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Development and validation of playful didactic resources for the prevention of accidents in childhood

Desenvolvimento e validação de recursos didáticos lúdicos para prevenção de acidentes na infância

Desarrollo y validación de recursos didácticos lúdicos para prevención de accidentes en la infancia

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ABSTRACT

Objective: To develop and validate playful didactic resources targeted at 4 and 5-year-old schoolchildren for the prevention of common accidents in childhood. **Methods:** This is a study for the development and validation of playful didactic resources and of the methodological research type, developed in two stages, the former being elaboration of such resources and the latter, validation of the material by expert judges. **Results:** A story script, two parodies, an illustrated activity, a game and two playful activities were elaborated that approached themes regarding prevention of common accidents in childhood, falls and burns, being later evaluated by eleven expert judges in the areas of children's health and childhood education who classified the playful didactic resources as effective tools for use in educational interventions with schoolchildren attending early childhood education to prevent common accidents in childhood. The overall mean of all the domains evaluated showed 98% agreement. **Conclusion:** This study evidenced the relevance of validating the playful didactic resources to be used in educational activities planned with quality, providing children with knowledge about the prevention of common accidents in childhood.

Descriptors: Child Health. Accident Prevention. Pediatric Nursing. Health Education. Validation Study.

RESUMO

Objetivo: Desenvolver e validar recursos didáticos lúdicos para prevenção de acidentes comuns na infância para escolares de 4 e 5 anos da educação infantil. **Métodos:** Trata-se de um estudo de desenvolvimento e validação de recursos didáticos lúdicos, do tipo pesquisa metodológica, desenvolvida em duas etapas, sendo a primeira a construção de recursos didáticos lúdicos e a segunda etapa a validação do material por juízes especialistas. **Resultados:** Foram elaborados um roteiro de história, duas paródias, uma atividade ilustrada, um jogo e duas brincadeiras que abordaram temáticas de prevenção de acidentes comuns na infância, quedas e queimaduras, sendo posteriormente avaliados por onze juízes especialistas na área da saúde da criança e da educação infantil que classificaram os recursos didáticos lúdicos como ferramentas eficazes para uso em intervenções educativas com escolares da educação infantil para prevenção de acidentes comuns na infância. A média geral de todos os domínios avaliados mostrou 98% de concordância. **Conclusão:** Este estudo evidenciou a relevância da validação dos recursos didáticos lúdicos para serem utilizados em ações educativas planejadas com qualidade, propiciando às crianças o conhecimento sobre prevenção de acidentes comuns na infância.

Descritores: Saúde da Criança. Prevenção de Acidentes. Enfermagem Pediátrica. Educação em Saúde. Estudo de Validação.

RESUMÉN

Objetivo: Desarrollar y validar recursos didácticos lúdicos para la prevención de accidentes comunes en la infancia en niños en etapa escolar, de entre 4 y 5 años. **Métodos:** Estudio de elaboración y validación de recursos didácticos lúdicos, de tipo investigación metodológica, desarrollado en dos etapas: primera, construcción de recursos didácticos lúdicos y segunda, etapa de validación del material por parte de jueces expertos. **Resultados:** Se elaboraron un guion de cuentos, dos parodias, una actividad ilustrada y dos juegos que abordaron temas vinculados a la prevención de accidentes comunes en la infancia, caídas y quemaduras, con posterior evaluación por once jueces expertos en el área de Salud del Niño y Educación del Niño, quienes clasificaron a los recursos didácticos lúdicos como herramientas eficaces para su uso en intervenciones educativas con niños en etapa escolar, para prevenir accidentes comunes en la infancia. El promedio general de todos los dominios evaluados mostró un acuerdo del 98%. **Conclusión:** Este estudio demostró la pertinencia de la validación de recursos didácticos lúdicos para su utilización en actividades educativas planificadas con calidad, proporcionando a los niños conocimientos sobre la prevención de accidentes comunes en la infancia.

Descriptores: Salud del Niño. Prevención de Accidentes. Enfermería Pediátrica. Educación en Salud. Estudio de Validación.

