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Identification of Psychosocial Risk Factors in Working in Confined Spaces: preparation of the questionnaire

Elaboração de Instrumento de Fatores de Risco Psicossocial no Trabalho em Espaços Confinado: elaboração de instrumento

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Abstract

Objective
This study aimed to develop and validate the content of a questionnaire for identifying psychosocial risk factors in the performance of confined spaces workers, since so far there is no questionnaire available to access this context.

Method
This methodological study was developed from a literature review between 2010 and 2019 and semi-structured interviews with 50 workers who work in confined spaces, resulting in items that made up the initial version of the instrument.

Results
Participants in the questionnaire's content validation process were 18 professionals working in confined spaces and 22 expert judges. The workers suggested few changes in 24 items, but they considered all relevant and comprehensive. There were 22 items remained unchanged and six new ones were included, totaling 45 items with a good content validity index.

Conclusion
More robust psychometric analyses are suggested for final validation.

Keywords: Confined spaces; Occupational health; Psychosocial impact; Work; Working conditions.

Resumo

Objetivo

Elaborar e validar o conteúdo de um instrumento para identificação dos fatores de risco psicossocial no trabalho em espaços confinados, considerando que, até o presente momento, não há um questionário disponível para avaliar esse contexto.

Método

Trata-se de um estudo metodológico desenvolvido a partir de revisão de literatura entre 2010 e 2019 e entrevistas semiestruturadas com 50 trabalhadores atuantes em espaços confinados, resultando nos itens que compuseram a versão inicial do instrumento.

Resultados

Participaram da validação de conteúdo 18 profissionais que atuam em espaços confinados e 22 juízes experts. Os trabalhadores sugeriram poucas modificações em 24 itens, considerando-os relevantes e abrangentes. Permaneceram inalterados 22 itens e seis novos foram incluídos, totalizando 45 itens com bons índices de validade de conteúdo.

Conclusão

Análises psicométricas mais robustas são indicadas para as próximas etapas de validação do instrumento.

Palavras-chave: *Espaços confinados; Saúde ocupacional; Impacto psicossocial; Trabalho; Condições de trabalho.*

Working in Confined Spaces (CSs) is among the categories that have received more attention in the contemporary context of worker's health. This type of work covers activities carried out in environments not originally designed for human occupation, with possibly limited means of exit and entry, insufficient oxygenation or without the option of removing contaminants (Ministério do Trabalho e Previdência, 2022a). Confined spaces can also contain high concentration of toxic gases, poor natural ventilation, low visibility and reduced mobility, as is the case with preventive and corrective maintenance activities in pressure vessels, fuel tanks, pipes, culverts and basic sanitation facilities in general. This set of risk factors composes a scenario of vulnerability for these professionals, making it legitimate and necessary to increase scientific knowledge about this work context. More recent reflections in the field of sociology of work have also included on the CS list activities that involve less physical effort, such as telemarketing, expanding the discussion on the effects of work in these scenarios (Beck, 2020) and considering the need to reflect on the context of the Coronavirus Disease 2019 (COVID-19) pandemic and its health problems for workers exposed to risk factors (Nowak et al., 2021; Sinclair et al., 2020).

The various health effects derived from continuous exposure to these spaces have been studied in the literature from different dimensions, such as possible mental health problems (Beck, 2020; Pereira et al., 2020; Vasconcelos & Trentini, 2021), and greater exposure to accidents and long-term repercussions (Rodrigues & Faiad, 2018). The importance of advancing studies on working conditions in different contexts, such as CS activities, is justified by, among other aspects, the high rates of work-related accidents and deaths recorded in Brazil, even considering the advance in legislation on worker health in recent years (Shimizu et al., 2021).

According to an investigation carried out by the Occupational Safety and Health Observatory, Brazil ranks second in terms of mortality at work among the countries that make up the G20, recording eight deaths for every 100,000 jobs between 2002 and 2020 (Observatório de Segurança e Saúde no Trabalho, 2021). In the eight years of this study, 5.6 million illnesses and work accidents were recorded in Brazil, which generated social security expenditure in excess of R$100 billion. In the context of the COVID-19 pandemic, considering only the year 2020, there was a 40% increase in notifications of serious work accidents. Requests for sickness benefits for depression,

anxiety, stress and other mental and behavioral disorders increased 30% (Observatório de Segurança e Saúde no Trabalho, 2021).

Therefore, a more in-depth study of psychosocial risk factors at work emerges not only as a scientific requirement, but also due to the way work has been understood in our society. For CS workers in the Brazilian context, the assessment of psychosocial aspects for the *Atestado de Saúde Ocupacional* (ASO, Occupational Health Certificate) is mandatory, which was guaranteed by the Regulatory Labor Standards (NR 33 and 35) (Ministério da Economia et al., 2019; Ministério do Trabalho e Previdência, 2022a) which state that every worker assigned to CS work must undergo specific examinations for the function they will perform, including the assessment of psychosocial risk factors. However, there is still an important gap in measurement questionnaire capable of contributing to these examinations.

The term 'psychosocial risk factor' refers to the effect of the risk influenced by the worker's personal or subjective characteristics. The assessment of psychosocial risk factors also presupposes the identification of conditions that preceded the risk, even though this relationship is not linear (Zoni & Lucchini, 2012). Currently, there are national (Ferreira et al., 2015) and international (Leka & Cox, 2008; Nubling & Hasselhorn, 2010) questionnaire to assess psychosocial risk factors in work environments, but no questionnaire was found in the scientific literature to assess psychosocial risk factors in CSs. It is understood that CS work has specificities that can expose the worker to a series of vulnerabilities that need to be estimated and controlled not only by companies and their managers, but also through the awareness of workers for the correct dimensioning of these elements in their daily work. The aim is for the present study to fill this gap, given the physical conditions of CSs and the cognitive and behavioral requirements for performing these activities, as well as from a perspective of satisfying the legislation that ensures these workers safety and protection.

