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☑ Knowledge translation and advances in health and nursing practices

Construction and validation of educational videos content for hypertensive children in times of COVID-19

Construção e validação de conteúdo de vídeos educativos para crianças hipertensas em tempos de COVID-19

Construcción y validación de contenidos de videos educativos para niños hipertensos en tiempos de COVID-19

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ABSTRACT

Objective: To build and validate two educational videos for hypertensive children about their disease and measures to cope with COVID-19.

Methods: Methodological study composed of five stages: 1) Analysis/Planning; 2) Modeling; 3) Implementation; 4) Evaluation/Maintenance and 5) Distribution. A committee of eight experts validated two educational videos for their content. The study was conducted at a public university in the interior of the state of São Paulo, from August 2020 to March 2022. The Content Validity Index was applied to measure the agreement of the items of the validation instrument.

Results: Script/storyboard obtained Content Validity Index = 1 in the audiovisual/content category. The educational videos obtained Content Validity Index = 0.99 in the audiovisual/content category.

Conclusions: The educational videos were produced and proved to be valid in terms of content, with the potential to promote the knowledge of hypertensive children in the context of COVID-19.

Keywords: Hypertension. Education, nursing. Teaching materials. Educational film and video. Child. Coronavirus.

RESUMO

Objetivo: Construir e validar dois vídeos educativos para crianças hipertensas acerca de sua doença e das medidas de enfrentamento da COVID-19.

Métodos: Estudo metodológico composto por cinco etapas: 1) Análise/Planejamento; 2) Modelagem; 3) Implementação; 4) Avaliação/Manutenção e 5) Distribuição. Dois vídeos educativos foram validados quanto ao seu conteúdo por um comitê de oito peritos. O estudo foi realizado em uma Universidade pública do interior do estado de São Paulo, no período de agosto de 2020 a março de 2022. O Índice de Validade de Conteúdo foi aplicado para mensurar a concordância dos itens do instrumento de validação.

Resultados: Roteiro/*storyboard* obtiveram Índice de Validade de Conteúdo = 1 no quesito audiovisual/conteúdo. Os vídeos educativos obtiveram Índice de Validade de Conteúdo = 0,99 no quesito audiovisual/conteúdo.

Conclusões: Os vídeos educativos foram produzidos e mostraram-se válidos quanto ao conteúdo, com potencial para promover o conhecimento de crianças hipertensas no contexto da COVID-19.

Palavras-chaves: Hipertensão. Educação em enfermagem. Materiais de ensino. Filme e vídeo educativo. Criança. Coronavírus.

RESUMEN

Objetivo: Construir y validar dos videos educativos para niños hipertensos sobre su enfermedad y medidas para enfrentar el COVID-19.

Métodos: Estudio metodológico compuesto por cinco pasos: 1) Análisis/Planificación; 2) Modelado; 3) Implementación; 4) Evaluación/Mantenimiento y 5) Distribución. Dos videos educativos fueron validados por su contenido por un comité de ocho expertos. El estudio se realizó en una universidad pública del interior del estado de São Paulo, de agosto de 2020 a marzo de 2022. Se aplicó el Índice de Validez de Contenido para medir la concordancia de los ítems del instrumento de validación.

Resultados: Guión/*storyboard* obtuvo Índice de Validez de Contenido = 1 en la categoría audiovisual/contenido. Los videos educativos obtuvieron Índice de Validez de Contenido = 0,99 en la categoría audiovisual/contenido.

Conclusiones: Los videos educativos fueron producidos y demostraron ser válidos en cuanto al contenido, con potencial para promover el conocimiento de los niños hipertensos en el contexto de la COVID-19.

Palabras clave: Hipertensión. Educación en enfermería. Materiales de enseñanza. Película y video educativos. Niño. Coronavirus.

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INTRODUCTION

Arterial Hypertension (AH) is a disease characterized by a sustained increase in Blood Pressure (BP) values and it configures as one of the main risk factors for the development of cardiovascular, renal and cerebral diseases[1]. In the Brazilian population, the prevalence of AH in the childhood life cycle ranges from 3 to 5% and occurs due to the family history of the disease, body weight increase, sedentary lifestyle, stress of modern life and excessive intake of sodium and industrialized food[2–5].

The early diagnosis of AH at any stage of life is related to the control of blood pressure values and to the reduction in the development of cardiovascular diseases and their aggravations[3–5].

