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ARQUIVOS EM ODONTOLOGIA

Development and validation of educational videos to improve adolescents' ability to identify fake news and seek reliable online health information

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Aim: this methodological study aimed to develop and validate six educational videos to improve adolescents' ability to identify fake news and critically seek reliable online health information.

Materials and Methods: ten adolescents and ten experts in Dentistry, Education, and Audiovisual Media participated in the study, which followed ten steps: literature review, script development, expert selection, script evaluation with an instrument, script improvement, video recording, video editing, expert evaluation through instrument and interview, feedback analysis, and final versions development.

Results: both scripts and videos scored 80% or higher in all evaluations, indicating their adequacy. Videos scored 80% or higher in content, audiovisual quality, and character portrayal. Feedback on audiovisual elements and key information was incorporated into the final versions. The average video duration was 1 minute 48 seconds.

Conclusion: both experts and adolescents found the videos a useful and valid tool for improving adolescents' skills in identifying fake news and seeking reliable health information online.

Uniterms: health education; adolescent; disinformation; instructional film and video.

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INTRODUCTION

Access to health information is crucial for patient empowerment, enabling individuals to actively engage in decisions about their health[1]. The internet connects people to essential resources like education, income, and healthcare[2,3], and it has become an increasingly popular tool for obtaining health information[4]. It can be extremely useful and reduce inequalities in health[1]. Technological advances and wider access to digital media have made significant strides, even in underserved socioeconomic areas and remote locations, offering more people the opportunity to connect to the internet[5,6]. In 2022, 5.3 billion people globally were using the internet[7].

Although the internet has become an essential tool in healthcare, it also plays a significant role in disseminating incorrect and false information. This can lead to confusion and harmful changes in health behaviors[8,9]. Therefore, it is essential to improve the population's Digital Health Literacy (DHL)[8,9]. DHL refers to the ability to effectively access, understand, evaluate, communicate, share, and apply health information sources from the internet[9].

Brazilian teenagers aged between 14 and 19 use the internet daily on their cell phones[10]. Moreover, adolescence is a moment marked by

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changes with an increase in self-awareness and interest in their health[11]. To better understand and manage their health, teenagers often seek information online due to easy access, a wide range of health topics available, and the discretion with which they can seek sensitive information[11]. Research on DHL among Brazilian teenagers is limited. However, a recent study[12] revealed striking statistics: 85.7% of teenagers surveyed reported daily internet use, with 28.6% spending more than 10 hours online each day. Additionally, 57.1% had searched for health information online, 50% had followed health advice from influencers or social media figures, and 23.8% admitted self-medicating based on information they found on the internet[12]. Therefore, it is necessary to empower the population to make effective use of digital media, that is, to carry out searches, interpret the information found, and adopt measures to prevent, treat, or solve health problems[13].

Despite the number of people looking for health information on the internet, false information, also known as Fake News, has also had an increasing presence. In addition to spreading quickly, Fake News has compromised the advances in government strategies for dealing with health problems, as they are shared faster and more widely than health information based on scientific evidence[14-16]. It has affected the trust of individuals towards health professionals and even influenced the choice of inappropriate treatments[17]. Furthermore, a health crisis occurred due to the infodemic situation, i.e., the excessive dissemination of unconfirmed and inaccurate digital information through social media[18]. The World Health Organization has recognized the infodemic as a public health issue and suggested that plans be developed and implemented to promote reliable information, based on scientific evidence, to combat misinformation[18-21]. Based on that, enabling adolescents to identify Fake News and carry out reliable searches for health information on the internet is a strategy to expand DHL.

Educational practices developed by health professionals can be a bridge between professional and patient, theory and practice, and help discern reliable information from fake news[22,23]. Educational Technology (ET) is understood as a mediation device between teaching and learning, resulting from systematized processes based on scientific evidence to develop a technology, material or not, to intervene in a given situation[22,23]. Short-duration videos can be an educational device due to their ease of consumption and shareability, with formats between 1 to 3 minutes being ideal for social media. This type of video captures the attention of younger audiences, making it interesting for the rapid and objective dissemination of important information.

Furthermore, this study aimed to develop and validate six educational short-duration videos, which are audiovisual ETs aimed at adolescents to empower them to identify fake news related to health and help them make reliable searches for health information online.

