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Original Article

Content validity evidence of a digital educational technology for alcohol use prevention

Evidências de validade de conteúdo de uma tecnologia educacional digital para prevenção do uso de álcool

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ABSTRACT

Objective: to verify the content validity evidence of a digital educational technology to prevent the use of alcohol in adolescents. **Methods:** this is a methodological study to validate the content of a digital educational technology called "Emotional health and alcohol use in adolescents". Validated instruments were used to evaluate the content, including expert appearance validation, and an instrument adapted for semantic validation by the adolescents. For data analysis, we calculated content validity, appearance, and semantic indexes. **Results:** participants included nine specialists and six adolescents, and we found a total content validity index of 0.97, a total appearance validation index of 0.83, and a total semantic validation index of 0.87, all above the parameters selected. **Conclusion:** the educational technology evaluated showed evidence of content validity, including its appearance and semantic aspects. **Contributions to practice:** we believe that the content validation process of this booklet can provide significant support to ensure its credibility, coherence, and appropriateness to address the topic of alcohol use prevention in adolescents.

Descriptors: Adolescent; Emotional Intelligence; Educational Technology; Nursing; Underage Drinking.

RESUMO

Objetivo: verificar evidências de validade de conteúdo de uma tecnologia educacional digital para prevenção do uso de álcool em adolescentes. **Métodos**: trata-se de um estudo metodológico voltado à validação de conteúdo de uma tecnologia educacional digital intitulada "Saúde Emocional e o Uso de Álcool em Adolescentes". Foram utilizados instrumentos validados para a avaliação do conteúdo, complementados por uma avaliação de aparência realizada por especialistas e por um instrumento adaptado para a análise semântica junto aos adolescentes. Para a análise dos dados, calcularam-se os índices de validação de conteúdo, aparência e semântica. **Resultados**: participaram nove especialistas e seis adolescentes, obtendo índice de validação de conteúdo total de 0,97, índice de validação de aparência total de 0,83 e índice de validação semântica total de 0,87, superiores aos parâmetros adotados. **Conclusão:** a Tecnologia educacional digital apresentou evidências de validade de conteúdo, abrangendo os aspectos de aparência e semântica. **Contribuições para a prática:** acredita-se que o processo de validação do conteúdo desta cartilha contribui significativamente para assegurar sua credibilidade, coerência e adequação ao abordar a temática da prevenção do uso de álcool entre adolescentes.

Descritores: Adolescente; Inteligência Emocional; Tecnologia Educacional; Enfermagem; Consumo de Álcool por Menores.

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Introduction

Alcohol consumption is a fixture of the social and cultural manifestations of different populations. However, its pure annual consumption in 15-year-old or older Brazilians reaches 7.7 liters, which is higher than the worldwide mean of 5.5 liters a year[1]. Moreover, there has been an increase in the rates of experimenting with alcohol before 13[2].

Considering that adolescence is a period of intense physical, psychological, emotional, and behavioral transformations aimed at social development and autonomy[3], there is also an increase in risk behaviors such as alcohol consumption, which can impair the biopsychosocial development of young people. In this context, excessive alcohol use during adolescence interferes with the development of cognitive functions, leading to deficits in learning, attention, memory, and psychomotor skills[3-4]. Additionally, alcohol use in this phase is often associated with the pursuit of social enhancement and coping strategies[5].

Research investigating factors that might protect against this risky behavior, which has important consequences for the development of the adolescent, research has shown that the lower the emotional intelligence, the greater the relationship between the intake of alcohol and that of other drugs. On the other hand, a higher emotional intelligence has a positive association with social skills, quality of life, better stress management, and the ability to deal with emotional adversities[6-7].

Thus, improving the emotional intelligence of adolescents can be a promising path to promote their mental health and prevent their alcohol consumption. Emotional intelligence is described as a person's ability to better understand and identify their own feelings and the feelings of others, stimulating and managing one's own emotions and interpersonal relationships[8].

Additionally, some emotional intelligence skills[8], namely self-control and self-knowledge, are described as essential for the development of teens, while also being protective factors against alcohol consumption[5]. Self-control is seen as one of the main abilities to build one's emotional intelligence, given that it is the capability of effectively managing emotions, especially in stressful situations. Self-knowledge is the ability of recognizing one's own emotional, social, and behavioral uniqueness[8].

Thus, considering that strengthening certain skills of emotional intelligence can serve as a protective factor against alcohol use among adolescents, nurses, as leaders in health promotion, emerge as key agents in developing actions aimed at promoting mental health. These actions can be implemented across different life stages and social contexts, also contributing to the prevention of risky behaviors and mental health disorders through care technologies informed by solid theoretical frameworks[9].

In this setting, Digital Educational Technology (DET) is an innovation in the development of health education, making it diverse and dynamic, and unveiling essential elements for adolescent learning[10]. Furthermore, considering that 95% of children and adolescents in Brazil access Internet every day or nearly every day, virtual environments have great potential as spaces for health education activities targeted at adolescents[11].