The lack of studies and epidemiological data on AH and its impacts on childhood, the divergence between the prevalence and incidence rates in different Brazilian regions, as well as the lack of standard in the measurement and evaluation of BP have made it impossible to develop public policies aimed at promoting health among children and youth[1,6]. Besides, the COVID-19 pandemic and social isolation generated major impacts on the quality of life and biopsychosocial health of children. Changes in routine made them more susceptible to sedentary lifestyle, poor diet, stress and anxiety. This scenario favored the increase in the incidence of chronic diseases and the lack of AH control in this population[7–8].

It is very important that children with AH to have simple and effective knowledge about the disease, about the treatment, about BP monitoring at home and about possible complications, in addition to coping, protection and personal hygiene measures, especially in times of COVID-19.

Studies pointed out that patients with pre-existing heart disease and/or cardiovascular risk factors are at greater risk of developing the most severe symptoms of COVID-19[8–9]. Among Brazilian children, the mortality rate is 7.6%, which is considered high in comparison with other countries such as the United Kingdom, where the mortality rate is 1.0%[10]. In addition, morbidity and mortality occur frequently in those with underlying comorbidities[10].

It is evident that children are susceptible to infection by the new coronavirus and have mild symptoms of the disease, constituting as a public facilitator of virus transmission[11–12]. So far, clinical knowledge about the course of the disease, its complications and therapy has been limited, especially in this population, which justifies the need to develop instruments that aim to inform and educate the children and youth public[13].

The production of digital content is an important ally for children's health education, since they have great contact with this type of technology. Playful content presented through digital media can be used as a teaching and learning activity, since audiovisual resources help in the development of critical thinking and learning, as well as favoring the knowledge transmission and the effective understanding of the contents addressed[14].

The elaboration and validation of two educational videos to guide hypertensive children about the importance of health measures and knowledge of AH in times of COVID-19 can contribute to health education, with AH control, with the prevention of infections associated with the new coronavirus, with the promotion of quality of life and with the stimulation of autonomy for self-care and coping with the pandemic caused by COVID-19.

In view of the above, the guiding question of the research was: Is it possible to build educational videos for hypertensive children about their disease and measures to cope with COVID-19, as well as validate their content through an expert panel? The objective of this study was to build and validate two educational videos for hypertensive children about their disease and measures to cope with COVID-19.

METHOD

This is a methodological study of construction and validation of educational materials in terms of content, composed of five stages: 1) Analysis and Planning; 2) Modeling; 3) Implementation; 4) Evaluation and Maintenance and 5) Distribution, which are detailed below and are based on the Falkembach model[15]. The materials were prepared at the *Universidade de São Paulo* at the School of Nursing of Ribeirão Preto (EERP-USP), with the collaboration of members of the Interdisciplinary Research Group on Arterial Hypertension (*Grupo Interdisciplinar de Pesquisa em Hipertensão Arterial* - GIPHA) of the Department of General and Specialized Nursing of EERP-USP in the period from August 2020 to March 2022.

Stage 1 – Analysis and Planning

The bibliographical research occurred throughout the research elaboration, focusing on publications related to the topics of interest of the study: AH and COVID-19 in childhood. The content addressed aimed to bring simple and effective knowledge about AH to children's audience, so that children can know and understand their disease, in addition to acquire and develop greater autonomy over it. Moreover, preventive and coping measures that children can take regarding the

new coronavirus pandemic were addressed, with the aim of promoting individual and collective protection. The target audience that this project intended to reach was school-age children (from 6 to 12 years old).

The sample of experts was composed of five experts who evaluated the content and three technical experts who evaluated the audiovisual content and the aesthetic, practical and specific issues involved in video production. An odd sample of technical experts and another of content experts were selected to avoid a tie of opinions[16].

The selection of content experts was conducted by a partnership network and according to the criteria proposed by Fehring[17]: master's degree in nursing (4 points); master's degree in nursing with dissertation in the area of interest of the study (1 point); doctoral thesis in the area of interest of the study (2 points); doctoral thesis on the subject of interest of the study (1 point), specialization on the subject of interest of the study (2 points); publication of research relevant to the area of interest of the study (2 points) and publication of an article on the area of interest of the study (2 points), being the area of interest of the study: pediatrics, AH and health education; and the subject of interest of the study: pediatrics, AH and construction of an educational video.