INTRODUCTION

Accidents are defined as unintentional, unexpected and casual injuries that can be caused, for example, by traffic events, burns, falls, drowning, airway obstruction (suffocation, strangulation and choking), poisoning and exogenous intoxication, electric shocks and firearms, among others.[1]

These injuries represent a public health problem at the global level and are considered the main cause of death in children and adolescents, accounting for nearly 40% of the deaths in this age group.[1]

Annually in Brazil and according to data from the Ministry of Health, accidents are responsible for more than 3,600 deaths and 111,000 hospitalizations of children aged from 0 to 14 years old. In addition to that, for each child that dies in an accident, another four are left with permanent sequelae, with countless social, emotional and financial costs.[2]

Children's vulnerability varies mainly depending on the coordination level of their nervous system, motor skills and sense of risk perception. For this reason, as they have a lower risk perception, younger children are more exposed to accidents.[3]

From this perspective, it is important to develop dynamic and playful educational activities that aim at enabling effective learning and development on the prevention of common accidents in childhood, a topic that needs to be explored with a focus on children. For this, it is fundamental to clearly plan the objectives, as well as the aspects of the pedagogical practice, the physical spaces and the didactic resources that will be used, with a methodology that must be in accordance with the age group and the social reality of the target population.[4]

Early childhood education in Brazil comprises the first stage of basic education offered in day care centers to children up to 3 years of age, as well as in preschool to children aged 4 and 5 years old; and is intended to provide them with integral development in their physical, psychological, intellectual and social aspects.[5]

Playful activities, which are defined as entertainment that generates pleasure, amuses and promotes new learning, are shown as a methodology capable of facilitating the construction of critical reflection and autonomy, as well as establishing a relationship of interest of children in the activities developed.[6]

Thus, this paper is justified by the fact that the elaboration and validation of didactic resources that address the theme of accident prevention provide children as learning subjects with crucial knowledge in the construction of their knowledge, favoring a good quality teaching-learning process, which results in a better understanding of the topics covered and encourages children's participation in the construction of their learning.[7-8]

Evaluation of the content of the didactic resources that will be used in the playful educational interventions is an essential step for the development of mechanisms that make it possible to associate abstract concepts with observable and measurable indicators of the teaching-learning process.[9]

In this context, the research sought to answer the following guiding question: “Are playful didactic resources on the prevention of common accidents in childhood effective tools for use in educational interventions with 4 and 5-year-old schoolchildren?”; and it aimed at developing and validating such resources for the prevention of common accidents in childhood for the aforementioned target population.

METHODS

This is a study of the methodological research type for the development and validation of didactic resources, which investigates the methods present in the processes of development, production or elaboration of tools; validation of the tools developed; and subsequent evaluation and/or application with the target population.[10] Two stages were developed in this study: the first was the elaboration of playful didactic resources and the second stage consisted in validation of the material by expert judges.

In the first stage of the study, the playful didactic resources were created with digital tools using Microsoft Word for Windows and Microsoft PowerPoint for Windows, from public images available for free on the Internet and adapted with the authors' designer. These didactic resources portray topics related to the prevention of common accidents in childhood, falls and burns, and will be used in educational interventions in the school environment with children aged 4 and 5 years old, in a university extension activity.

Considering the story script, parodies, illustrated activity, games and playful activities, development of the playful didactic resources followed these steps: the story script was created digitally, using Microsoft Word and written with the aim of promoting interaction of the child with the storyteller and with the characters so that there was dialog about accident risk situations, their prevention and care for the injured, based on the scientific literature on the subject matter. The parodies with short verses used the 4 and 5-year-old children's own language, and described the risk situation and the accident experienced by the character in the story's script, as well as the care provided. For this, the authors agreed on which children's music would be used, having as a selection criterion a song that was more likely to be known by the age group of the study. The illustrated activity, as well as the games and playful activities, were elaborated from public images and adapted with the authors' designer, based on the script and parodies, and aimed at assessing the children's degree of understanding in relation to risk situations and accident prevention.

The illustrations of the games and playful activities were handmade with enhancement on a digitalizing tablet or exclusively on a tablet with the Clip StudioPaint professional drawing program. The handmade drawings were sketched with pencil and eraser on A4 Canson 140 g/m² paper, colored with pencils, watercolor and marker pens; the line art, outline of the drawing, was made with a black

ballpoint pen. These images were then digitalized by means of the CamScaner mobile app at maximum image enhancement, which is a free feature of the program, and transferred to the Clip StudioPaint program for adjustments. Some images were entirely drawn on a digitalizing tablet, using the available resources of the professional program, where there are no free resources.

The story script characters were inspired by puppets previously created by the authors, adapted to the cartoon style. This style was chosen because of the simplicity of the strokes, its popularity and familiarity among children.

