with the following central question, "what is evaluated in your Pilates patients?" and, as secondary questions, "how long have you worked with the Pilates method?" and "do you use validated instruments in your evaluation?". The information reported by the professionals was noted and recorded for later content analysis.

To select the number of physical therapists interviewed, the qualitative research criterion was used, called sampling by redundancy or sample saturation, in which the sample size is defined by the suspension of the inclusion of new participants when the data obtained begins to present, in the researcher's evaluation, a certain redundancy or repetition, not being relevant to persist in the collection.[14-16]

### Association of the information obtained with ICF categories

The information obtained in the scoping review and in the open interviews with the physical therapists who work with the Pilates method were tabulated and then content analysis was performed, in which the key points of the interview were extracted, which were associated with the ICF categories of components, body functions, body structures, activity and participation, and environmental factors.

The selection of the categories was carried out by two researchers, independently, who presented as educational criteria: having knowledge in the theoretical and practical

applicability of the ICF, carrying out research on the ICF, being physiotherapists and holding a master's degree. As a way to guarantee the reliability of the results, we followed the recommendations for linking information with ICF categories, proposed by Cieza et al.[17] Subsequently, meetings were held to analyze the selected categories and, in case of doubts, a third evaluator, with the criteria already described, would judge the most adequate.

**Delphi Study**

This is a validation study using the Delphi method. This is defined as a systematized method for judging information, used to obtain consensus among experts on a given theme through successive validation rounds. Some studies have even used Delphi to select ICF categories.[18-21]

The panel of invited specialists, responsible for the content analysis of the proposed instrument, followed the following inclusion criteria: physiotherapist, trained in the Pilates method, and with theoretical and practical knowledge of the ICF. An e mail survey was conducted with 20 judges, who received an invitation letter and a request for the indication of other participants, making use of the "snowball" technique.

The operationalization was carried out in two rounds. In the first round, the instrument was sent to the experts and, after their return, the answers were analyzed. The instrument was revised by the researcher and sent again to the judges with the results of the first round. In the second round, in anonymity, the participants were asked to make a new judgment of their opinions, facing the group's answers, being possible to keep or change them. In the first round, the items with 90% agreement were included, and in the second round, with 100% agreement.

**Construction of the evaluation instrument for the Pilates method based on the ICF**

The ICF categories included in the Delphi study were used to guide the construction of the instrument. The description of each category was used to elaborate the question and the answers were based on the ICF qualifiers, which were considered to be 0- no disability, 1- mild disability, 2- moderate disability, 3- severe disability, and 4- complete disability.

Meetings were held with three researchers with knowledge about Pilates and ICF to analyze the previously prepared questions and answers. After discussion, items were rewritten or kept following the recommendations of each researcher, reaching a consensus of the minimum number of categories selected. The language used was directed to a communication of easy understanding, clear, simple and objective, without allowing doubt in the interpretation.

For statistical analysis, the data were represented by tables prepared in Microsoft Excel® version 2016 software. The data was distributed in absolute and relative frequencies and analyzed by simple percentage distribution. Measures of central tendency were used (mean).

**RESULTS**

Scoping review

For the strategy used 123 articles were found, being 31 in PubMed, 35 in SCOPUS, 35 in Web of Science, and 53 in Google Scholar. After reading the titles and abstracts, 59 articles were considered eligible, and after excluding duplicates, 26 articles went on to the second phase of selection. After reading the full text, 20 articles were included (Figure 1).