The professionals included as experts were those who scored equal to or greater than five points according to the established criteria, and all selected content experts scored greater than and/or equal to seven points.

The members of the Expert Committee were selected through the partnership network and contacted by email, through an invitation letter. Those who agreed to participate in the research received guidance for validating the script/storyboard and the educational videos, the validation instruments and the Free and Informed Consent Form (FICF), which were answered online.

The content experts were health professionals with broad knowledge and experience in research on AH and pediatrics, being members of the Interdisciplinary Research Group on Arterial Hypertension (*Grupo Interdisciplinar de Pesquisa em Hipertensão Arterial* - GIPHA) of the Department of General and Specialized Nursing of the School of Nursing of Ribeirão Preto from the *Universidade de São Paulo* (EERP – USP) and experts/scientists from the academic community. The team of technical experts was composed of professionals with previous experience in communication and video production, as well as experts in the scientific production of audiovisual media focused on the health area.

Stage 2 – Modeling

The preparation of the script/storyboard took place from readings of scientific articles that addressed AH in childhood, COVID-19 and the relationship of the new coronavirus pandemic with the imminent risk in the lifestyle of the hypertensive child population. The script was created with the aim of gathering and presenting the contents that would be relevant in educational videos. It has an explanation of what AH is, its causes, complications, treatment and BP monitoring at home. Moreover, it addresses what COVID-19 is, its transmission, contagion and symptoms, highlighting protection/coping measures and strategies to reduce the impacts caused by the pandemic on children's physical and mental health.

The storyboard was prepared based on the previously script, in which the selected themes and contents are portrayed in a playful and fun manner. It has a detailed description of the animations that will translate the verbal language and the content of the videos in the form of illustrations and drawings that catch the child's attention and allow them to learn through the playfulnessproduced by digital media.

To validation of the script/storyboard, two validation instruments proposed by Campoy[18] and adapted for the study subject were used: one for the content experts and another for the technical experts. The instruments had questions about the characterization of the experts and questions that allowed evaluating the materials regarding the items: objectives, content, relevance, verbal language, inclusion of topics, functionality, usability and efficiency. The instruments sought to assess the quality and effectiveness of the materials produced for possible applicability to the target audience.

Both Instruments were structured for Google Form and had a Likert-type scale of five points in level of agreement, in which the technical and content experts analyzed the sections/questions and marked the options "Strongly Agree", "Agree", "Disagree", "Strongly Disagree" and "Don't know" according to their assessment.

To validation of the script/storyboard content, two rounds of validation were performed. The instrument had 19 questions, divided into 05 sections and provided spaces for experts to show their suggestions and comments regarding each topic. The experts evaluated the materials regarding the sections and questions described in detail below:

- **Objectives (3 questions):** These refer to purposes, goals, or endings that you want to achieve through practice with educational videos. Questions: Are the objectives consistent with the target audience?; Are the objectives consistent with the research proposal?; Are the objectives adequate to be performed?
- **Content (7 questions):** Refers to the way of presenting the videos, including their general organization, structure, presentation strategy and sufficiency. Questions: Does the content presented in the storyboard correspond to the objectives proposed in the work?; Does the content facilitate the teaching-learning process of the target audience?; Does the content allow understanding of the topic?; Does the content follow a logical sequence?; Does the content address all the information on AH necessary for the target population to learn about the topic?; Does the content address all the necessary steps for the target audience to cope with COVID-19?; Is the information the storyboard presents correct?
- **Relevance (3 questions):** Refers to the characteristics that assess the degree of significance of the items (images and scenes), based on the script and the storyboard of the educational videos. Questions: Do the images and animations illustrate important aspects for understanding the measures to cope with COVID-19 by the target audience?; Are the images and scenes relevant for children to understand about AH?; Do the images and scenes allow the transfer and generalization of the content learned to different contexts?
- **Verbal Language (2 questions):** Refers to the language that will be used in the educational videos. Questions: Is the language of the storyboard accessible to the target audience?; Is the verbal language easy to assimilate and can be easily understood by the target audience?
- **Inclusion of Topics (4 questions):** Refers to the inclusion of topics related to procedures of coping with COVID-19 and understanding about hypertension in childhood, which will be presented in the educational videos. Questions: Objectives of educational videos; Objectives of blood pressure monitoring at home; Description of the information necessary for understanding AH in childhood; Description of measures to cope with COVID-19 that can be adopted by the target audience.
- To validation of the **audiovisual content** of the script/storyboard, two rounds of validation were performed. The instrument had 11 questions, divided into 03 sections, and had spaces for experts to place their suggestions and comments regarding each topic. The experts evaluated the materials regarding the sections and questions described in detail below:
- **Functionality (2 questions):** Refers to the components present in the script and storyboard of the videos, which aim to accomplish the objectives. Questions: The script and storyboard of the videos propose understandable and easy-to-understand interventions on AH in childhood and coping with COVID-19; Does the video script and storyboard have the potential to generate positive results?
- **Usability (3 questions):** Refers to the expected ease of using the videos, from the script and the storyboard. Questions: Is it easy to learn the concepts that will be used in the videos and their applications on AH and COVID-19?; Do the videos allow the user to learn about hypertension in childhood and the measures to cope with COVID-19?; Do the videos help the user clearly and efficiently, not being tiring?
- **Efficiency (6 questions):** Refers to the predicted level of performance of the videos about the resources used, based on the script and the storyboard. Questions: Is the proposed time suitable for the user to understand and learn the content?; Is the number of scenes consistent with the time proposed for the videos?; Do the images and animations meet the target audience and the proposed objective?; Does the text that will be narrated in the videos coherent and easy to understand?; Are the description of the scenes, the materials that will be used and the techniques demonstrated clear?; Is the language description (audio/narration, images/animations, pictures) clear?