MATERIALS AND METHODS

Ethics

The study received approval from the Research Ethics Committee of the Federal University of Minas Gerais (Protocol: 51593521.2.0000.5149), in accordance with Resolution n. 466/12 of the National Health Council on research involving human participants.

Upon completion, the videos will be disseminated to the public via the official webpages of the UFMG Pediatric Dentistry Department, ensuring broad access to the educational content.

Study design and setting

This methodological study was conducted between April 2022 and May 2023, with all research activities performed online using e-mails and communication platforms, such as WhatsApp (Meta Platforms, Inc., https://web.whatsapp.com/) and Zoom (Zoom Video Communications, https://zoom.us/).

Study team and materials

The research team included two Ph.D. students and three dental students, supervised by an experienced professor. Required technological equipment comprised a laptop, smartphone, tripod, and ring light.

Study participants

A total of twenty participants took part in this study, including ten expert judges and ten adolescents representing the target audience.

The expert judges consisted of professionals from Dentistry, Education, and Audiovisual Media. Inclusion criteria for

audiovisual specialists required completion of, at least, a postgraduate specialization, while dentists and educators were expected to have a minimum of four years of professional experience and, at least, a master's degree in their respective fields. The expert judges provided consent by signing an informed consent form.

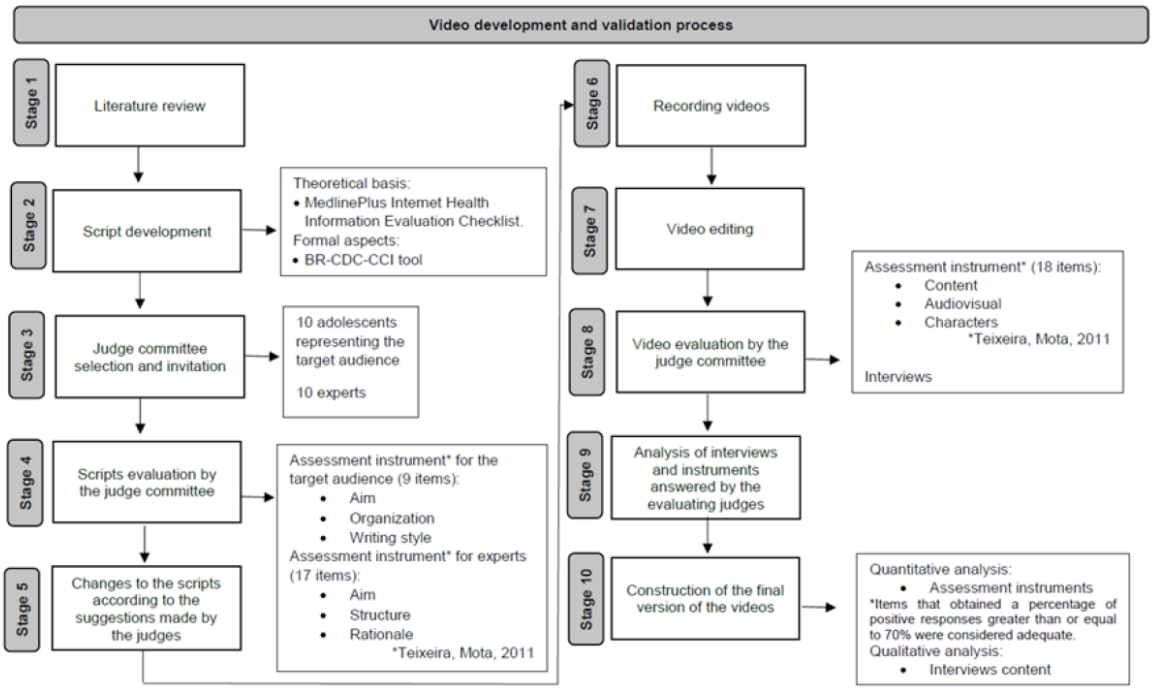
The adolescent jury included participants aged 13–18 years, who provided assent through a signed assent form, with caregiver consent obtained through a separate signed consent form. Adolescents with cognitive disabilities or those who were illiterate were excluded from the study.

Participants were recruited through convenience sampling from adolescents in the social circles of the authors. The sample size of ten per group was determined based on the methodology described by Teixeira and Mota[23], considered sufficient to achieve data saturation.