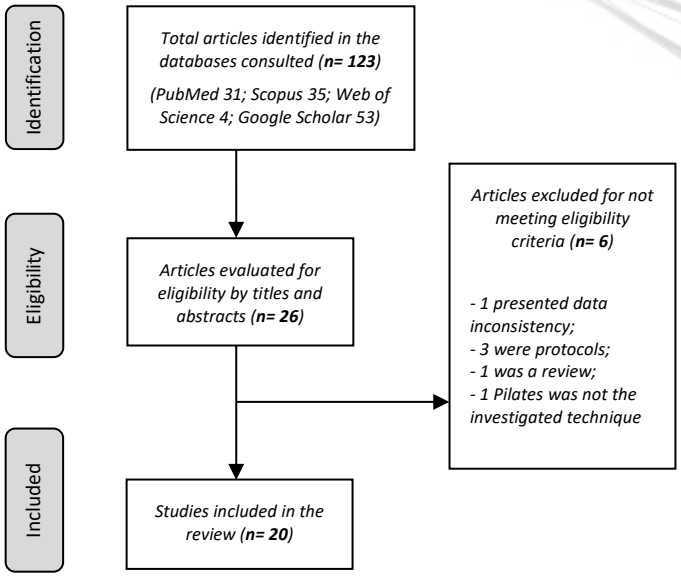


**Figure 1.** Flowchart of the literature search and screening process

Of the 20 articles included, only three did not use Pilates in the context of low back pain rehabilitation.[22-24] They addressed topics such as cervicalgia,[22] shoulder pain[23] and elderly women.[24]

All the articles evaluated the disability or functional capacity of their sample. The second most studied variable was pain, present in 75% of the studies.[2,22,23,25-36] Other aspects analyzed were pain catastrophizing,[2,32] kinesiophobia,[2,26,27,33,34] quality of life[2,37,38] and treatment quality and satisfaction.[2,33]

To assess disability, the most commonly used instruments were the Oswestry Disability Index (ODI)[3,25,28-32,35-37] and the Roland-Morris Disability Questionnaire,[2,25-27,33,34,37,38] to measure pain the Visual Analog Scale (VAS)[23,25,27-30,32,35,36] and the 0 to 10 Pain numerical rating scale (NRS)[2,22,33,34] were the tools of choice.

Other frequent instruments in the articles included here were the Fear-Avoidance Beliefs Questionnaire (FABQ),[32] the Tampa Kinesiophobia scale[2,26,27,33] and versions of the SF-36 quality of life questionnaire[2,37,38] (Chart 1).

Twenty-eight physical therapists who work with the Pilates method were interviewed regarding what is evaluated in their patients. The collection was closed when the information started to repeat itself. The average time working with the Pilates method was 3.875 years, ranging from 11 months to 12 years, and only one physiotherapist used validated evaluation instruments.

The items evaluated by the 28 physical therapists are shown in Table 1. All of them evaluate the patient regarding having some disease, his/her profession, pain, flexibility, posture, use of medication and results of complementary exams. However, items such as the respiratory pattern is analyzed by only one, motor coordination by two and six physiotherapists evaluate the interaction of clients with family and friends and the patient's follow-up by other health professionals.