In the literature, there are different reviews on the use of the psychosocial factor or risk construct and concomitantly theoretical models that deal with the theme, defining concepts, foundations, variables, questionnaire and techniques to measure these elements (Carlotto et al., 2018; Rodrigues et al., 2020). These models can be grouped into classic stress theories, emerging theoretical models and occupational risk management models (Carlotto et al., 2018).

This study used the model adapted by Leka and Cox (2008) from the original study by Cox (1993). In addition to summarizing the psychosocial risks, this model provides support for a risk management program in the workplace. According to Cox (1993), psychosocial risks are related to the work content or the work context; the first referring to working conditions and organization of tasks and the other referring to the work organization and interpersonal relationships. The content category encompasses four dimensions: task planning, workload and pace, working hours, and environment and equipment. The context category encompasses six dimensions of risk: organizational function and culture, role in the organization, career development, decision and control latitude, interpersonal relationships at work, and home-work interface.

The creation of construct measurement questionnaire requires methodological rigor, delineated steps and clear procedures. The methodological proposal for the construction and validation of the questionnaire developed in this study was carried out based on the adaptation of standardized criteria in the literature (Disabkids Group, 2002). From this background and the need to offer secure questionnaire that can provide a quality assessment of the psychosocial factors related to work activities carried out in specific contexts, this study aimed to develop and validate the content of a questionnaire for the description of psychosocial risk factors in the practice of workers in CSs.

Method

This is a methodological study developed from the DISABKIDS method (Disabkids Group, 2002), which presupposes the following steps: literature review and knowledge about the empirical context of reference for the construction of contents that effectively allow the assessment of the desired scenario or phenomenon.

Participants

Workers of an electrical level III company, according to NR 4, table I (Ministério do Trabalho e Previdência, 2022b) located in the western region of the state of Paraná (Brazil) participated in the elaboration of the questionnaire. These workers perform activities in CSs. Semi-structured and individual interviews were conducted with 50 employees working in CSs in order to assess their perceptions and experiences regarding the nature of the work and the psychosocial risk factors associated with this activity (Mombelli et al., 2022). The number of participants in this stage was defined taking into account the representativeness and depth of the meanings expressed.

For the content validation of this first version, a sample of 18 CS workers was composed according to a sample calculation based on the DISABKIDS method (Schmidt et al., 2006). In the second phase of content validation the participants were 22 judges (experts) who perform research and have published on the topic, with methodological knowledge about the construction of measuring questionnaires. Representatives of the target population also participated in this phase (Alexandre & Colucci, 2011).

Procedures

Phase 1 – Integrative Review

To ensure the relevance of the contents for the assessment of the constructs of the questionnaire, two integrative reviews of scientific literature were carried out, both supported by a protocol that guides the preparation of reviews as questionnaires of evidence-based practice (Mendes et al., 2008). Literature reviews with this scope aim to gather the best evidence that will support the adoption of practices in the health field.

Reviews Protocols

Review 1

The identification of articles was performed through systematic searches in national and international indexed journals, in the following databases/libraries: Web of Science, Scopus, PubMed, PsycINFO, Scientific Electronic Library Online (SciELO) and Literatura Latino-Americana e do Caribe em Ciências da Saúde (Lilacs, Latin American and Caribbean Health Sciences Literature). Controlled (Medical Subject Headings/MESH and Thesaurus of the American Psychological Association/APA) and uncontrolled (EntryTerms) descriptors were used. The OR and AND Boolean operators were adopted in order to obtain the largest number of studies on the subject.

In the first literature review, the guiding question was: what are the psychosocial risk factors identified in work carried out in confined spaces? The search descriptors on the Web of Science, Scopus, PubMed and PsycINFO were: psychological factors OR psychosocial factors OR job stress

OR psychosocial risk OR occupational risk OR psychosocial stress OR occupational stress AND job OR occupational OR work* AND confined spaces.

Review 2

The second integrative review aimed to identify the validated questionnaire for the assessment of psychosocial risk factors in the work environment and the domains that each one aimed to evaluate. The guiding question was which validated psychosocial factor measurement questionnaires assess psychosocial risk factors in the work context?

The terms used were "psychosocial risk*" OR "psychosocial factor*" OR "psychosocial aspect*" OR "psychosocial hazard*" OR "psychosocial stressor*" AND job OR occupational OR work* AND questionnaire OR scale OR instrument OR assessment OR form OR test OR inventory AND "validation studies" OR *cultural* OR translat* OR valid* OR reproduc* OR psychomet*.

Inclusion and Exclusion Criteria

Review 1

Articles published in Portuguese, English and Spanish between January 2010 and December 2019 were considered. Studies published in national or international journals and with the presence of descriptors in the title or abstract were included, except for other review studies.

Review 2

Articles published in Portuguese, English and Spanish between January 2010 and December 2019 were eligible. A total of 440 publications were found.

Selection Processes

Review 1

Based on an analysis carried out by two independent judges, with the supervision of a third judge responsible for solving possible impasses and disagreements, only studies that dealt with the theme of psychosocial risk factors in the context of CS work were included in the final sample. The analytical path for selecting evidence is described in Figure 1.

Review 2

The selection process by judges followed the same guidelines as the first investigation, recovering, in full, 41 studies that presented evidence to answer the guiding question. Data from this second investigation were organized in a spreadsheet containing the categories of title, authors, year of publication, study objective and main results. The analytical path of the second review is summarized in Figure 2.

Phase 2 – Interviews

The interviews took place at the participants' work place during their shift after prior scheduling through telephone contact. All interviews were audio-recorded and transcribed verbatim and literally, with an average duration of 60 minutes.