Stage 3 – Implementation

The production of educational videos occurred from the script/storyboard after the double round of validation of these materials. The videos were produced and prepared using audiovisual animation techniques. It should be highlighted that the two videos were constructed in a complementary way and designed for joint application, with the first addressing more on AH, its pathophysiology, its complications, on monitoring (BP) at home, on medication treatment and non-medicated and on the consequences of the disease for the public. At the end of the first video, the connection begins with the second video, which addresses COVID-19, its pathophysiology, its signs and symptoms, its complications, the coping measures that should be adopted,

vaccination of children's audience and on the consequences of the pandemic and COVID-19 for hypertensive children. It was chosen to divide the content into two videos to prevent them from becoming long, tiring material that did not catch the attention of the children.

The construction of the materials took place through applications, digital media platforms and specific software for the creation of this type of media. Three independent acquisition applications were used to design and edit the educational videos: Paint Tool Sai to create hand-made drawings; Photoshop CS6 for cutting and editing images/animations and Adobe Premier Pro 2020 for editing animations, audio/narrations, and background music. The narration was done voluntarily, the audios were recorded using the ASR application (Free MP3 Audio Recorder) and later edited and inserted into the videos. The uncopyrighted incidental music (background music) called "Children's Background" was previously selected to suit the children's audience and was later inserted in the educational videos.

Stage 4 – Evaluation and Maintenance

The two educational videos were analyzed and validated by technical and content experts. It should be highlighted that only one round of validation of the educational videos was performed and that the selected experts were the same ones who validated the script/storyboard, ensuring the continuity of production and monitoring of results.

At that moment, the experts made their first contact with the videos, where they analyzed and evaluated the contents, animations, narration, and the audiovisual part. Next, observations were made for improvement.

For the validation of the educational videos, only one instrument was used aimed at technical and content experts, which had 19 questions, divided into 06 sections with spaces for them to place their suggestions and comments regarding each topic. The experts evaluated the materials regarding the sections and questions described in detail below:

- **Functionality (2 questions):** Refers to the functions and/or objectives of the educational videos that are aimed at facilitating teaching about hypertension in childhood and measures to cope with COVID-19. Questions: Are the videos suitable tools for the objective they are intended for?; Do the videos allow to generate positive results in the teaching-learning process on the subject?
- **Usability (3 questions):** Refers to the effort required to use the videos, as well as the individual judgment of this use. Questions: Are the videos easy to use?; Is it easy to understand the theoretical concepts used and their applications?; Does it allow the user to easily apply the concepts worked in practice?
- **Efficiency (3 questions):** Refers to the performance level of the videos and the quality of the resources used for applicability to the target audience. Questions: Is the duration of the videos (time used) appropriatefor the user to learn the contents?; Is the number of scenes consistent with the time proposed for the videos?; Is the language description (audio/narration, images/animations) clear?
- **Audiovisual Content (3 questions):** Refers to the set of technical resources used to display the content of the videos. Questions: Are the narrator's tone and voice clear and appropriate?; Is the narration of the videos used efficiently and understandableto the target audience?; Do the pictures, images and animations used in the videos contribute to interactivity and efficiency?
- **Environment (3 questions):** Refers to the evaluation of scenes from educational videos. Questions: Are the images/animations used consistent with the target audience?; Are the colors and background music suitable for the target audience?; Does the animated format of the videos allow a better understanding of the content by the target audience?
- **Procedure (5 questions):** Evaluates whether the content presented in the educational videos allows the target audience understanding. Questions: Objectives of educational videos; Are the contents about AH (what it is, causes and functioning) appropriate and understandable?; Are the guidance on the stage of indirect blood pressure measurement at home clear and understandable?; Are the guidance on the treatment of AH (non-drug and drug) appropriate and understandable?; Are the guidance on COVID-19 (contagion, coping measures and symptoms) clear and understandable?