**Chart 1.** Characterization of the studies included in the Scoping review

| Study | Population | What was studied | Instruments used |
|---|---|---|---|
| Gagnon et al.[29] 2005 | Patients with low back pain | (1) Pain, (2) disability, (3) range of motion of the lumbar spine, (4) CORE strength and stability | (1) VAS, (2) ODI, (3) dual inclinometer technique, (4) stability platform |
| Donzelli et al.[30] 2006 | Chronic nonspecific low back pain | (1) Pain, (2) disability | (1) EVA, (2) ODI |
| Curnow et al.[31] 2009 | Mild chronic low back pain | (1) Disability, (2) pain, (3) load transfer efficiency | (1) ODI, (2) diary on pain frequency, duration and intensity, (3) Stork test |
| Marshall et al.[32] 2013 | Chronic nonspecific low back pain | (1) Pain, (2) disability, (3) pain catastrophizing, (4) catastrophizing beliefs and fear | (1) EVA, (2) ODI, (3) PCS, (4) FABQ |
| Miyamoto et al.[33] 2013 | Chronic nonspecific low back pain | (1) Pain, (2) disability, (3) specific disability, (4) perceived global effects, (5) kinesiophobia, (6) patient's expectation of improvement, (7) credibility of treatment | (1) NRS, (2) Roland-Morris Disability Questionnaire, (3) 0 to 10 Patient-Specific Functional Scale, (4) -5 to +5 Global Perceived Effects Scale, (5) Tampa Scale, (6) 0 to 10 Expected Improvement Scale, (7) Treatment Credibility Scale |
| Luz et al.[34] 2013 | Chronic nonspecific low back pain | (1) Pain, (2) disability, (3) perceived global affect, (4) patient-specific disability, (5) kinesiophobia | (1) NRS, (2) Roland-Morris Disability Questionnaire, (3) -5 to +5 Global Perceived Effect Scale, (4) 0 to 10 Patient-Specific Functional Scale, (5) Tampa scale |
| Notarnicola et al.[37] 2014 | Conical low back pain | (1) Disability, (2) quality of life, (3) perceived ability to perform tasks involving the spine and lower extremity | (1) ODI, Roland-Morris Disability Questionnaire, (2) SF-36, (3) Spinal Functional Sort |
| Dunleavy et al.[22] 2016 | Cervicalgia | (1) Disability, (2) pain, (3) range of motion, (4) postural measures | (1) NDI, (2) NRS, (3) Cervical Range Device (CROM; Performance Attainment Associates Lindstrom, MN, USA) |
| Cruz-Díaz et al.[35] 2016 | Chronic low back pain in postmenopausal women | (1) Pain, (2) disability | (1) EVA, (2) ODI |
| Patti et al.[3] 2016 | Chronic nonspecific low back pain | (1) Posturography measurements, (2) disability | (1) Romberg test using the FreeMed posturography system, including the FreeMed baropodometric platform and FreeStep v.1.0.3 software, (2) ODI |
| Stieglitz et al.[36] 2016 | Chronic low back pain in workers | (1) Pain, (2) disability | (1) EVA, (2) ODI |
| Kofotolis et al.[38] 2016 | Women with chronic low back pain | (1) Quality of life, (2) disability | (1) SF-36v2, (2) Roland-Morris Disability Questionnaire |
| Valenza et al.[25] 2017 | Chronic nonspecific low back pain | (1) Disability, (2) pain, (3) lumbar mobility, (4) flexibility, (5) balance | (1) Roland-Morris Disability Questionnaire and ODI, (2) VAS, (3) modified Shober test, (4) finger on the floor test, (5) single limb stance test |
| Cruz-Díaz et al.[26] 2017 | Chronic low back pain | (1) Disability, (2) pain, (3) kinesiophobia, (4) transverse abdominis muscle activation | (1) Roland-Morris Disability Questionnaire, (2) VAS, (3) Tampa Scale, (4) real-time ultrasound measurements |
| Bertoli et al.[24] 2017 | Older Women | Functional ability | Senior Fitness Test, HR measurements |
| Atılgan et al.[23] 2017 | Shoulder pain | (1) Pain, (2) disability | (1) EVA, (2) SPADI |
| Miyamoto et al.[2] 2018 | Chronic nonspecific low back pain | (1) Pain, (2) disability, (3) perceived global effects, (4) specific disability, (5) catastrophizing, (6) kinesiophobia, (7) quality of life, (8) treatment quality and satisfaction | (1) NRS, (2) Roland-Morris Disability Questionnaire, (3) -5 to +5 Global Perceived Effect Scale, (4) 0 to 10 Patient-Specific Functional Scale, (5) 13-item Pain Catastrophizing Scale, (6) Tampa Scale, (7) SF-6D, (8) Credibility Scale |
| Cruz-Díaz et al.[27] 2018 | Chronic low back pain | (1) Disability, (2) pain, (3) kinesiophobia, (4) transverse abdominis muscle activation | (1) Roland-Morris Disability Questionnaire, (2) VAS, (3) Tampa Scale, (4) real-time ultrasound measurements |
| Mazloum et al.[28] 2018 | Chronic nonspecific low back pain | (1) Pain, (2) disability, (3) range of motion of forward lumbar tilt, (4) measurement of lumbar curvature | (1) VAS, (2) ODI, (3) Modified Schober Test, (4) Goniometer |
| Baillie et al.[39] 2019 | Chronic low back pain | (1) Reported disability | (1) 0 a 10 Patient-Specific Functional Scale |