Figure 1
Flowchart of identification and selection of articles related to psychosocial risk factors in confined spaces

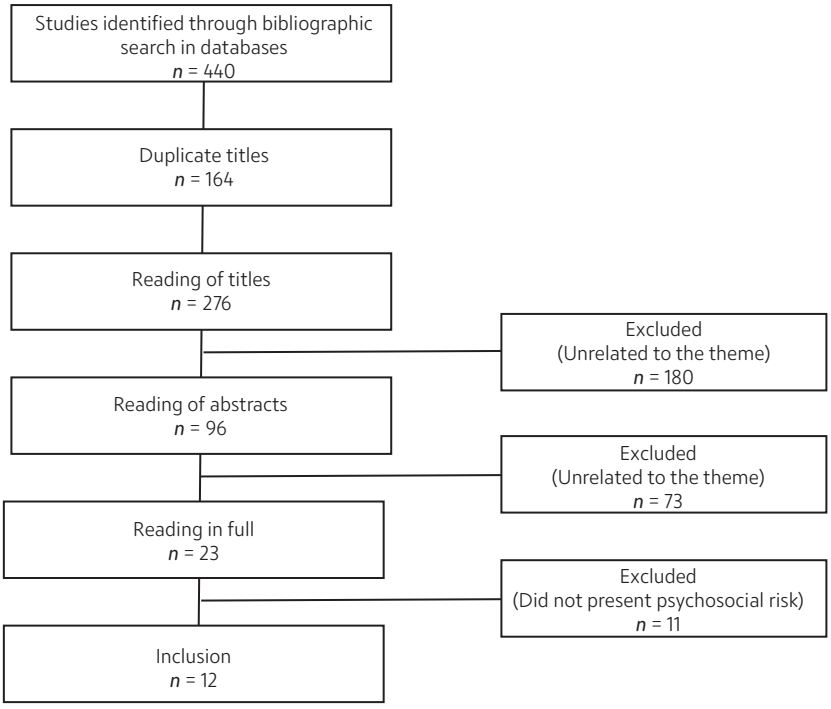
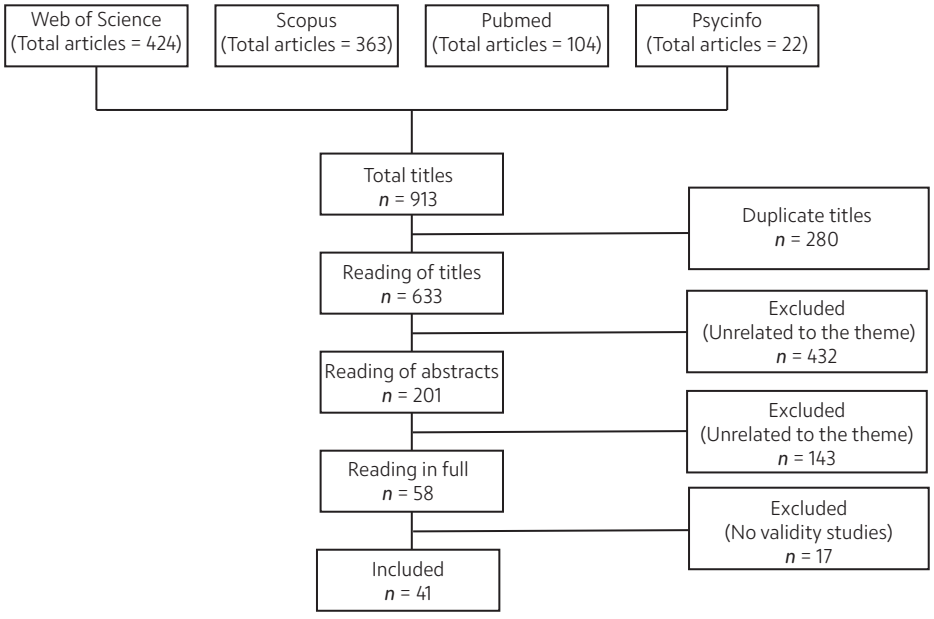


Figure 2
Flowchart of the application of the inclusion and exclusion criteria for the retrieved studies related to questionnaires for the assessment of psychosocial risk factors



Phase 3 – Content Validation

To perform this validation, the items were analyzed by the research group and the second version of the questionnaire was defined. Then, the online presentation of the questionnaire's items

for analysis by the judges was performed. Taking into account the judges' considerations, the items addressed were analyzed by the research team and a third version of the questionnaire was defined.

Instruments

Phase 2 – Interviews

The interview script was prepared and validated by members of a research group specialized in the construction of measurement questionnaires based on measurement theories and other questionnaires for the assessment of psychosocial factors available in the scientific literature, following the recommendations of Leka and Cox (2008). The questionnaire included questions to characterize the worker, including sociodemographic variables and 15 questions that aim to identify the performance of activities in CSs and its interface with the psychosocial factors.

Phase 3 – Content Validation

Data obtained from the interviews with the workers and from the literature reviews led to the first version of the questionnaire, consisting of 46 items (Mombelli, 2019). In this phase, adapted DISABKIDS forms were used with results presented in absolute frequencies and percentages (Romeiro et al., 2020).

Data Analysis

Content validity was analyzed through the Content Validity Index (CVI) using a Likert-type scale with scores from 1 (not relevant/not representative/not clear/not suitable format) to 4 (relevant/representative/clear item) /appropriate format) to assess relevance/representativeness/clarity/form. The cutoff point recommended in the literature to verify the validity of new constructs is 0.90 (Alexandre & Colucci, 2011).

To measure the level of agreement of the CVI values among the specialists in the study area and representatives of the population in relation to the categorization of items regarding risk factor or protective factor, the Intra-Class Correlation Coefficient (ICC) was used. The values used as the reference for this analysis are described as less than 0.40, indicating a weak correlation; 0.41 to 0.60, moderate; 0.61 to 0.80, good or substantial; and greater than 0.81 an almost perfect or excellent correlation (Fayers & Machin, 2016; McDowell & Neweel, 1996; Terwee et al., 2007).

This study followed the recommendations of Resolution No. 466/12 of the National Health Council. The research project that originated the study was approved by the Research Ethics Committee of (CAAE: 60906216.2.0000.5393 and authorization No. 1.821.514).