The Content Validity Index (CVI) was used to measure the agreement of the validation instrument items and the quality of the material produced, and the items considered valid were those that obtained CVI > 0.80[19]. The data collected were insertedinto a database, constructed, and stored in an Excel spreadsheet.

The quantitative variables were measured and represented through the variability test (minimum, maximum and standard deviation), while the qualitative variables were evaluated by calculating the absolute and relative frequencies and the mean and median of the experts' answers to

the validation instruments (strongly agree, agree, disagree, strongly disagree and don't know).

After validation and analysis of the suggestions made by the experts, modifications were made to the educational videos, through corrections and changes in animations, narration and video editing, aiming at better quality of materials and better understanding by the target audience.

It should be highlighted that the materials will be used later for the development of new semantic validation studies.

Stage 5 – Distribution

The finalized and validated educational videos were published on social and institutional media.

Ethical aspects

The research was submitted to the Research Ethics Committee of the School of Nursing of Ribeirão Preto, *Universidade de São Paulo*, it was approved under opinion 4,296,656 and was registered in *Plataforma Brasil* under CAAE No.: 36921720.2.0000.5393.

RESULTS

The expert committee that validated the script/storyboard and the educational videos was composed of eight members, being five content experts responsible for evaluating the content addressed in the materials, and three technical experts responsible for analyzing the audiovisual content.

The **content** experts were female, with a mean age of 43 years and academic background between 11 and 20 years or more. Regarding the area of current training, 100% of the experts are professors of related disciplines (AH, Pediatrics and Health Education) and 20% are nurses in the area of study. Sixty percent of the experts are doctors and 40% have a postdoctoral degree. Eighty percent claimed to be nurses and 20% had an academic degree in Health Sciences. All experts had a doctoral thesis and scientific research publications in the area of interest of the study; 80% reported having clinical practice for at least one year in the subject of interest of the study; 40% had specialization in the subject of interest of the study; 20% had a master's degree in nursing and 20% had a master's degree in nursing with a dissertation in the area of interest of the study.

Among the **technical** experts, 66% were female, with a mean age of 39 years and with academic training between 3 and 20 years or more. Regarding the areas of work of the experts, 100% worked in universities, higher education institutions and similar, in addition to have previously worked with the production of educational material in health. Regarding academic degrees, two of them were graduated and one had a specialization in the subject and/or area of study. One of them had a degree in nursing, another in advertising and one had a specialization in Communication and Arts.

First round of script/storyboard validation

The instrument of content validation had 19 questions divided into five sections, which when evaluated by the five content experts resulted in 95 answers in total, 15 answers in the objectives section, 35 answers in the content section, 15 answers in the relevance section, 10 answers in the verbal language section and 4 answers in the inclusion of topics section. The results of the first round of **script and storyboard content** validation are shown in Table 1, which describes the distribution of answers by content experts in each section of the instrument.

The instrument of audiovisual content validation had 11 questions, divided into three sections, which when evaluated by the three technical experts resulted in 33 answers, with 6 answers in the functionality section, 9 answers in the usability section and 18 answers in the efficiency section. The results of the first round of validation of the **audiovisual content** are shown in Table 2, which describes the distribution of the answers of the technical experts in each section of the instrument.

The experts suggested changes in the materials, regarding the objectives and content presented, the language used and the intended animations. Items marked as "Disagree" were analyzed and modified according to the experts' suggestions and observations.