*VAS: Visual Analog Scale; ODI: Oswestry Disability Index; PCS: Pain Catastrophizing Scale; FABQ: Fear-Avoidance Beliefs Questionnaire; NRS: 0 to 10 Pain Numeric Rating Scale; SF-36: Short Form-36; NDI: Neck Disability Index; SF-36v2: Short-Form 36 Health Survey; HR: heart rate; SPADI: Shoulder Pain and Disability Index; SF-6D: Short-Form 6 Dimensions Questionnaire*

**Table 1.** Items evaluated by 28 physical therapists in the Pilates method

| | AF | RF | Resources used in the evaluation |
|---|---|---|---|
| Presence of disease, disorder or trauma | 28 | 100% | Patient report, complementary examinations, clinical diagnosis |
| Profession | 28 | 100% | Patient Report |
| Pain | 28 | 100% | Visual analogue scale |
| Range of motion | 15 | 53,57% | Goniometer, active and passive movement (subjective form) |
| Flexibility | 28 | 100% | Manual flexibility test and during the execution of stretching exercises |
| Muscle strength | 26 | 92,85% | Manual muscle strength testing and during exercise execution |
| Balance | 10 | 35,71% | Romberg and visualization during care |
| Static postural evaluation | 28 | 100% | Visualization |
| Dynamic postural evaluation | 15 | 53,57% | Movement execution |
| Presence of tension points | 20 | 71,42% | Palpation |
| Main activities that you feel difficulty in performing | 20 | 71,42% | Patient report, during execution of exercises |
| Respiratory pattern | 1 | 3,57% | Visualization and patient reports |
| Motor coordination | 5 | 17,85% | Motor coordination tests and during execution of exercises |
| If you take medication | 28 | 100% | Patient report |
| March | 15 | 53,57% | Visualization |
| Interaction with family and friends | 6 | 21,42% | Patient report and SF-36 |
| Other health professionals | 6 | 21,42% | Patient Report |
| Complementary exams | 28 | 100% | Image Examinations |

*AF: Absolute frequency; RF: Relative frequency in percentage (%)*

The association of the items found in the Scoping Review and in the evaluation of the physical therapists with the ICF categories are shown in Chart 2. The information regarding the Body Functions component was associated with categories from the chapters of mental functions (5 categories), sensory functions and pain (3 categories) and neuro-musculoskeletal and movement-related functions (23 categories); Body Structure to the chapters on nervous system structure (1 category), movement related structures (6 categories); Activity and Participation, to the chapters mobility (22 categories), personal care (7 categories), home life (1 category), interpersonal relationships and interactions (1 category), major areas of life (2 categories), and community, social, and civic life (4 categories); Environmental factors, to the chapters on products and technologies (7 categories), support and relationships (6 categories) and services, systems and policies (1 category); totaling 89 categories.

The content validation was carried out in two stages, initially 20 judges were invited, 14 of whom participated in the first round of Delphi and 13 in the second. Regarding the characterization of the judges, six of them had specializations, seven had master's degrees, and one had a doctorate. The average time of training in the Pilates method was 5.6 years, and the average time of theoretical and practical knowledge in the ICF was 4 years. The data from the judgment of the categories are shown in Chart 3. After the first round of Delphi, 30 categories were kept from the Body Functions component, seven from Body Structures, 28 from Activity and Participation, and eight from environmental factors. Then the items that were included in the first round, but did not have 100% agreement were analyzed again. Then, at the end of the second round with the consensus among the judges, the final version of the selected categories was obtained, with 23 categories of Body Functions, seven of Body Structures, 22 of Activity and Participation, and five of Environmental Factors.