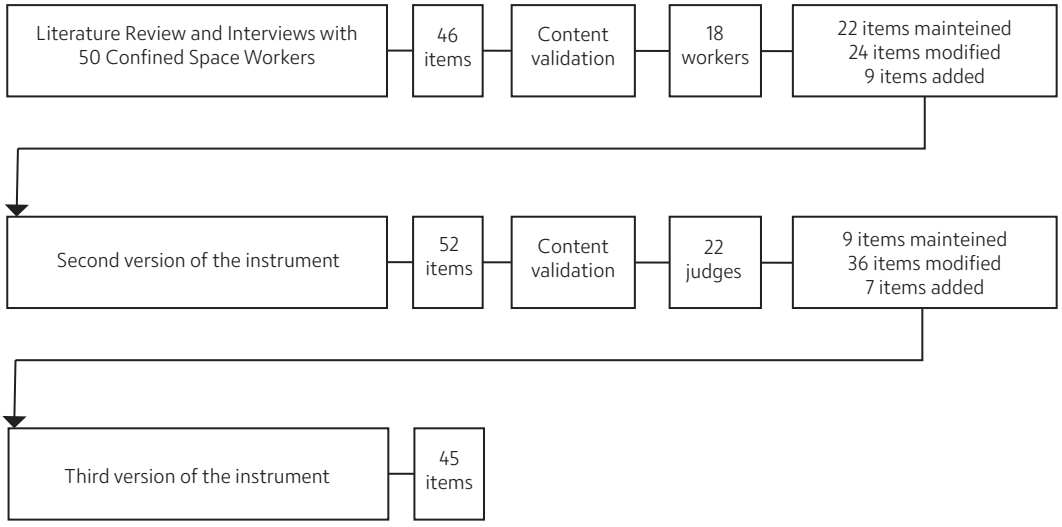
Results

The phases for developing the questionnaire and the respective number of participants and items of each version were systematized in Figure 3.

During the study period, the number of collaborators working in CSs was around 250 people, of which 18 participated in the feedback phase of the empirical material resulting from the 50 interviews and content validation of the first version of the questionnaire, consisting of

Figure 3

Schematic diagram of the development phases of this study and respective numbers of participants and items of each version of the questionnaire



46 items. At this stage, the respondents were allocated to groups A, B and C and analyzed only a subset of the items, that is, group A assessed items 1 to 16, group B items 17 to 32 and group C items 33 to 46. These actions allowed the respondent to elaborate the items in another way until there was no difficulty in comprehending them. This division, proposed by the DISABKIDS manual (Disabkids Group, 2002), was performed so that each participant responded to a certain number of items, avoiding possible biases arising from possible effects such as discomfort and fatigue in the analysis of the items.

The age of the participants ranged between 27 and 53 years, with a mean of 40 years and standard deviation of 7.2 years. The level of education was high school (50%) and higher education (39%). The length of experience in the performance of activities in confined spaces ranged between 1 and 23 years, with a mean of 9.7 years and standard deviation of 7.0 years.

Content validation with the workers showed that the 18 participants understood all the items and would not ask them in another way. However, all suggested modifications, additions or removal of items. The pertinent suggestions were accepted by the researcher in agreement with the questionnaire's elaboration committee and generated changes in the wording of 24 items and the addition of six items. A total of 22 items remained unchanged.

Regarding the evaluations of items 1 to 16, assessed by group A, suggestions for changes to items on the type of exposure to risk, from 1 to 4, were made by three of the evaluators and accepted by the researcher in agreement with the elaboration committee. They suggested including examples to detail what each type of risk is, that is, what is a biological, chemical, physical and ergonomic risk. As an example, item 1 "The biological risk for my work in confined spaces is": was changed to "The biological risk (bacteria, fungi) for my work in confined spaces is": As shown, after naming the risks, some examples were included in parentheses. The addition of one item was suggested – "I am aware of the risks I may encounter when working in confined spaces" – prior to the types of risks, in order to identify whether the worker is aware of their exposure to the risk. Also the addition of the item "The risk of accidents (inadequate physical arrangement, inadequate Personal Protective Equipment (PPE), unprotected machinery, poor electrical connections) for my work in confined spaces is: related to the identification of the risk of accident was suggested and added. Five items

in the set remained unchanged. The wording or form of presentation was changed in 11 items and two items were added as proposed by the evaluators.

Group B evaluated items 17 to 32 and eight remained unchanged. In the others, the changes were related to word substitutions for a better understanding of the items. For example, item 17 "My work in confined space gives me security to the point of skipping procedures while performing it" was changed to "My experience working in confined spaces may lead me to disregard some steps of the performance procedure". According to five participants, the term skipping procedures could indicate that the worker was taking actions.

In items 19, 21, 25, 26, 28, 30 and 32 there were replacement or omission of words or terms for their synonyms, aimed at ease of understanding. As an example, in item 19 "I can be assigned to perform different functions while performing my work in a confined space": the phrase I can be assigned was substituted for I am prepared. In item 21 "Given the perception of a risky situation in a confined space, I am able to maintain self-control in order to solve the situation", the section in order to solve the situation was excluded. In item 30 "I have difficulty recognizing my technical limits related to carrying out work in a confined space" the word difficulty was replaced by technical limitations, since the word difficulty did not express the type of difficulty according to two workers and the word recognizing was also eliminated because, according to one participant, the worker may have technical limitations for performing the activity, but may recognize their limitation.

Group C evaluated items from 33 to 46. Nine remained unchanged and four (49, 50, 51 and 52) were added at the suggestion of the evaluators and accepted by the researcher in agreement with the elaboration committee. The items added aim to assess the use of PPE and workers' access to the work safety team. In items 35, 37, 40, 45, 46 and 47 terms or excerpts were replaced or eliminated in order to better understand the items. For item 37 "The time to perform my work is independent of the pressure exerted to finish it", the term independent of was replaced by not dependent on. In item 45 "I am uncomfortable when I am assigned to work in a confined space" the expression "I am" was replaced with "I feel" and the word assigned was changed to scheduled. Finally, in item 46 "The use of substances, such as alcohol and drugs can harm my work in confined spaces", the wording the use of substances was changed to the substance use and the word medicines was added.