Procedures

The study involved the production and validation of six educational videos, designed to empower the target adolescents to identify health-related Fake News online. The development followed a ten-step process (Figure 1), with a detailed description of the methodology available in Baldiotti et al.[24] and further described below. Scripts followed the guidelines of the Brazilian Version of the Clear Communication Index[25]. The scripts and videos were developed and validated following the methodology proposed by Teixeira and Mota[23], with audiovisual adaptations made based on the work of Rosa[26].

Figure 1. Ten-step procedure for video development and validation.



Source: authors, 2025.

In the first stage, a literature review was conducted. Each video was developed to address topics in a logical, comprehensible sequence, tailored to the target age group. The content followed the guidelines outlined in the U.S. National Library of Medicine's *Evaluating Internet Health Information: A Tutorial*[27], and the *Internet Health Information Assessment Checklist*, from MedlinePlus[28].

Six scripts were then developed, each containing detailed information for its corresponding video. These scripts were designed to help the authors organize content and ideas, and later to allow the judges to evaluate the quality of the ET being developed.

With the scripts finalized, the team selected the judges based on the eligibility criteria. The judges were invited to participate, agreed to take part, and signed the consent forms.

Afterward, the experts received the six scripts to perform their evaluation. They were instructed to record their observations, critiques, opinions, and suggestions directly on the

scripts[26]. In addition, they completed an evaluation instrument originally developed by Teixeira and Mota[23] and later adapted for audiovisual ET by Rosa et al.[26]. The instrument consisted of items rated on a four-point Likert scale: "fully adequate", "adequate", "partially adequate", and "inadequate". The instrument for adolescents, representing the target audience, was appropriate for their age group and included 3 items on objectives, 2 on organization, and 4 on writing style. The instrument for the expert jury included 5 items related to objectives, 7 items related to structure, and 5 items related to rationale.

In the fifth stage, the authors received the observations, critiques, opinions, and suggestions written on the scripts, along with the completed evaluation instruments. Adjustments were made to the scripts whenever deemed necessary and appropriate for the development of the script's final validated version.

The sixth stage consisted of video recording, conducted indoors with controlled lighting to ensure visual consistency. One of the researchers appeared on camera, presenting the content based on the validated script. Following the recording, the seventh stage involved post-production, in which an audiovisual specialist handled the editing and refinement of the videos.

The eighth stage consisted of the video evaluation, which took place after the judges had individually watched each video during a meeting held on the Zoom platform. This process occurred in two phases: completion of a quantitative evaluation instrument originally developed by Teixeira and Mota[23] and adapted by Rosa et al.[26], followed by an interview. The instrument, applied to both experts and adolescents, included items assessing content, audiovisual elements, and characters[23,26], with responses rated on a four-point Likert scale ("fully adequate", "adequate", "partially adequate", and "inadequate"). After completing the instrument, the judges participated in an individual interview. The purpose of the interviews was to allow participants to reflect on each video and share their perceptions, as well as any suggestions or critiques.

In the ninth stage, a quantitative analysis was conducted based on responses to the evaluation instruments. For analytical purposes, items rated as "fully adequate" or "adequate" were classified as "adequate", while those rated as "partially adequate" and "inadequate" were classified as "inadequate". The percentage of positive responses was calculated for each item by dividing the number of participants who rated it as adequate by the total number of evaluators (n = 20, 10 experts and 10 adolescents) and multiplying the result by 100. If all participants rated an item as adequate, it received 100% positive responses. If, for example, two participants (10% of the sample) rated an item as inadequate, it received 90% positive responses. An item was considered inadequate if at least 7 participants (35%) rated it as inadequate, resulting in 65% or fewer positive responses. An item was considered appropriate if the percentage of positive responses was equal to or greater than 70%. Items that did not meet this criterion were modified. The qualitative analysis was conducted using the interview transcripts, following the phenomenological discourse analysis method proposed by Martins and Bicudo[29]. This involved identifying recurring themes and suggestions considered relevant by the participants.

In the final stage, the feedback obtained from both the quantitative and qualitative analyses was applied to the videos. This integrated approach guided the final refinements and resulted in the production of the validated video versions.

RESULTS

Six educational videos were developed and validated with the aim of empowering adolescents to identify fake news and perform reliable online searches. The videos' average length was 1 minute and 48 seconds (minimum of 1 minute and 34 seconds and maximum of two minutes and 48 seconds). Each video theme and duration are described in Table 1.

Table 1. Videos characteristics.