As a way to make the evaluation more didactic and objective, adaptations of the categories obtained in the final version of the Delphi study were made.

In the body functions component, categories related to pain, mobility, stability, and strength were replaced. In activity and participation, categories d420 (transferring one's own position) and d455 (moving around) were excluded, since other questions already contemplated these items, and d450 (walking) was replaced by d4501 (walking long distances).

Thus, the instrument in its final version was constituted by 49 ICF categories, distributed in 33 questions, which approached the four ICF components, being ten of body functions, two of body structures, 16 of activity and participation, and five of environmental factors. Chart 4 represents the questions and their respective categories.

**Chart 2.** Selected Categories for the Evaluation Instrument for the Pilates Method

| Component | Chapter | Category | *Scoping Review* | Interviews |
|---|---|---|---|---|
| **Body functions** | Mental functions | b1267, b1301, b1302, b134, b1522 | Credibility in treatment, Expectation of patient improvement, Oswestry Disability Index, Tampa Scale for kinesiophobia | ----- |
| | Sensory and pain function | b280, b28013, b2351 | Numerical or Visual Pain Scale, Oswestry Disability Index, Fear- Avoidance Beliefs Questionnaire, Tampa Scale for Kinesiophobia, Roland-Morris Disability Questionnaire, Balance | Numerical or visual pain scale |
| | Neuro-musculoskeletal and movement-related functions | b710, b7100, b7101, b715, b7150, b7151, b7152, b720, b7200, b7201, b7202, b7203, b730, b7300, b7301, b7302, b7303, b7305, b7306, b760, b780, b770 | CORE flexibility, strength and stability | Range of motion, Flexibility, Strength, Balance, Dynamic postural assessment, Breathing pattern, Stress points, Motor coordination, Gait |
| **Body structure** | Structure of the nervous system | s120 | ----- | Complementary exams |
| | Structures related to movement | s710, s720, s730, s740, s750, s760 | Static postural evaluation | Static postural evaluation |
| **Activity and Participation** | Mobility | d410, d4100, d4101, d4102, d4103, d4104, d4105, d4107, d415, d4150, d4154, d420, d435, d445, d450, d4500, d4150, d4153, d455, d4551, d4552, d4553 | Oswestry Disability Index, Roland Morris Disability Questionnaire | Activities that the patient finds difficult to perform |
| | Personal care | d510, d520, d5400, d5402, d5403, d550, d570 | Oswestry Disability Index, Roland Morris Disability Questionnaire | ----- |
| | Domestic life | d630 | Roland Morris Disability Questionnaire | ----- |
| | Interpersonal relations and interactions | d7702 | Oswestry Disability Index | ----- |
| | Major areas of life | d8451, d85 | Fear- Avoidance Beliefs Questionnaire | Occupation/work |
| | Community, social and civic life | d910, d920, d9200, d9201 | Oswestry Disability Index, Fear- Avoidance Beliefs Questionnaire, Tampa Scale for Kinesiophobia | ----- |
| **Environmental Factors** | Products and Technologies | e110, e1101, e115, e1151, e120, e1201, e1503 | Roland Morris Disability Questionnaire | Use of medications and walking aids |
| | Support and relationships | e310, e315, e320, e325, e345, e355 | Roland Morris Disability Questionnaire | Interaction with family members and health care professionals and SF-36 |
| | Services, Systems, and Policies | e5800 | ----- | Health services you attend |