In summary, in the first version of the questionnaire, 22 (47.8%) items were maintained, 24 items were modified (52.2%) and six items were added. Consequently, the second version of the questionnaire consisted of 52 items. After this process, the content validation phase took place with 22 judges, 16 of whom were experts in the field of study related to psychosocial risk factors and six representatives of the target population who had not participated in the previous steps.

In items 1 to 6, eight judges suggested the addition, aiming to improve the workers' comprehension, of the term I am exposed to and new examples of the types of risk. As an example, item 2 was presented like this after the suggestions: "I am exposed to biological risks (fungi, bacteria, microbes and other agents) when performing my work in confined spaces". Also at their suggestion, the way the Likert-type scale was presented changed for the answer options, with the space for choosing the answer in front of the text, which changed from "Never ( ), Almost never ( ), Sometimes ( ), Almost always ( ), Always ( )" to "( ) Never, ( ) Almost never, ( ) Sometimes, ( ) Almost always, ( ) Always", standardizing the questionnaire's response options.

Item 8 "There are well-defined assignments for my work team in confined spaces" had the wording changed at the suggestion of eight judges, as they indicated that there could be difficulty in comprehension due to it not being clear whether it was referring to the assignments of each professional of the team or the team as a whole, given that, according to NR 33, there are specific

roles and assignments designated for the supervisor, the inspector and the worker. Therefore, it was presented as follows: "There are well-defined assignments for each professional in my team when performing work in confined spaces.

In seven items (10, 12, 15, 22, 31, 37 and 44) words were added. In 13 items, word replacements (13, 18, 23, 25, 26, 34, 38, 40, 43, 47, 49, 51 and 52) and preposition substitutions or punctuation placements (11, 19 and 29) were made. Finally, in four items (24, 30, 32, 36) some words were moved from one place to another in the sentence. All changes were based on the judges' considerations, who made relevant considerations, consequently accepted, so that the worker better understood the items, even in those evaluated with scores of 3 (Needs a small review to be relevant/representative/clear/present a suitable format) or 4 (Item relevant/representative/clear/suitable format). In the items in which there were words with the possibility of identifying sex/gender, the option was added, contemplating the development of the questionnaire for female respondents, even though no female professionals took part in this study. In summary, the questionnaire presented to the judges consisted of 52 items. Of these, 36 were changed, 7 were excluded and 9 remained unchanged. Accordingly, the final version of the questionnaire at this stage had 45 items.

As described in the method, the items were evaluated according to the CVI and from the "risk factor" or "protective factor" categories. Table 1 shows the CVI values resulting from the content validation phase, according to the judges, participants from the target population and total.

Regarding the CVI values assigned by the judges and by the participants of the target population, the ICC resulted in 0.023 with CI [95%]: [-0.167; 0.238], which shows disagreement between the distributions of values. In fact, for the participants of the target population, the CVI values were 100% in 51 of the 52 items. The variability of CVI values among the judges was greater.

According to Table 1, 45 items had a CVI greater than 0.90, a level established as the minimum to verify the validity of new constructs. Seven items had an overall CVI below 0.90 and were eliminated from the questionnaire at this time.

Table 1

Percentage of judges CVI, target population CVI and total CVI classification, resulting from the content validation phase, according to the judges and target population participants. Brazil, 2018

1 of 2

Items	Judges CVI	Population CVI	Total CVI
		%	
1	93.8	100.0	95.5
2	93.8	100.0	95.5
3	93.8	100.0	95.5
4	100.0	100.0	100.0
5	93.8	100.0	95.5
6	93.8	100.0	95.5
7	81.3	100.0	86.4
8	100.0	100.0	100.0
9	100.0	100.0	100.0
10	93.8	100.0	95.5
11	100.0	100.0	100.0
12	93.8	100.0	95.5
13	100.0	100.0	100.0
14	100.0	100.0	100.0
15	100.0	100.0	100.0
16	100.0	100.0	100.0
17	87.5	100.0	90.9

Table 1

Percentage of judges CVI, target population CVI and total CVI classification, resulting from the content validation phase, according to the judges and target population participants. Brazil, 2018

Items	Judges CVI	Population CVI	Total CVI
		%	
18	93.8	100.0	95.5
19	100.0	100.0	100.0
20	100.0	100.0	100.0
21	87.5	100.0	90.9
22	93.8	100.0	95.5
23	93.8	100.0	95.5
24	93.8	100.0	95.5
25	93.8	100.0	95.5
26	100.0	100.0	100.0
27	93.8	100.0	95.5
28	100	100.0	100.0
29	93.8	100.0	95.5
30	87.6	100.0	90.9
31	87.6	100.0	90.9
32	100.0	100.0	100.0
33	100.0	100.0	100.0
34	100.0	100.0	100.0
35	100.0	100.0	100.0
36	100.0	100.0	100.0
37	100.0	100.0	100.0
38	93.8	100.0	95.5
39	87.6	100.0	86.4
40	87.6	100.0	90.9
41	56.3	100.0	68.2
42	81.3	100.0	86.4
43	93.8	100.0	95.5
44	93.8	100.0	95.5
45	68.8	100.0	77.3
46	62.5	100.0	72.7
47	100.0	100.0	100.0
48	81.3	100.0	86.4
49	93.8	100.0	95.5
50	100.0	100.0	100.0
51	100.0	100.0	100.0
52	100.0	100.0	100.0

Note: CVI: Content Validity Index.

The items excluded from the questionnaire were: (7) I have material resources to analyze the environmental risks of my work in confined spaces, with CVI = 86.4%; (39) The time to perform the work by the team in a confined space is not dependent on the pressure exerted to finish it, with CVI = 86.4%; (41) My work problems interfere with my family life, with CVI = 68.2%; (42) Inappropriate games can impair the quality of relationships at work in confined spaces, with CVI = 86.4%; (45) I can separate family problems from my work context, with CVI = 77.3%; (46) The psychosocial assessment helps to identify emotional aspects that can influence the performance of work in confined spaces, with CVI = 72.7% and (48) The use of legal or illegal substances, including medications, can impair the work in confined spaces, with CVI = 86.4%.