Second round of script/storyboard validation

After the first stage of validation, the materials were reformulated and forwarded again to be evaluated a second time by content and audiovisual experts. The instrument of validation used in the second round was the same used in the first and contained the same questions. Only a final question was added, asking whether the changes made to the materials were efficient in improving the preparation of the videos.

Table 1 – First stage of validation: distribution of absolute and relative frequencies of answers by content experts in the sections of the instrument of script/storyboard validation. Ribeirão Preto, São Paulo, Brazil, 2022

Sections	Strongly agree	Agree	Strongly disagree	Disagree	Don't know	Total
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
1. Objectives (3 questions)	07 (46.66)	05 (33.33)	-	-	03(20)	15 (100)
2. Content (7 questions)	19 (54.28)	15 (42.86)	01 (2.86)	-	-	35 (100)
3. Relevance (3 questions)	06 (40)	08 (53.33)	01 (6.7)	-	-	15 (100)
4. Verbal language (2 questions)	04 (40)	04(40)	02 (20)	-	-	10 (100)
5. Inclusion of topics (4 questions)	16 (80)	04 (20)	-	-	-	20 (100)

Source: Research data, 2022.

Table 2 – First stage of validation: distribution of absolute and relative frequencies of answers by technical experts in the sections of the instrument of script/storyboard validation. Ribeirão Preto, São Paulo, Brazil, 2022

Sections	Strongly agree	Agree	Strongly disagree	Disagree	Don't know	Total
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
1. Functionality (2 questions)	06 (100)	-	-	-	-	06(100)
2. Usability (3 questions)	07 (77.77)	02 (22.22)	-	-	-	09 (100)
3. Efficiency (6 questions)	14 (77.77)	04 (22.22)	-	-	-	18 (100)

Source: Research data, 2022.

In the second round of validation of the **videos content**, 100% of positive answers were obtained, with 20% related to the option "Agree" and 80% related to the option "Strongly agree". There were no "Disagree", "Strongly Disagree" or "Don't know" answers and the CVI was equal to 1.

In the second round of validation of the **audiovisual content**, 100% of positive answers were obtained, with 9% related to the option "Agree" and 91% related to the option "Strongly agree". There were no negative answers, and a CVI of 1 was obtained.

Regarding the added final question (which inquired about the changes made), 100% of the experts, both technical and content, answered "Strongly agree" or "Agree" regarding the importance of the changes made to improve the materials. In this final topic, 100% of positive answers were obtained and a CVI of 1.

Suggestions and modifications in the script/ storyboard

In addition to grammatical corrections, the main change suggested and made in the script was about the objectives, as exemplified below:

- **Pre-validation script:** "The objectives of the educational videos are to guide and provide knowledge to the child population regarding Arterial Hypertension (AH) and its complications, health care, improvement of quality of life, monitoring of blood pressure, information on COVID-19, as well as the coping measures that can be adopted to prevent the contagion and worsening of AH, thus seeking to improve the autonomy and knowledge of these children about AH and the pandemic of the new coronavirus".
- **Post-validation script:** "The objectives of the educational videos are to guide and provide information to the child population regarding Arterial Hypertension (AH), its causes, complications and treatment; health care and improvement of quality of life; monitoring of blood pressure at home; information about COVID-19, as well as the coping measures that can be adopted to prevent the contagion and worsening of AH. Thus, the aim is to improve the autonomy and knowledge of these children about AH and the new coronavirus pandemic. The educational videos target school-age children (6 to 12 years old)".

The suggestions were accepted, since the old version did not address all the objectives present in the materials, such as the causes and treatment of AH. The definition of the age of the target audience in the post-validation version is fundamental, since all the content, approach and preparation of the study is worked in such a way as to be accessible and easy to understand for children, since each age group within childhood has different development characteristics, such as motor, social, cognitive and language skills[20]. Therefore, the delimitation of the age of the target audience allows maintaining consistency between what will be addressed, the language that will be used and the types of animations/ illustrations.