**Chart 3.** Versions of the selected categories for the Pilates Assessment Instrument

| Round 1 | Round 2 (final version) |
|---|---|
| **Body functions** | **Body functions** |
| b1301 (motivation) | b1301 (motivation) |
| b134 (sleep functions) | b134 (sleep functions) |
| b1522 (range of emotions) | b2351 (vestibular balance function) |
| b2351 (vestibular balance function) | b280 (pain sensation) |
| b280 (pain sensation) | b28013 (back pain) |
| b28013 (back pain) | b710 (functions related to joint mobility) |
| b710 (functions related to joint mobility) | b7100 (mobility of a single joint) |
| b7100 (mobility of a single joint) | b7101 (mobility of several joints) |
| b7101 (mobility of several joints) | b715 (functions related to joint stability) |
| b715 (functions related to joint stability) | b7151 (stability of multiple joints) |
| b7150 (stability of a single joint) | b7152 (stability of generalized joints) |
| b7151 (stability of multiple joints) | b7200 (scapular mobility) |
| b7152 (stability of generalised joints) | b7201 (mobility of the pelvis) |
| b720 (bone mobility functions) | b730 (functions related to muscle strength) |
| b7200 (scapular mobility) | b7300 (strength of individual muscles and muscle groups) |
| b7201 (mobility of the pelvis) | b7301 (strength of muscles of one limb) |
| b730 (functions related to muscle strength) | b7302 (strength of muscles on one side of the body) |
| b7300 (strength of individual muscles and muscle groups) | b7303 (muscle strength of lower half of body) |
| b7301 (strength of muscles of one limb) | b7305 (strength of muscles in the trunk) |
| b7302 (strength of muscles on one side of the body) | b7306 (strength of all body muscles) |
| b7303 (muscle strength of lower half of body) | b760 (functions related to the control of voluntary movements) |
| b7305 (strength of muscles in the trunk) | b770 (functions related to gait pattern) |
| b7306 (strength of all body muscles) | b780 (sensations related to muscles and movement functions |
| b760 (functions related to the control of voluntary movements) | |
| b770 (functions related to gait pattern) | |
| b780 (sensations related to muscles and movement functions) | |
| **Body structure** | **Body structure** |
| s120 (spinal cord and related structures) | s120 (spinal cord and related structures) |
| s710 (structure of head and neck region) | s710 (structure of head and neck region) |
| s720 (structure of shoulder region) | s720 (structure of shoulder region) |
| s730 (structure of the upper extremity) | s730 (structure of the upper extremity) |
| s740 (structure of pelvic region) | s740 (structure of pelvic region) |
| s750 (lower extremity structure) | s750 (lower extremity structure) |
| s760 (trunk structure) | s760 (trunk structure) |
| **Activity and participation** | **Activity and participation** |
| d410 (change basic body position) | d410 (change basic body position) |
| d4100 (lie down) | d4100 (lie down) |
| d4101 (crouch) | d4101 (crouch) |
| d4102 (kneel) | d4102 (kneel) |
| d4103 (sit down) | d4103 (sit down) |
| d4104 (stand up) | d4104 (stand up) |
| d4105 (bend over) | d4105 (bend over) |
| d415 (maintain body position) | d415 (maintain body position) |
| d4153 (remain seated) | d4153 (remain seated) |
| d4154 (stand) | d4154 (stand) |
| d420 (transfer own position) | d420 (transfer own position) |
| d435 (move objects with lower extremities) | d445 (use hand and arm) |
| d445 (use hand and arm) | d450 (walk) |
| d450 (walk) | d4500 (walking short distances) |
| d4500 (walk short distances) | d455 (move around) |
| d455 (move around) | d4551 (climbing) |
| d4551 (climbing) | d4552 (run) |
| d4552 (run) | d4553 (jumping) |
| d4553 (jumping) | d5400 (dressing) |
| d510 (washing up) | d570 (taking care of own health) |
| d5400 (getting dressed) | d910 (community life) |
| d5402 (putting on shoe) | d920 (recreation and leisure) |
| d550 (eating) | |
| d570 (taking care of own health) | |
| d7702 (sexual intercourse) | |
| d910 (community life) | |
| d920 (recreation and leisure) | |
| d9201 (sports) | |
| **Environmental factors** | **Environmental factors** |
| e1101 (medicines) | e1101 (medicines) |
| e1151 (assistive products and technologies for personal use in daily life) | e120 (products and technologies for mobility and personal transport indoors and outdoors) |
| e120 (products and technologies for personal indoor and outdoor mobility and transportation) | e310 (nuclear family) |
| e1201 (assistive products and technologies for mobility and personal transport indoors and outdoors) | e355 (health professionals) |
| | e5800 (health services) |
| e310 (nuclear family) | |
| e315 (extended family) | |
| e355 (health professionals) | |
| e5800 (health services) | |