Nonetheless, despite the growing number of research on mental health and newly proposed DETs for mental health promotion, there are still few technologies of the sort in Brazil[12], especially considering materials that associate alcohol intake prevention and strategies to strengthen emotional intelligence skills. Authors have also shown the importance of studies that recognize the context of the population that is the target audience of technology, and how the participation of this public is essential in its process of production, seeing as technologies based on the needs of the subject are more likely to meet the demands of their target audience[13].

In this context, this study is based on the development of a person's meaningful learning and focused on the development of autonomy, emphasizing DETs to promote the digital access of adolescents to

interactive scientific content through easy-to-understand materials. This makes it a potential tool to care that is easily available for health and education professionals that work directly with teens.

Therefore, the goal of this study was to verify the content validity evidence of a digital educational technology to prevent the use of alcohol in adolescents.

Methods

Design of the study

This is a methodological study for the content validation of a DET to prevent alcohol consumption in adolescents by fostering the self-control and self-knowledge abilities that are part of their emotional skills.

Furthermore, in the content validation process, three specific aspects were evaluated: content and appearance, which were analyzed by specialists, and semantics, which was analyzed by the target-audience. For each aspect, we used specific evaluation instruments.

The development of DET took place in a meeting in November 2022, following four of the five stages of the Charles Maguerez Arch: a) observation of reality; b) key points; c) theorization; and d) solution hypothesis[14]. It counted on the participation of 38 students from 12 to 18 years old, from a public school in Cuiabá-MT. This school was selected by convenience, considering how accessible it was and how the school management welcomed the research. As for the adolescents, we included those who were at school in the day of the meeting and wanted to participate after being invited in the classrooms, as long as they were from 12 to 18 years of age.

At first, they were asked to build a critical tree, in which they would identify a mental health issue that was common in teens, including its causes and consequences. The most mentioned problems were: anxiety, alcoholism, and low self-esteem; the causes were bullying, family, and school; and the consequences were anxiety, depression, and isolation.

Then students were asked to associate the central issues to each social-emotional skill[8], namely: a) Empathy; b) Resilience; c) Self-control; d) Self-efficacy; e) Self-esteem. Self-control was the most common in the abilities mentioned (76 placements), followed by self-esteem (50), and self-efficacy (36).

At the end of the meetings, we concluded that three educational technologies were needed, involving the central issues and the emotional skills cited in the responses of the teens. For alcohol consumption, the skill was self-control; for anxiety, self-control and resilience; and for low self-esteem, self-esteem.

Thus, a booklet DET was built using the online platform Canva®. The contents of the booklet were elaborated according to the associations made by the students during the meeting and supported by scientific evidence found in the references of the booklet. The language of the information provided was adapted to its target audience. Content and appearance adjustments were made in three encounters, counting on the presence of nursing students, nurses who were PhD in mental health, as well as MS and PhD students in nursing. As a result, we developed a digital, educational and interactive booklet using the application Canva®, called "Teen mental health - promote to prevent".

We chose to separate the three topics within the booklet, and the alcohol was the first topic chosen given that it was the priority reported by the school community. As a result, this study seeks to validate this DET, an interactive booklet called ""Emotional health and alcohol use in adolescents".

Population

Specialists were selected according to specific selection parameters from this research, including: being a health worker; having *lato sensu* or *stricto sensu* education in mental health; and a minimum of six months of experience in teen health care. The selec-

tion began with a search in the Lattes platform, using the Boolean operator AND to connect two Portuguese descriptors chosen from the Health Sciences Descriptors (DeCS), namely "Adolescent Health AND Mental Health Services" Filters were also used to select both doctors and other researchers. The search strategy was put in place on April 22, 2024. Furthermore, specialists were selected via intentional sampling, following recommendations according to which groups should include from 5 to 10 specialists[15].

To form the group of target-audience evaluators, we selected the same state school of Cuiabá-MT in which data was collected to build the DET, as it is easy to access and the school management welcomed the research. Convenience sampling was used to select the teens, considering a minimum of six[16]. Thus, in June 2024, a meeting was held with the teens, and the evaluation stages were explained collectively. They were: a) booklet analysis; b) response to the form; c) closing.

Measuring instruments

After selecting experts, three data collection instruments were transcribed into the Google Forms® platform, including one instrument for the collection of sociodemographic data, one instrument validated for content evaluation[17], and one supplementary instrument validated for appearance assessment[18]. The sociodemographic data collection instrument included questions about sex, age, city, state, education, academic degrees, and the time working with adolescents.

The instruments used to validate the health education content use three domains to do so: 1- Objectives; 2 - Structure/Presentation; and 3 - Relevance. The responses to the instrument use a Likert scale scored as follows: 0 - Disagree; 1 - Partially agree; 2 - Strongly agree[17].