For the second stage of the study, which was conducted in the virtual environment, the authors prepared an instrument to validate the playful didactic resources, using questionnaires from docs.google.com. The population and sample consisted of expert judges in the areas of children's health and early childhood education. The inclusion criteria were working as professors in public and/or private universities or as early childhood education teachers in public and/or private schools with experience with children. The exclusion criterion was not making use of playful resources in the teaching-learning activities developed. The sample was of the non-probabilistic type, for convenience, and selection was made through the lists requested and provided by the educational institutions of the teachers who fit the study inclusion criteria. An invitation to participate in the study was e-mailed to professors in the area of children's health at two Nursing colleges, as well as to early childhood education teachers working in two schools, with a deadline for responding to the validation instrument during the data collection period. No participants were excluded.

In the literature there is no consensus regarding the number of expert judges required; some authors recommend from five to ten, others suggest from six to twenty, and others consider a number of seven judges as adequate for the evaluation stage. Consequently, we followed the suggestion of using from six to twenty judges, in order to increase the number of opinions about the resources elaborated.[10-12]

The access link to the form was e-mailed to twenty expert judges, where a tutorial on common accidents in childhood and their prevention was made available, based on current scientific references available and on the playful didactic resources developed.

Data collection took place from October 21st to November 28th, 2019, and the expert judges evaluated the following items: Item 1 - Does it address the prevention of common accidents in childhood? Item 2 - Is the language used appropriate for the age group? Item 3 - Was it written in a playful way? Item 4 - Does it allow you to assess learning? Item 5 - Does it achieve the educational objective of leading the child to prevent common accidents in childhood? The items were designed on a four-point unipolar scale, as follows: 1 for totally disagree, 2 for partially disagree, 3 for partially agree, and 4 for totally agree, with the possibility for the expert judge to leave a comment or suggestion related to the resource evaluated.

The data were entered into a Microsoft Office Excel 2016 spreadsheet and the agreement percentage was calculated using the Content Validity Index (CVI), a method that measures the proportion or percentage of expert judges who are in agreement on certain aspects of the instrument and its items, which allows analyzing each item individually and the instrument as a whole.[9,13]

A second analysis was performed using the Kappa agreement coefficient, which is an association measure used to describe and test the data agreement degree.[14]

To calculate the CVI, the “3-I partially agree” and “4-I totally agree” answers obtained in the questionnaire were added up, and then divided by the total answers. This calculation was made for each item asked and for the instrument as a whole.

The Kappa coefficient (k) was calculated to evaluate the agreement levels between the expert judges, which is the ratio of the observed proportion of agreement (sum of the concordant 4 answers divided by the total) subtracted from the expected proportion of agreement (sum of the expected values of the concordant answers divided by the total), corrected for agreement due to chance.

Kappa values vary from 0 for complete lack of agreement to 1 for complete agreement. Values below zero are considered insignificant results, between 0 and 0.2 are considered as with weak agreement, between 0.21 and 0.4 as with reasonable agreement, between 0.41 and 0.6 as with moderate agreement; those between 0.61 and 0.8 indicate strong agreement; and those between 0.8 and 1 are considered to have almost perfect agreement.[14]

This study was approved by the Research Ethics Committee of the HUOC/PROCAPE Hospital Complex under CAAE: 16597119.9.0000.5192, and opinion No. 3,487,260, respecting the principles of Bioethics on research involving human beings, in accordance with Resolution No. 466/2012 of the National Health Council belonging to the Ministry of Health.

RESULTS

The following playful didactic resources were developed for children attending early childhood education in the age group of 4 and 5 years old: a story script, two parodies, an illustrated activity, a game and two playful activities that portray the prevention of falls and burns in childhood.

The story script allows for dialog between the storyteller, the characters (puppets) and the schoolchildren that will be the target population of the educational intervention. During the narration, the characters walk through the scenarios and sound effects add more playfulness to storytelling. The parodies are sung by the child characters Pedrinho and Alice, who report their experiences with falls and burns, and share the care provided by the adult characters Pedrinho's father, Mr. Antônio, Alice's mother, Mrs. Maria, and nurse Patrícia, as shown in **Figure 1** below.

Figure 1. Excerpt from the story script and parody elaborated. Recife, Pernambuco, Brazil.

Extension Project: Accidents in Childhood are not a joke!
Health Education for Children with Use of Playful Resources

Story Script – Falls and Burns
Characters: Storyteller (extension student); Puppets: Children (Pedrinho and Alice); Pedrinho's Father (Mr. Antonio); Alice's mother (Mrs. Maria); Nurse (Patrícia).