**Chart 4.** Assessment instrument for Pilates based on ICF

| Instrument questions | Categories |
|---|---|
| 1. How motivated are you to practice Pilates? | b1301 |
| 2. Do you have trouble sleeping? | b134 |
| 3. How much difficulty did you have to perform the test? *see the test on the instrument | b2351 |
| 4. Do you feel pain in any region? What is the intensity of pain? | b2800, b28010, b28013, b28014, b28015 |
| 5. Do you have any restriction in the range of movement of any joint? What is the intensity? | b7100, b7101 |
| 6. Do you have change in the stability of any joint? What is the intens | b7150, b7151 |
| 7. Do you have a change in muscle strength? What is the intensity? | b7300, b7300, b7300, b7300, b7300 |
| 8. Evaluate the patient's coordination during the execution of the exercises. How much difficulty did he/she have executing the movements? | b760 |
| 9. Does the patient have any alteration in gait? | b770 |
| 10. Does the patient have muscle tension or contraction? | b780 |
| 11. Is there anything compressing the spinal cord or nerves (vertebral dislocation, hematoma, abscess, tumor, hernia)? | s120 |
| 12. Postural evaluation | s710, s720, s730, s740, s750, s760 |
| 13. Ask the patient to perform the movement of lying down and getting up from a stretcher, Cadillac, for example. | d4100 |
| 14. Ask the patient to perform the movement of squatting, report whether the movement was performed with or without support. | d4101 |
| 15. Ask the patient to perform the movement of kneeling. | d4102 |
| 16. Ask the patient to perform the movement of sitting down and getting up from a chair or some structure with a height similar to a chair. | d4103, d4104 |
| 17. How much difficulty does the patient have in remaining seated, such as watching television or working? | d4153 |
| 18. How much difficulty does the patient have standing, for example in a supermarket or bank line? | d4154 |
| 19. Observe during the execution of routine Pilates exercises. | d445 |
| 20. How much difficulty do you have walking less than 1 km? | d4500 |
| 21. How much difficulty do you have to walk more than 1 km? | d4501 |
| 22. How much difficulty do you have to go up and down stairs, curbs? | d4551 |
| 23. How much difficulty do you have to run? | d4552 |
| 24. How much difficulty do you have to jump? | d4553 |
| 25. How much difficulty do you have to dress yourself? | d5400 |
| 26. How much difficulty do you have to take care of your own health, such as following directions from health professionals? | d570 |
| 27. How much difficulty do you have to participate in ceremonies such as weddings, baptisms? | d910 |
| 28. How much difficulty do you have to participate in leisure activities, such as games, movies, restaurants, museums? | d920 |
| 29. Do you use medication? If YES, how much do you consider that helps or hinders your life? | e1101 |
| 30. Do you use technology for mobility and personal transportation indoors and outdoors, such as cane, walker, crutch or wheelchair? If YES, how much do you consider that it helps or hinders your life? | e120 |
| 31. How much do you consider that your family helps or hinders your life? | e310 |
| 32. How much do you consider that health professionals help or hinder your life? | e355 |
| 33. How much do you consider that Pilates helps or hinders your life? | e5800 |

## DISCUSSION

The ICF has been having a major impact on the way data on disability and impairment is conceptualized, collected and treated, by allowing the systematic recording of data regardless of the method used to obtain or access the information.[7] This study falls within this context, by developing an assessment instrument for Pilates based on the ICF, which with its use will favor a common language and a bio-psychosocial approach.