Regarding item 7, eight judges expressed difficulty in comprehending the type of material resource used to carry out the risk analysis. Seven judges identified item 39 as confusing and difficult

for the worker to understand. Likewise, for item 41, eight judges described it as unclear and unspecific in view of the relationship with psychosocial risk factors. Item 42 was considered confusing by seven judges and they made considerations about "*the way in which these games interfere in the quality of the work in a confined space*". When evaluating item 45, eight expert judges considered that the psychosocial assessment should be an evaluation questionnaire and not a psychosocial factor in itself, although the six workers in the area considered the item relevant. Finally, the evaluation of item 48 showed, according to five judges, that the worker could have difficulty understanding the wording "*legal and illegal substances*".

Table 2 shows the values of the percentages of classification into the "risk factor" or "protective factor" categories, resulting from the content validation phase, according to judges and participants from the target population.

Table 2

Percentages of classification into the "risk factor" or "protective factor" categories, resulting from the content validation phase, according to judges and participants from the target population. Brazil, 2019

1 of 2

Items	Judges		Population	
	Risk (%)	Protection (%)	Risk (%)	Protection (%)
1	100.0	0	83.3	16.7
2	56.3	43.8	33.3	66.7
3	100.0	0	83.3	16.7
4	100.0	0	83.3	16.7
5	87.5	12.5	83.3	16.7
6	93.8	6.3	100.0	0
7	0	100.0	0	100.0
8	0	100.0	0	100.0
9	6.3	93.8	0	100.0
10	81.3	18.8	100.0	0
11	12.5	87.5	0	100.0
12	0	100.0	0	100.0
13	12.5	87.5	16.7	83.3
14	6.3	93.8	0	100.0
15	6.3	93.8	16.7	83.3
16	75.0	25.0	100.0	0
17	68.8	31.3	100.0	0
18	87.5	12.5	100.0	0
19	87.5	12.5	100.0	0
20	12.5	87.5	33.3	66.7
21	18.8	81.3	16.7	83.3
22	25.0	75.0	33.3	66.7
23	87.5	12.5	83.3	16.7
24	12.5	87.5	0	100.0
25	12.5	87.5	0	100.0
26	18.8	81.3	0	100.0
27	6.3	93.8	0	100.0
28	18.8	81.3	16.7	83.3
29	25.0	75.0	0	100.0
30	0	100.0	16.7	83.3
31	81.3	18.8	83.3	16.7
32	6.3	93.8	16.7	83.3
33	6.3	93.8	16.7	83.3
34	6.3	93.8	33.3	66.7
35	6.3	93.8	0	100.0

Table 2

Percentages of classification into the "risk factor" or "protective factor" categories, resulting from the content validation phase, according to judges and participants from the target population. Brazil, 2019

Items	Judges		Population	
	Risk (%)	Protection (%)	Risk (%)	Protection (%)
36	6.3	93.8	0	100.0
37	81.3	18.8	83.3	16.7
38	25.0	75.0	16.7	83.3
39	37.5	62.5	33.3	66.7
40	81.3	18.8	100.0	0
41	81.3	18.8	100.0	0
42	75.0	25.0	100.0	0
43	12.5	87.5	16.7	83.3
44	81.3	18.8	100.0	0
45	43.8	56.3	50.0	50.0
46	18.8	81.3	16.7	83.3
47	87.5	12.5	66.7	33.3
48	81.3	18.8	100.0	0
49	87.5	12.5	100.0	0
50	6.3	93.8	16.7	83.3
51	6.3	93.8	0	100.0
52	6.3	93.8	0	100.0

The items resulting from the content validation phase, according to the judges and participants from the target population, were also classified in the "risk factor" or "protective factor" categories. The values obtained for the ICC showed agreement between the assessments of the two groups, with ICC = 0.936 and CI [95%]: [0.892; 0.963].

The resulting 45 items were then categorized, according to the theoretical framework adopted, in the "Content" and "Context" domains. For example, the following items can be found in the content domain: "I am exposed to chemical risk (dust, gases, vapors and other agents) when performing my work in confined spaces"; "I have technical training to perform different tasks in confined spaces"; "I have difficulty memorizing the procedures required to perform my work in confined spaces. With the following items in the context domain: "My team will help me if I encounter any difficulties related to carrying out work in a confined space", "If I observe that a colleague does not have adequate emotional conditions to carry out the work, I tell them this", "I have difficulty expressing myself if I feel afraid while performing work in a confined space".

The final version of the Perception of Psychosocial Risk Factors for Confined Spaces Questionnaire was divided into two domains: Content (60.0%) and Context (40.0%). The content domain has four attributes: 1. Work environment and equipment (22.2%), with 10 items; 2. Workload and pace (6.7%), with three items; 3. Task planning (31.2%), with 14 items. The Content domain has five attributes: 1. Organizational culture and function (2.2%), with one item; 2. Role in the organization (8.9%), with four items; 3. Decision and control latitude (24.4%), with 11 items; 4. Interpersonal relationship at work (2.2%), with one item and 5. Work-home interface with one item (2.2%).

The model presented in this study should be applied to about 315 workers to conduct the exploratory factor analysis so that the latent structure associated with the "perception of psychosocial risk factors" construct can be proposed and validated in future studies (Terwee et al., 2007). It should be highlighted that, in this study, some attributes of the model "Working hours"

and "Career development" did not have items assigned, which does not mean that they will be excluded from the final model of the questionnaire.

Discussion

This study aimed to develop and validate the content of a questionnaire for the description of psychosocial risk factors in the practice of CS workers. This process showed the importance of each step taken to prepare the version of the questionnaire, which, after content validation, was composed of 45 items distributed into eight attributes of psychosocial risk factors, three of which being associated with the "Content of work" domain and five with the "Context of work" domain.