SCENARIO 1: PARK
Storyteller: Good morning buddies, is everything alright with you? I can't hear you (wait for answers). My name is Aunt _____, and I would like to introduce you my little buddies, Pedrinho and Alice!
Pedrinho and Alice: Hi buddies, how are you?
Storyteller: Today we are talking about accidents. Do you know what an accident is? (wait for answers). Has anybody here suffered an accident already? (wait for answers) And what about a fall? (wait for answers).
Storyteller opens for *three* children tell their history.
Pedrinho interrupts and says: AUNTIE, AUNTIE, I've fallen too!
Storyteller: So, Pedrinho, tell us how it was...
PLAY PEDRINHO'S MUSIC
Storyteller: (with great astonishment) Pedrinho!! How dangerous it is to climb trees, tables, shelves, children don't have super powers!
Pedrinho: I know, Auntie, now I've learned that I have to play safe. It was good that Alice helped me.
Storyteller: And were you very hurt by the fall?
Pedrinho: Yes, I was; and Alice got hurt too, Auntie!!
Storyteller: Indeed, Alice? (with an air of astonishment) How was it?
Alice: Auntie, Auntie, I got burned. Is this an accident too?
Storyteller: Yes, Alice burns are accidents too. Tell us how you got hurt?
SCENARIO 2: KITCHEN
PLAY ALICE'S MUSIC
Storyteller: That's right Alice, if it's hot you can't take it because it burns. And your mother did well in washing your burn with water.