Pre-validation storyboard	Post-validation storyboard
2.1 "But what is this COVID-19 that everyone is talking about? It is a pandemic that has spread all over the world. It is caused by a virus: the coronavirus, which can affect us in many ways, it may not manifest itself, it may leave us with flu-like symptoms or lead to very serious conditions and even death. It really is pretty bad, right?"	2.2 "But what is this COVID-19 that everyone is talking about? It is a disease that has spread all over the world. It is caused by a virus: the coronavirus, which can affect us in many ways: it can be quiet, not manifest itself and we do not feel any different. It can leave us with a fever, cough and runny nose or lead to very serious conditions and even death. It really is pretty bad, right?"
3.1 "How do we get this disease? The AH can happen because of increased body weight and lack of physical activity for at least 60 minutes every day. In addition, stress, and a diet with a lot of salt and processed foods can also contribute to the onset of the disease".	3.2 "But what can cause AH? It may arise due to increased body weight and lack of physical activity for at least one hour every day. It can also arise due to stress and due to a diet with a lot of salt and processed foods."
4.1 "But how does this disease work? It all starts in our heart: it has the important function of pumping blood to all our organs and for that it exerts a force on the blood vessels, known as blood pressure. However, the heart of a person with Hypertension has to exert a very large force to be able to distribute that blood to the body, putting greater pressure on the blood vessels and making the passage of blood more difficult".	4.2 "But how does this disease work? It all starts in our heart: it has the important function of pumping blood to all our organs and for that it exerts a force, which is our blood pressure. However, the heart of a person with Arterial Hypertension has to exert a very large force to be able to distribute that blood to the body, making the heart sick".

Chart 1 – Pre and post validation versions of the storyboard of items "2.1, 3.1 and 4.1". Ribeirão Preto, São Paulo, Brazil, 2022
Source: Prepared by the authors, 2022.

In the storyboard, the inclusion of terms and words that facilitate the public's approach to the theme were suggested, such as "high blood pressure". In addition, some changes in the way of addressing and in the way of explaining the content were also pointed out, as exemplified in Chart 1.

Some topics and subjects were added in the narration of the videos, such as the relationship between AH and the most serious manifestations of COVID-19, as well as guidance for preventing the virus. It was suggested the introduction of some more relevant coping measures that can be adopted by children, such as the correct way to wash hands and the right way to sanitize electronic devices.

Validation of Educational Videos

The instrument of educational video validation had 19 questions, divided into six sections, which when answered by the eight technical and content experts accounted for 152 answers in total, 16 answers in the functionality section, 24 answers in the usability section, 24 answers in the efficiency section, 24 answers in the audiovisual content section, 24 answers inthe environment section and 40 answers in the procedure section. The results of the validation of the educational videos are shown in Table 3, which describes the distribution of answers by technical and content experts in each section of the instrument.

We can see that all technical and content experts answered all the questions present in the Validation Instrument, accounting for a total of 100% of answers. We can observe that in total, 99.34% of the answers were positive, obtaining a CVI of 0.99. Only 0.66% of the answers were negative. In view of the results presented, we can consider the educational videos as validated materials regarding their content and the audiovisual technique applied.

Suggestions and modifications in the educational videos

Small changes were suggested in the videos, especially aimed at the visual and for better understanding and visualization, such as changes in the color palette and the introduction of more animations. Some adjustments to the narrations were requested, such as introducing "when leaving home" instead of "if it is necessary to leave home", since social isolation is no longer recommended as at the beginning of the pandemic. In addition, the need to include at the end of the second video about vaccination of children was discussed.

Table 3 – Distribution of absolute and relative frequencies of answers by technical and content experts in the sections of the instrument of educational video validation. Ribeirão Preto, São Paulo, Brazil, 2022

Sections	Strongly agree	Agree	Strongly disagree	Disagree	Don't know	Total
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
1. Functionality (2 questions)	13 (81)	03 (19)	-	-	-	16 (100)
2. Usability (3 questions)	21 (87.5)	03 (12.5)	-	-	-	24 (100)
3. Efficiency (3 questions)	17 (71)	06 (25)	01 (4)	-	-	24 (100)
4. Audiovisual Cont. (3 questions)	22 (92)	02 (8)	-	-	-	24 (100)
5. Environment (3 questions)	21 (87.5)	03 (12.5)	-	-	-	24 (100)
6. Procedure (5 questions)	36 (90)	04 (10)	-	-	-	40 (100)

Source: Research data, 2022.

Access to materials produced

The educational videos were posted on the institutional YouTube channel of School of Nursing of Ribeirão Preto of the *Universidade de São Paulo* and can be accessed through the following links: https://www.youtube.com/watch?v=RvMEnOhC6DY and https://www.youtube.com/watch?v=siPjq8Kgo7Q.