Pilates is an effective tool for the physical therapist in the rehabilitation of different populations and dysfunctions. However, there is a scarcity of studies regarding the evaluation and which are the fundamental points that should be investigated. In this study, 92.85% of the physical therapists reported evaluating muscle strength and 100% evaluated pain, flexibility and posture. Corroborating studies included in the scoping review, which also highlighted these points as essential in the Pilates evaluation, in order to allow the quantification of the patient's functional improvement.[2,22,23,25,26,30-36,39]

However, there are still few reliable reports that address environmental factors and their influence on functionality. In the interviews only six physical therapists reported evaluating the interaction of the individual with his family and friends, and if he is accompanied by other health professionals. In the studies included in the scoping review only one instrument, the Roland-Morris disability questionnaire, was linked to categories of the environmental factors component.

Another point worth mentioning was the predominance of studies on low back pain included in the scoping review. The theme is extremely important, after all low back pain is the leading cause of years lived with disability in the world, with an annual prevalence of 15% to 20% and up to 39% throughout life.[40,41] However, several other conditions can and are treated within the Pilates environment when we look at clinical practice. That is why a biopsychosocial approach is so important, to understand the subject's health far beyond the disease.

In the development of this study, the association of validated tools used in physical therapy clinical practice with corresponding ICF categories was carried out. Cieza et al.[17,42] and collaborators published rules for linking information with ICF categories, as a way to increase the transparency and

reliability of this process. In the current literature, there are several studies that have used this method.[43-47] In one study, we carried out the linking of instruments to assess sleep, cognition, and function with the ICF and were used in patients with stroke.

The sample was composed of twelve patients, who were evaluated by the Pittsburgh Sleep Quality Index (PSQI), Mini Mental State Examination (MMSE) and Barthel Index (BI). In which, 46 categories were recorded, with the most being Body Functions, followed by Activity and Participation. And for a better reliability of this comparison, the inter-rater agreement was calculated for each instrument.[47]

As in this study, most of the categories selected were in the components of body functions and activity and participation, which refers to the linear model of disability as a consequence of the disease, therefore, the importance of a broader approach, with the inclusion of more aspects related to environmental factors, to also identify the influence of this on the subject's functionality.

Another method widely used in the process is the Delphi study, which consists of integrating the evidence collected in preliminary studies. In the case of this study, the interviews with the physical therapists and the scoping review, with the opinion of experts.

The instrument was composed of 33 questions, which addressed the four components of the ICF: ten of body functions, two of body structures, 16 of activity and participation, and five of environmental factors. Unlike the study by Campos[47] the codes obtained for the present study covered only the Body Functions and Activity and Participation components. However, it is essential that the ICF categories be correlated with each other by their different components, corroborating the bio-psychosocial model of health.

The instrument developed will direct the evaluation of physical therapists in Pilates from a consensus of which terms should be considered about functionality and from an evaluation already performed in each service. In addition, it will help in the interpretation and comparison of results based on a common language, which facilitates the application of these tools and communication between different professionals.

Another important point is that an assessment based on the biopsychosocial ICF model aims to provide a broader approach to the subject's health condition. In this way, it facilitates the identification of key points that require intervention and allows a more targeted health promotion action, since the disability may be influenced by social, psychological and environmental factors and not necessarily the result of a health condition.[48]

So far, there is no data in the literature about specific evaluation instruments for Pilates, which prevents direct comparisons with this study.

Regarding the limitations of this study, a necessary point for better standardization would be the association of the scores of the tests and instruments used in the evaluation with the ICF qualification criteria. In addition, it should be applied to a validation sample to identify if the instrument really measures what was established. And, for better reliability of the instrument, it is necessary that other studies be carried out as a way to identify possible flaws.

## CONCLUSION

The proposed instrument is considered innovative and consists of the four ICF components: body functions and structure, activity and participation, and environmental factors. In view of the results, it is possible to characterize items considered important in the evaluation and the need for inclusion of others, still infrequent. In addition, it aims to facilitate the understanding of the patient's health status from an assessment already performed in each service and, at the end, will provide a common language.

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