Video theme	Duration (minutes)
Video 1 – What is fake news?	1:34
Video 2 – Why and how are fake news created?	2:06
Video 3 – How to identify whether the information is true or not – provider and purpose	2:48
Video 4 – How to identify whether the information is true or not – information quality	2:31
Video 5 – How to identify whether the information is true or not – privacy	2:14
Video 6 – How to identify fake news on the internet?	2:09

In the experts' jury, seven judges were female, and three were male. They all resided in Brazil, being three in Minas Gerais state, three in São Paulo state, two in Paraná state, and one in Goiás state. Five of them have a Ph.D., three have a master's degree, and two have a specialization course. Graduation time ranged from 4 to 37 years, with an average of 11.6 (±10,74) years.

In the jury representing the target audience, five judges were female, and five were male, all of them from the state of Minas Gerais. Regarding their age, one of them was 13 years old, two were 14 years old, one was 15 years old, three were 16 years old, and three were 18 years old. Among them, three were in elementary school, and seven were in high school, with all attending private schools.

All the aspects evaluated in the scripts (objectives, structure, and rationale) reached an approving rate equal to or greater than 80%, as described in Table 2. The lowest percentage of positive responses for the script was 80%, which is a high rate. Scripts 4 and 6 were the best evaluated, obtaining 100% positive responses among adolescents and only one 90% evaluation among specialists.

Table 2. Positive responses according to experts and the target audience regarding the scripts.

Evaluators/ Judges	Aspect	Items	Percentage of positive responses (%)					
			Scripts					
			1	2	3	4	5	6
Experts	Objectives	The information is consistent with the everyday needs of technology's target audience.	100	90	80	100	90	100
		The information is important for the quality of life and/or work of technology's target audience.	100	100	90	100	100	100
		It invites and/or instigates changes in behavior and attitude.	90	90	90	100	100	100
		It can circulate in the scientific area environment.	100	100	100	100	100	100
		Meets the goals of the institutions that work with the technology's target audience.	100	100	90	100	100	100
	Structure	The technology is suitable for the target audience.	90	100	100	100	100	100
		The information is presented clearly and objectively.	100	100	90	100	100	100
		The information presented is scientifically correct.	90	100	100	100	100	100
		The material is suitable for the sociocultural level of the target audience.	90	90	100	100	100	100
		There is a logical sequence.	100	100	100	100	100	100
		The information is well structured in agreement and spelling.	100	100	100	100	100	100
		The style of writing corresponds to the level of knowledge of the target audience.	100	100	100	100	100	100
	Rationale	The themes portray key aspects that should be reinforced.	100	90	90	100	90	100
		Technology allows generalization and transfer of learning to different contexts.	100	100	90	100	100	100
		Technology proposes the construction of knowledge.	100	100	90	100	100	100
		Addresses necessary issues for the target audience.	100	100	90	100	100	100
		The technology is suitable to be used by any professional with the target audience.	90	90	80	90	90	90
Adolescents (representing the target audience)	Objective	Meets the goals of the technology's target audience.	100	100	100	100	100	100
		It helps during the daily life of the target audience.	100	100	100	100	100	100
		It is suitable for use by any professional who works with the target audience.	100	100	100	100	100	100
	Organization	The information is presented clearly and objectively.	100	100	100	100	100	100
		The themes are important and suitable for the needs.	100	100	100	100	100	100
	Writing style	The writing is in proper style.	90	90	80	100	90	100
		The text is interesting. The tone is friendly.	100	100	100	100	100	100
		The text is clear.	100	100	100	100	100	100
		The writing corresponds to the target audience's level of knowledge	100	100	100	100	100	100

The aspects evaluated in the videos (content, audiovisual elements, and characters) also reached an approving rate equal to or greater than 80%, as described in Table 3. Videos 2, 3, and 4 obtained the maximum score in all evaluated items by both specialists' and adolescents' juries.

Table 3. Positive responses, according to experts and the target audience, regarding the videos.