The theoretical framework adopted describes six dimensions associated with the "Work context" domain and four with the "Work content" domain (Leka & Cox, 2008). In this study, no evidence was found associated with the "Working hours" and "Career development" attributes. The workers of the company under study have a career development plan and in the interview they did not report situations of uncertainty or stagnation. Furthermore, with regard to working hours, no reports were identified associated with shift changes, unpredictable or very long working hours, or inflexible work schedules. However, this does not mean that they will be excluded from the final model of the questionnaire.

In the "Content" domain, the attribute most perceived by the workers was "Task planning" and in the "Context" domain, the attribute most perceived was "Decision and control latitude". According to Leka and Cox (2008), the attribute "Work planning" can be characterized as a psychosocial risk when the conditions that define the risk show, from the worker's perception: poorly-defined work, high degree of job uncertainty, little variety/short work cycles, fragmented or meaningless work, inappropriate use of talent/skills, continual exposure to customers or groups of consumers. The attribute "Decision and control latitude" is identified as a psychosocial risk when it is associated with low participation in decision-making processes, lack of control over work and few decisions made in the work.

It is important to reflect that, according to Leka and Jain (2010), the attribute "Task planning" associated with a positive work environment is capable of providing workers with adequate use of their skills, interest and engagement in the development of their activities. Likewise, the attribute "Decision and control latitude" can provide participation in decision-making and control in the work performed, domains that are essential for carrying out activities in CSs.

The content validation carried out with the workers was of great value, considering that they were able to evaluate the items before sending them to the judges. It should also be highlighted that the execution time of activities in CSs and the experience of moments that preceded the implementation of NR 33 significantly contributed to the identification of relevant attributes by the target population. Accordingly, depending on the specificity of the construct analyzed, the performance of content validation with the target population, followed by content validation by judges is recommended, which, in the case of this study, certainly improved the method.

Conclusion

The absence of expanded knowledge of the work context results in the inability to comprehend how environmental, sociocultural, biological and psychological phenomena can be intimately connected both in promoting worker health and in preventing injuries and accidents

resulting from exposure to psychosocial risk factors. Therefore, to advance scientific knowledge about the psychosocial risk factors to which workers are exposed in CSs, it is necessary to direct the objectives of studies from the perspective of exploring the environment in a comprehensive way. Accordingly, the construction of the questionnaire reported in this study constitutes an important advance in the labor scenario represented by CSs.

This study presents a questionnaire developed from the perceptions of employees who work in CSs and in accordance with what is recommended by NR 33 on psychosocial risk factors, providing support for the organization of integrative health care, notably prevention and health promotion with this population. In this scenario, this study was guided by reflection on the theoretical and conceptual perspectives of psychosocial risk factors, giving voice to workers, considering that they provide a view of the interface between the work content and context dimensions.

Furthermore, the difficulty in identifying or recognizing the relevance of mental health in the work environment affects the implementation of preventive and corrective measures, with interventions based on the reduction of psychosocial risk factors. Therefore, the results indicate the importance of developing and implementing management practices aimed at the participation of workers in work processes and, consequently, the questionnaire developed can support these actions. Considering the effects of the COVID-19 pandemic on workers working in CSs also emerges as a need, which still needs to be addressed in scientific studies that can add to the evidence available so far.

In terms of future perspectives, the final items of the questionnaire will be applied for workers in CSs to conducted exploratory factor analysis, verification of psychometric properties and confirmatory factor analysis, in order to make it valid and reliable so that it can be applied in different places where there is the performance of activities in CSs. In short, this methodological study contributes to the advancement of scientific knowledge, as well as the clinical practice in the context of worker health, given that the identification of psychosocial risks is as relevant as their management, considering their physical, behavioral and social consequences.

References

Alexandre, N. M. C., & Colucci, M. Z. O. (2011). Validade de conteúdo nos processos de construção e adaptação de instrumentos de medidas. *Ciência & Saúde Coletiva, 16*(7), 3061-3068. https://doi.org/10.1590/S1413-81232011000800006

Beck, M. (2020). Forças produtivas e compleições corporais: do trabalho braçal ao trabalho confinado. *Revista Katálysis, 23*(3), 667-673. https://doi.org/10.1590/1982-02592020v23n3p667

Carlotto, P. A. C. C., Cruz, R. M., Guilland, R., Rocha, R.E.R., Dalagasperina, P., & Arino, D. O. (2018). Riscos psicossociais relacionados ao trabalho: perspectivas teóricas e conceituais. *Revista Interamericana de Psicologia Ocupacional, 37*(1), 52-70. https://doi.org/10.21772/ripo.v37n1a04

Cox, T. (1993). *Stress research and stress management: putting theory to work*. HSE Contract Research Report No. 61.

Disabkids Group. (2002). *Pilot test manual*. The DISABDIKS Group.

Fayers, P. M., & Machin, D. (2016). *Scores and measurements: validity, reliability and sensitivity*. John Wiley & Sons.

Ferreira, M. C., Milfont, T. L., Silva, A. P. C., Fernandes, H. A., Almeida, S. P., & Mendonça, H. (2015). Escala para avaliação de estressores psicossociais no contexto laboral: construção e evidências de validade. *Psicologia: Reflexão e Crítica, 28*(2), 340-349. https://doi.org/10.1590/1678-7153.201528214

Leka, S., & Cox, T. (2008). *PRIMA-EF: Guidance on the European framework for psychosocial risk management*. WHO Library.

Leka, S., & Jain, A. (2010). *Health impact of psychosocial hazards at work: an overview*. World Health Organization.

McDowell, I., & Newell, C. (1996). *Measuring health*: *a guide to rating scales and questionnaires*. Oxford University Press.