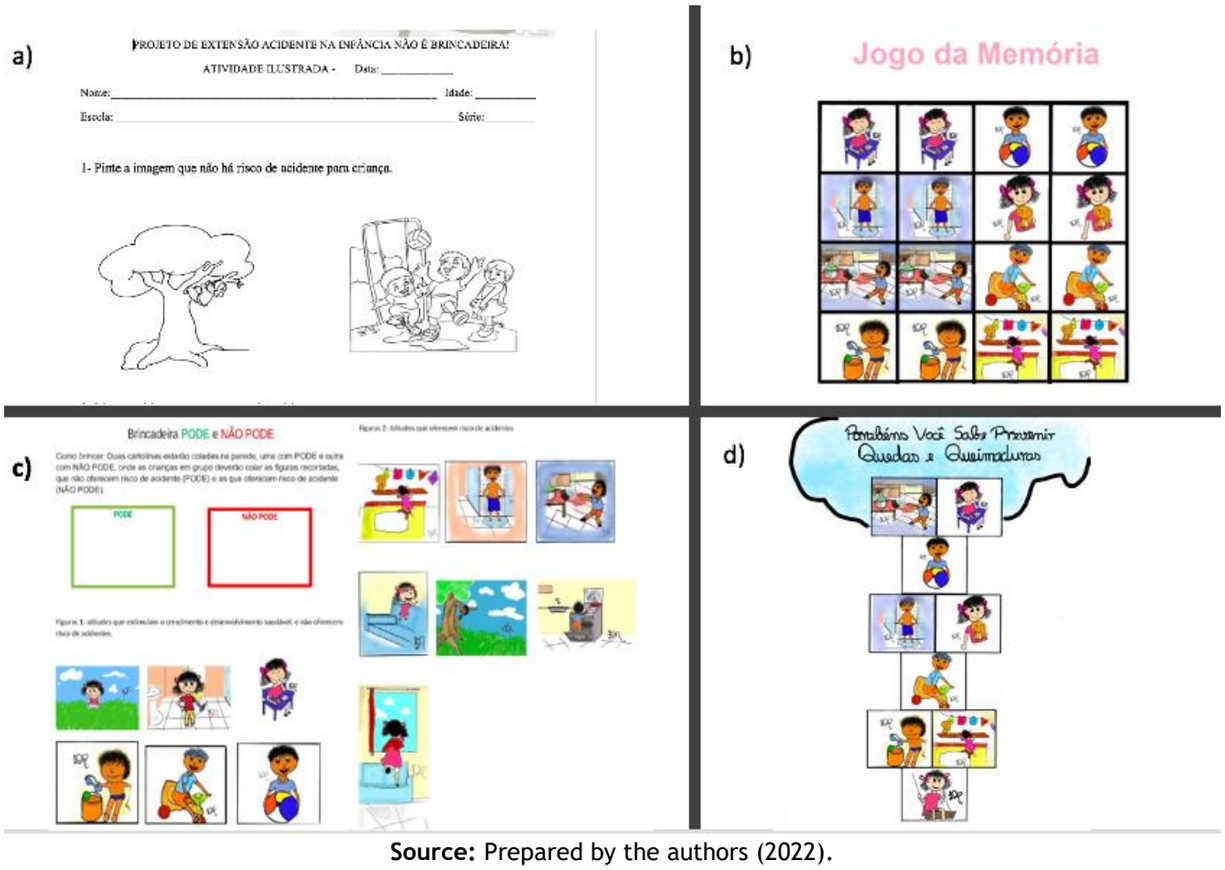
Pedrinho's Music – FALL

D
Do you want to play outside?
A
I want to be Spiderman!
Bm G
You have to be careful not to fall
A
You're going to get hurt
G A
I'm already pretty big, I won't fall
Bm G
I know how to protect myself
D
So let's play outside, that's alright
D
Don't climb this tree
A
You'd better come down
Bm
That's too high, yes you'll fall
A
And you'll suffer
G A
I give you a little help, come on
Bm G
Dad is coming soon
hey hey hey DADDY

Source: Prepared by the authors (2022).

In **Figure 2**, we have Image a) a clipping of the illustrated activity made up of questions of coloring, connecting and circulating, about objects/attitudes that impose risk of falls and burns and care measures in the event of accidents. Image b) is a memory game with illustrations of risk situations and safe attitudes for the child. Image c) Pode and Não Pode (DOs and DON'Ts) is where the child makes a collage of images that refer to attitudes that stimulate healthy growth and development and do not offer risk of accidents on the DOs poster, as well images of attitudes that represent risk of accidents on the DON'Ts poster. Image d): hopscotch, is where the child will have to walk through the illustrations of safe attitudes that do not represent risk of accidents to win congratulations for knowing how to prevent falls and burns. The illustrations of the game and the playful activities were made in a cartoon style inspired by the puppet characters from the story script.

Figure 2. Clipping of the illustrated activity, game and playful activities elaborated. Recife, Pernambuco, Brazil.



Source: Prepared by the authors (2022).

The sample for validation of the didactic resources elaborated consisted of eleven expert judges. Regarding the sociodemographic characteristics of the sample, nine judges were female and two were male. Their age varied between 22 and 51 years old. Among the participants, 54.5% are trained nurses and work as professors in public and/or private universities in the area of children's health and 45.5% are training pedagogues and work as early childhood education teachers in public and/or private schools. The mean time of professional activity was 17 years, and varied between 6 and 30 years.

In relation to the academic degrees of the participating expert judges, four are PhDs, one has a Master's degree, four have some specialization, and two participants have an undergraduate degree. All stated making use of playful resources in their professional activities.

Among the playful didactic resources evaluated, the story script and the game and playful activities had an agreement rate of 100% among the expert judges; the illustrated activity, 98%; and the parodies, 96%. The CVI of each didactic resource and its items are described in **Table 1**.

The Kappa coefficient was applied considering the playful didactic resource to be validated as a whole with n=44 possible "4-I totally agree" answers, and each of the evaluation items evaluated by the judges, with n=55 for the total of "4-I totally agree" possible answers. The story script obtained the highest Kappa coefficient (0.89), which represents almost perfect agreement, and the other resources obtained a coefficient that represents strong agreement. The "Was it written in a playful way?" item obtained a coefficient of 0.89, which represents almost perfect agreement. All the other items evaluated obtained a coefficient that represents strong agreement. The overall coefficient obtained after applying Kappa was 0.8, as described in **Table 2**.

Table 1. Content Validity Index among the expert judges in the evaluation of playful didactic resources and their items. Recife, Pernambuco, Brazil.

Didactic resource	Item evaluated	Item CVI	Total CVI
Story script	Does it address the prevention of common accidents in childhood?	1.0	1.0
	Is the language used appropriate for the age group?	1.0	
	Was it written in a playful way?	1.0	
	Does it allow you to assess learning?	1.0	
	Does it achieve the educational objective of leading the child to prevent common accidents in childhood?	1.0	
Parodies	Does it address the prevention of common accidents in childhood?	1.0	0.96
	Is the language used appropriate for the age group?	1.0	
	Was it written in a playful way?	1.0	
	Does it allow you to assess learning?	0.81	
	Does it achieve the educational objective of leading the child to prevent common accidents in childhood?	1.0	
Illustrated activity	Does it address the prevention of common accidents in childhood?	1.0	0.98
	Is the language used appropriate for the age group?	1.0	
	Was it written in a playful way?	1.0	
	Does it allow you to assess learning?	0.90	
	Does it achieve the educational objective of leading the child to prevent common accidents in childhood?	1.0	
Game and playful activities	Does it address the prevention of common accidents in childhood?	1.0	1.0

Source: Prepared by the authors (2022).