Aspect	Item evaluated by the jury	Percentage of positive responses (%)											
		Experts						Adolescents					
		Videos						Videos					
		1	2	3	4	5	6	1	2	3	4	5	6
Content	The information/content is coherent.	100	100	100	100	100	100	100	100	100	100	100	100
	The information/content is presented clearly and understandably.	100	100	100	100	100	100	100	100	100	100	100	100
	The way of presenting the content in the video is inviting for those who watch it.	100	100	100	100	100	100	100	100	100	100	100	100
	It can circulate in the scientific environment.	100	100	100	100	100	100	100	100	100	100	100	100
	It meets project goals.	100	100	100	100	100	100	100	100	100	100	100	100
	There is a logical content sequence.	100	100	100	100	100	100	100	100	100	100	100	100
	The information presented is scientifically correct.	100	100	100	100	100	100	100	100	100	100	100	100
	Content is not repeated.	100	100	100	100	100	100	100	100	100	100	100	100
	The content reflects the validated script.	100	100	100	100	100	100	100	100	100	100	100	100
Audiovisual elements	The video audio is suitable and helps with understanding the content.	100	100	100	100	100	100	100	100	100	100	100	100
	The songs are appropriate for the moment they are used.	100	100	100	100	100	100	100	100	100	100	100	100
	The video images are suitable for the content being worked on.	90	100	100	100	80	90	100	100	100	100	100	100
	The scenery is suitable.	100	100	100	100	100	100	100	100	100	100	100	100
	The illustrations are suitable for the work content.	100	100	100	100	90	100	100	100	100	100	100	100
	The images' lighting and framing are suitable.	100	100	100	100	100	100	100	100	100	100	100	100
Characters	The video participants speak clearly.	100	100	100	100	100	100	100	100	100	100	100	100
	The way they present themselves is suitable.	100	100	100	100	100	100	100	100	100	100	100	100
	The statements are suitable and reflect reality.	100	100	100	100	100	100	100	100	100	100	100	100

The judges offered suggestions for the script and for the videos, especially on the audiovisual characteristics, to highlight some information. There were similarities in some topics, such as changing the caption color, circling some images, and highlighting some phrases. Some of the main judges' suggestions can be seen in Frame 1.

Frame 1. Some of the main judges' suggestions for the script and videos.

(continues)

Theme	Quote
Audiovisual The judges commented on the video's color palette, particularly the background, suggesting that some choices could distract viewers.	Colors: *"I think that a color palette with shades of purple and yellow will be more attractive than the one with warm colors that is in the script" ("Acho que uma paleta de cores com tons de roxo e amarelo ficará mais atrativo do que essa de tons quentes que está no roteiro")* Music: *"Turn down the background music volume" ("Diminua o volume da música de fundo")*

(conclusion)

Also, they mentioned some issues with audio balance, noting that the music volume at times interfered with comprehension. Additionally, they noted that some scenes appeared visually crowded, suggesting image resizing and adjustments to font style and text movement for better clarity. Furthermore, they provided feedback on text design and subtitles, offering suggestions to enhance their clarity, functionality, and overall readability.	<u>Images:</u> *"At this point in the video, I think it's loaded with images..." ("Neste momento do vídeo acho que está bem carregado de imagens…")* *"I think it would be interesting to increase the size of this image" ("Acho que seria interessante aumentar o tamanho dessa imagem")* <u>Text Design:</u> *"I think it would be interesting to put a less rounded font" ("Acho que seria interessante colocar uma fonte menos arredondada")* *It would be better for the lettering to come out from the side and not from the top of the screen ("Ficaria melhor as palavras sairem do lado e não de cima da tela")* <u>Subtitles:</u> "I suggest changing the subtitle color to yellow or black" ("Sugiro mudar a cor da legenda para amarelo ou preto") "The subtitle would look better in yellow" ("A legenda ficaria melhor em amarelo") *"Put the subtitle a little higher*" ("Suba um pouco mais a legenda")
Highlight information The judges suggested emphasizing key elements on the screen to improve user attention and guidance. They recommended circling important phrases and highlighting certain images and sentences. Additionally, they proposed numbering the checklist items to make the sequence clearer, organized, and easier to follow.	Emphasis: "I think it is important to highlight some images and phrases" ("Acho importante destacar, circular, algumas imagens e frases") "Circle the sentences in red: 'Where to sign up' and 'Accept the cookies'" ("Circule em vermelho a frase 'Onde se inscrever' e 'Aceitar os cookies'") *"Circle the phrase 'Privacy Policy'" ("Circule a frase 'Política de privacidade'")* *"I think the term 'Privacy Policy' could appear on the screen" ("Acho que o termo 'Política de privacidade' poderia aparecer na tela")* <u>Clarity and Organization:</u> *"It would be nice to number the checklist items" ("Seria bacana numerar os itens dos checklists")*

DISCUSSION

This study developed and validated six audiovisual ET aimed at adolescents to enable them to identify health-related Fake News and to carry out reliable searches for health information online. As the internet is part of the life of more than five billion people around the world[9,30,31] and adolescents, digital natives, use it often without supervision[32], it is interesting and necessary to make the internet a resource allied to health by finding trustworthy information.