Mendes, K. D. S., Silveira, R. C. C. P., & Galvão, C. M. (2008). Revisão integrativa: método de pesquisa para a incorporação de evidências na saúde e na enfermagem. *Texto & Contexto – Enfermagem, 17*(4), 758-764. https://doi.org/10.1590/S0104-07072008000400018

Ministério do Trabalho e Previdência. (Brasil). (2022a). Portaria n° 1.690 de 15 de junho de 2022. Aprova a nova redação da Norma Regulamentadora nº 33 - Segurança e Saúde nos Trabalhos em Espaços Confinados (NR33). *Diário Oficial da União, 118*, 94-98. https://sinpait.org.br/wp-content/uploads/2022/07/PORTARIA_MTP-No-1.690-DE-15-DE-JUNHO-DE-2022.pdf

Ministério do Trabalho e Previdência. (Brasil). (2022b). Portaria n° 2.318 de 3 de agosto de 2022. Aprova a nova redação da Norma Regulamentadora nº 04 - Serviços Especializados em Segurança e Medicina do Trabalho. *Diário Oficial da União, 153*, 100. https://www.in.gov.br/en/web/dou/-/portaria-mtp-n-2.318-de-3-de-agosto-de-2022-421959624

Ministério da Economia, Secretaria Especial de Previdência e Trabalho, & Secretaria de Previdência. (Brasil). (2019). Portaria SEPRT n° 915 de 30 de julho de 2019. Aprova a nova redação da Norma Regulamentadora nº 01 - Disposições Gerais. *Diário Oficial da União, 146*, 14. https://www.in.gov.br/en/web/dou/-/portaria-n-915-de-30-de-julho-de-2019-207941374

Mombelli, M. A. (2019). *Elaboração de instrumento para identificação de fatores de risco psicossocial associados à atuação em espaços confinados* [Tese de doutorado, Universidade de São Paulo]. https://repositorio.usp.br/item/002978591

Mombelli, M. A., Reis, R. A., Zilly, A., Marziale, M. H. P., Braga, W. O. A., & Santos, C. B. (2022). Fatores de risco no trabalho em espaços confinados: contribuições para a avaliação psicossocial. *Paidéia* (Ribeirão Preto), *32*, e3212. https://doi.org/10.1590/1982-4327e3212

Nowak, D., Ochmann, U., Brandenburg, S., Nienhaus, A., & Woltjen, M. (2021). COVID-19 as an occupational disease or work-related accident: considerations regarding insurance cover and reporting obligation in the statutory accident insurance. *Deutsche Medizinische Wochenschrift, 146*(3), 198-204. https://doi.org/10.1055/a-1341-7867

Nubbling, M., & Hasselhorn, H. M. (2010). The Copenhagen Psychosocial Questionnaire in Germany: from the validation of the instrument to the formation of a job-specific database of psychosocial factors at work. *Scandinavian Journal of Public Health, 38*, 120-124. https://doi.org/10.1177/1403494809353652

Pereira, A. C. L., Souza, H. A., Lucca, S. R., & Iguti, A. M. (2020). Fatores de riscos psicossociais no trabalho: limitações para uma abordagem integral da saúde mental relacionada ao trabalho. *Revista Brasileira de Saúde Ocupacional, 45*, e18. https://doi.org/10.1590/2317-6369000035118

Observatório de Segurança e Saúde no Trabalho. (2021). *Página principal*. https://smartlabbr.org/sst

Rodrigues, C. M. L., & Faiad, C. (2018). Avaliação psicossocial no contexto das normas regulamentadoras do trabalho: desafios e práticas profissionais. *Psicologia Revista, 27*(2), 287-310.

Rodrigues, C. M. L., Faiad, C., & Facas, E. M. (2020). Fatores e risco e riscos psicossociais no trabalho. *Psicologia*: *Teoria e Pesquisa, 36*(19), 1-9. https://doi.org/10.1590/0102.3772e36nspe19

Romeiro, V., Bullinger, M., Marziale, M. H. P., Fegadolli, C., Reis, R. A., Silveira, R. C. C. P., Costa-Júnior, M. L., Sousa, F. A. E. F., Conacci, B. J., Nascimento, F. K., & Santos, C. B. (2020). DISABKIDS® in Brazil: advances and future perspectives for the production of scientific knowledge. *Revista Latino-Americana de Enfermagem, 28*, e3257. https://doi.org/10.1590/1518-8345.3003.3257

Schmidt, S., Peterson, C., & Muchlan, H. (2006). *The DISABKIDS Questionnaires*: *Handbook incl*. Pabst Science Publishers, Lengerich, Germany.

Shimizu, H. E., Bezerra, J. C., Arantes, L. C., Merchán-Hamann, E., & Ramalho, W. (2021). Analysis of work-related accidents and ill-health in Brazil since the introduction of the accident prevention factor. *BMC Public Health, 21*, 725. https://doi.org/10.1186/s12889-021-10706-y

Sinclair, R. R., Allen, T., Barber, L., Bergman, M., Britt T., Butler, A., Ford, M., Hammer, L., Kath, L., Probst, T., & Yuan, Z. (2020). Occupational health science in the time of COVID-19: Now more than ever. *Occupational Health Science, 4*, 1-22. https://doi.org/10.1007/s41542-020-00064-3

Terwee, C. B., Bot, S. D. M., Boer, M. R., van der Windt, D. A. W. M., Knol, D. L., Dekker, J., Bouter, L. M., & Vet, H. C. W. (2007). Quality criteria were proposed for measurement properties of health status questionnaires. *Journal of Clinical Epidemiology, 60*(1), 34-42, 2007. https://doi.org/10.1016/j.jclinepi.2006.03.012

Vasconcelos, V. D., & Trentini, C. M. M. (2021). Avaliações psicossociais no trabalho no Brasil: estudo de levantamento sobre variáveis, modelos teóricos, instrumentos e critérios adotados. *Revista Psicologia Organizações e Trabalho, 21*(1), 1355-1366. https://doi.org/10.5935/rpot/2021.1.20373

Zoni, S., & Lucchini, R. G. (2012). European approaches to work-related stress: a critical review on risk evaluation. *Safety and Health at Work, 3*(1). https://doi.org/10.5491/SHAW.2012.3.1.43

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