Table 2. Calculation of the Kappa coefficient of the expert judges' "I totally agree" answers in relation to the playful didactic resources and their items. Recife, Pernambuco, Brazil.

Items evaluated	**Playful didactic resource**					
	Story script	Parody	Illustrated activity	Game and playful activities	n=44	Kappa
Does it address the prevention of common accidents in childhood?	11	09	07	10	37	0.84
Is the language used appropriate for the age group?	09	08	10	11	38	0.86
Was it written in a playful way?	10	11	08	10	39	0.89
Does it allow you to assess learning?	09	06	05	09	29	0.66
Does it achieve the educational objective of leading the child to prevent common accidents in childhood?	10	07	08	08	33	0.75
n=55	49	41	38	48	176	
Kappa	0.89	0.74	0.69	0.87		0.80

Source: Prepared by the authors (2022).

DISCUSSION

The various aspects of child development must be considered in their entirety to guide the development of didactic resources to prevent common accidents in childhood. These must be compatible with their age group, so that the interactions and relationships of their daily lives, their games, imagination, fantasies, the playful activities and the children's cultures make their learning possible.[4]

The didactic resources elaborated in a playful way had a general agreement mean of 98% in their relevance among the expert judges, exceeding the value to be considered excellent. Among the diversity of pedagogical resources used in early childhood education is storytelling, a pedagogical strategy that stimulates the child's imagination while educating and instructing, promotes the development of cognitive skills, and streamlines the reading and writing process. As it is an interactive activity, it enhances children's language and can significantly favor the teaching practice in early childhood education.[15] The story script elaborated was considered relevant by the expert judges for use in playful educational interventions with children because it enables interaction between the child, the storyteller and the characters, who, in a conversation, problematize accident risk situations, their prevention means and care for the injured.

Music can be used as a didactic resource, and when employed in the form of a parody, which consists of recreating an existing song from a predominantly comic point of view, it becomes a fun activity and at the same time didactic and of an evaluative nature.[16]

Other didactic resources that can be used in educational interventions with children are games and playful activities. They are instruments commonly employed as active methodologies that favor the teaching-learning process, motivating interaction and increasing the students' interest in the content proposed.[17]

The use of playful resources is attractive and involves the child because, in addition to having efficient communication, it makes for a more effective connection between sender and he receiver, favoring understanding of the topic addressed. Through play it is possible to have fun, problem solving, exchange of emotions and learning.[7,18]

Through qualified specialists with theoretical basis and practical experience in children's health care and their teaching, the didactic material was validated for the prevention of common accidents in childhood. The analyses and suggestions made by the experts were guiding and essential for refining the material, taking into account that the instruments evaluated are based on allowing dialog between applicator and receiver with a focus on the practical activities, with Paulo Freire's popular education as a reference.[8]

Evaluation and validation of instruments is fundamental in the content propagation process because, in this way, it is possible to evaluate the instruments' general and specific scopes, with the possibility of including or removing items from them.[19-21]

Thus, the evaluation made by the expert judges was relevant to verify that the material is valid for application and that, although it can be improved, it ensures excellent usability of the instruments.

The results obtained in the current study show that the instruments used to prevent common accidents in childhood achieve with excellence the goals proposed for their validation, as all of them reach a coefficient of 0.9 to 1 after applying the CVI.

We consider the following as study limitations: the difficulty finding expert judges who fit the previously defined requirements and who are available to answer the questionnaire and return it in the correct time frame.

This study contributes to the development of educational actions in health, focusing on the prevention of accidents in childhood aimed at the child population, making the children's interaction in their teaching-learning process more attractive and dynamic.

CONCLUSION

Accidents represent a high rate of mortality and hospitalizations in childhood; therefore, it is fundamental to develop educational interventions that are able to warn and prevent about the risks to which children are exposed, with the use of playful didactic resources.

Application of validated playful didactic resources allows these measures to be more attractive and easy to understand for children aged 4 and 5 years old, helping to build critical thinking and a protective attitude compatible with their age group. In this way, the relevance of validating educational actions planned with quality is perceived to guarantee effectiveness of the teaching-learning process and contribute to the prevention of common accidents in childhood.

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