The use of the internet, especially social media, has strongly marked the Z generation, who want brief content with accessible language and attractive visuals. Thus, the popularity of short videos ascended and gained the spotlight, mainly on social media like WhatsApp, Instagram, and TikTok[33]. In this scenario, webpages and digital influencers, who tend not to follow quality protocols on their posts, encourage different types of behavior that can affect adolescents' lives positively or negatively.

Besides, there is false content dissemination, often of ideological or political background, that spreads information without scientific evidence, which often leads to changes in adolescents' lifestyle, increasing health-related risky behaviors. An example of this phenomenon is the recent expansion of the anti-vaccine movement and its negative repercussions[34,35]. Therefore, it is necessary to improve DHL and empower adolescents to identify Fake News and search for quality online content, allowing them to make conscious choices, especially related to health[36]. In addition, it is important to highlight the good characteristics and broadcast potential of social media in sharing science-related information.

In this context, ET, especially short videos, have been gaining notoriety due to their potential to bring quality information to their

target audience in a more attractive way, without geographic barriers, and with reduced costs[37-45]. Although audiovisual ET studies are growing[37-45], most studies in the health area miss the script validation, only validating the video. Besides, they are longer, making them less attractive and less shareable. To the best of our knowledge, all published work so far has developed one video per study, mostly aimed at the adult population[37-45]. Considering this study's young population (13–18 years old), methodologies that bring accessible language and lightly expressed information are key to engagement.

Given these considerations, it is important to involve both, the target audience and experts from diverse and complementary backgrounds, in evaluating the ET to capture a wide range of perspectives. In the interviews conducted after the instrument assessment, it was possible to notice the difference in the criteria observed by the judges. Specialists in Health Literacy were more concerned about the content, while professionals in the audiovisual area focused on colors, background music, and subtitles, highlighting the value of including experts with different areas of expertise. The adolescents' jury also made suggestions regarding the videos' enjoyment potential and the messages' clarity and accessibility. This, combined with the instruments' high grades, raised confidence in the ET quality.

This study followed a detailed methodology, intending to develop and validate audiovisual ET (videos) suitable for this proposal. As a next step, these videos will have their effectiveness tested in a randomized controlled trial. However, we must acknowledge certain limitations of the study, including the lack of representation from other regions of Brazil among the evaluators. These factors may have unintentionally influenced the results, somewhat restricting the generalizability of the findings.

Tools such as those developed in this study can serve as a bridge between the academic universe and the population. And here are some points worth reflecting on: *Does science effectively communicate with the public? Why is it easier to follow recommendations from digital influencers than from health professionals? Would we be able to translate our scientific findings to the population and spread our information with the same speed and engagement as Fake News? Would it be possible to develop initiatives that make popular digital influencers share our quality information?*

The answers to these questions could serve as a guide for how the scientific community can improve. Currently, we often do not publish our findings in accessible formats that make it easy for the general population to understand. As a result, people might find it easier to follow recommendations from digital influencers, who are relatable and present their messages engagingly and understandably. The good news is that it is possible to translate scientific findings and effectively share evidence-based information. Our study demonstrated one potential approach to achieving this. When it comes to spreading quality information with the same speed and engagement as Fake News, we might need powerful tools, such as advanced bots, to support our efforts. Ultimately, we can only know what's possible if we try.

CONCLUSIONS

The six educational videos developed in this study proved to be adequate in terms of content, audiovisual characteristics, and characters. ET in video format can be a tool for transferring scientific knowledge. The adoption of these practices could strengthen communication between researchers, professionals, and patients, serving as ammunition in the fight against fake news.

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AUTHORS' CONTRIBUTIONS

A.L.P.B. contributed to Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Visualization, and Writing – original draft. M.C.F.B. participated in Investigation, Visualization, and Writing – review & editing. F.C.F. contributed to Validation and Writing – review & editing. S.M.P. contributed to Conceptualization, Funding acquisition, Methodology, and Writing – review & editing. F.M.F. contributed to Conceptualization, Funding acquisition, Methodology, Project administration, Supervision, and Writing – review & editing.

CONFLICT OF INTEREST

The authors have no conflicts to declare.

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