DISCUSSION

The development of educational strategies on AH and measures to cope with COVID-19 aimed at children can help in the early identification, treatment and control of these diseases, from school age to adulthood[1–4]. The promotion of knowledge about BP measurement at home, the monitoring of blood pressure figures and the effects of the COVID-19 infection on hypertensive children can be carried out with simple, low cost educational actions that can reach a large number of people and be applied in different social contexts[1–4,8,14].

Compared to text strategies, educational videos have been able to reinforce and motivate the importance of behavior changes in the health of school-aged children, as well as to reduce the incidence rates of infectious and chronic diseases through the application of methods of multimedia entertainment, with cartoons, based on real-life situations, in the form of dialogue or fun narrative[21–22].

The literature review conducted for the construction of this research did not find publications of current scientific studies on the effectiveness of educational videos in promoting knowledge about AH in children. The videos produced and validated in this study included suggestions for changes in lifestyle based on healthy eating habits, increased physical activity and BP measurement procedures at home[1–4]. However, the real contribution of the development of this material to the control of blood pressure figures in childhood requires the development and implementation of intervention studies with representative samples of this age group.

The literature pointed out that children understand and perceive the pandemic caused by COVID-19 and are not outside to recent events[23]. These data reinforce the need to develop research in the field of nursing and in the multidisciplinary context that playfully address measures to cope with the virus and the implications of health care for the prevention of cardiovascular diseases[23].

Initiatives to promote knowledge about COVID-19 and its effects on the health of hypertensive individuals were implemented after the discovery of the disease[24–25]. The urgent need to disseminate information in the mass media made it difficult to apply robust research methods and validate educational materials aimed at children. However, the creation and dissemination of videos in the context of public health has generated positive learning experiences for children around the world. As for example the material produced in 2021, the Pan American Health Organization (PAHO), in partnership with the global entertainment company Smart Study, published a video campaign on digital platforms with the aim of encouraging young children to protect themselves from COVID-19 by hand washing[26].

Studies that constructed and validated educational videos as a health education strategy demonstrated that audiovisual resources aimed at early childhood education contribute to attract the curiosity of the target audience and stimulate actions for change[27–29]. The use of playfulness brings the child closer to the portrayed subject, in order to allow better assimilation and understanding of the content, resulting in effective learning, development of self-care and health improvement. By being able to view the health problem in a animated and relaxed way through the video, the child becomes aware of the theme addressed and understands learning as something attractive, favoring the understanding of coping and prevention measures in the face of the health issue[27–29].

For the validation of educational materials in health, it is essential that the selected experts to be qualified to perform a critical, reflective and updated evaluation of the content, identifying whether the dimension of each item is relevant to the target audience, and defining whether the material produced has proper quality and is relevant to health education[30]. The characterization of the experts selected for this study showed a highly qualified board, since all the invited experts had academic titles, training, knowledge, and experiences related to the theme and area of study.

The experts performed a critical analysis based on evidence of the materials produced from measurable indicators proposed in the Validation Instruments, contributing with relevant suggestions and observations for the improvement of the videos, as well as the evaluation of the relevance of each material. It should be highlighted that methodological rigor was applied and followed at all stages of the preparation of this study.

The results showed high levels of agreement between the experts regarding the content (100%) and the audiovisual technique (100%) used in the materials produced, allowing us to consider the educational videos valid for the acquisition of knowledge about AH and COVID-19 to the children's audience.

Despite the methodological rigor, the quality of the expert panel, the time dedicated to the analysis and construction of the study, the choice of animations and the language used, the double rounds of validation and the relevance of the study and the materials produced, some limitations may be considered. The educational videos were narrated in Portuguese, are not available in other versions and do not have subtitles for other languages. Moreover, the videos produced did not undergo semantic validation and were not applied to the target audience, which could compromise the language used and its understanding by children, highlighting the need for further studies of semantic validation with the materials produced.

CONCLUSION

Considering the objective of this study, the educational videos were produced and proved to be valid in terms of content, with the potential to promote knowledge of hypertensive children in the context of COVID-19.

The material developed is open access and can contribute to the promotion of simple and effective knowledge of children with AH and their caregivers about the disease, possible complications, its treatment, and BP monitoring at home, as well as about the means of coping with the pandemic caused by COVID-19, its possible complications and the measures of personal protection and hygiene that must be adopted. In addition, the materials produced will contribute to health education, to the control of AH, to the prevention of new infections associated with the new coronavirus, as well as to the improvement of the quality of life and the exercise of the child's autonomy over their own health.

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