The last questionnaire applied to specialists is a supplementary instrument validated for the evaluation of the appearance of educational technologies. Its goal is to evaluate educational materials regarding their appearance using 12 questions. This instrument is also scored according to a Likert scale where 1 - Strongly Disagree; 2 - Disagree; 3 - Partially Disagree; 4 - Agree; 5 - Strongly Agree[18]. At the end of the instruments, there was an open question to include comments that specialists found necessary.

To collect the data from the target audience, we also developed a form using Google Forms®, which was the first instrument used for sociodemographic data collection. The second supplementary instrument was a tool adapted for semantic evaluations, addressing aspects such as organization, writing style, appearance, and booklet motivation. The responses to this instrument used a Likert scale, with the options: 1 - Inadequate; 2 - Partially Adequate; 3 - Adequate; 4 - Completely Adequate[16]. At the end, there was an open question, to receive comments.

Data collection

Data collection took place from April to September 2024. Specialists were contacted using a form that included the consent form, the three evaluation instruments, a PDF version of the booklet, the link to access its online version, and the PDF manual for PC access. We attempted to contact them three times, with a 15-day interval between these attempts. Specialists that did not respond after this period were excluded from the study.

As for the data collection with the target audience, participants were invited and received the consent form. A date, seven days later, was scheduled for them to respond and confirm participation. Thus, in June 2024, a meeting was held with the teens, and the evaluation stages were explained collectively. They were: a) booklet analysis; b) response to the form; c) closing.

Data analysis

The content validity of the DET was analyzed using the following indexes: Content Validity Index per item (CVI-I) and Total CVI (CVI-T), considering val-

ues of 0.80 or greater as valid[15]; Appearance Validity Index per item (AVI-I) and Total AVI (AVI-T), with values of at least 0.78 considered valid[18]; and Semantic Validation Index per item (SVI-I) and Total SVI (SVI-T), with values of at least 0.70 considered valid[16]. After this stage, subjective data in the "Comments" of the instruments were grouped in a Google Docs® file and analyzed for their pertinence. The booklet was adjusted after this step.

Ethical aspects

This research complied with all ethical principles of resolution 466/2012 from the National Council of Health for research with human beings. It was approved by the health Research Ethics Committee of *Universidade Federal de Mato Grosso* under opinion 4,466,951/2020 and Certificate of Submission for Ethical Appreciation: 38241420.4.0000.8124.

Results

Following the specialist search strategy described in the method, we found 5,737 results in the Lattes platform. The 100 first profiles were analyzed according to the selection criteria described in the method, and those with e-mail addresses were selected. After the CVs were analyzed in full, it was found that only seven experts were in accordance with our requirements. They were invited to participate, but only one responded. Later, 15 more experts were invited, but only 8 responded. As a result, 9 specialists participated in this study.

Regarding their sociodemographic data, most were female, from 35 to 44 years old, and most were graduated in nursing, followed by those graduated in psychology. Regarding their educational level, most professionals were specialists, followed by doctors and one master. As for their titles in mental health, all of them were specialists. In most cases they had worked with teens from one to three or four to six years, although there were two professionals with more than 10 years of experience. Regarding their geographical location in Brazil, they were from Mato Grosso, Amapá, and Bahia.

All items in the content validation instrument show a result of 0.88 or greater, with a total CVI of 0.97 (Table 1).

Table 1 – Validity index of the content of the digital educational technology, according to experts. Cuiabá, MT, Brazil, 2024

Domain/Items	n (%)	CVI*
Objectives: purpose, goal, or intent		
1. Meets its purported goal	9 (100.0)	1.00
2. Suitable for the teaching-learning process	8 (88.8)	0.88
3. Clarifies doubts about the topic addressed	9 (100.0)	1.00
4. Enables reflections on the topic	9 (100.0)	1.00
5. Encourages behavior change	9 (100.0)	1.00
Structure/Presentation: organization, structure, strategy, coherence, and sufficiency		
6. Language is appropriate to the target audience	8 (88.8)	0.88
7. Language is appropriate to the educational materials	9 (100.0)	1.00
8. Language is interactive, enabling active involvement in the educational process	8 (88.8)	0.88
9. Correct information	9 (100.0)	1.00
10. Information is objective	9 (100.0)	1.00
11. Information is explanatory	9 (100.0)	1.00
12. Information is necessary	9 (100.0)	1.00
13. Ideas are in a logical sequence	9 (100.0)	1.00
14. Subjects are up-to-date	9 (100.0)	1.00
15. Text size is appropriate	8 (88.8)	0.88
Relevance: significance, impact, motivation, and interest		
16. Stimulates learning	9 (100.0)	1.00
17. Contributes to increasing knowledge on the field	9 (100.0)	1.00
18. Creates interest about the subject	9 (100.0)	1.00
Total CVI		0.97

*CVI: Content validation index

Of the 12 items in the appearance validation instrument, 11 have an AVI ≥ 0.77. Item 6, "The illustrations depict the daily life of the target audience of the intervention" had an AVI of 0.66 and the total AVI was 0.83 (Table 2).

Regarding the answers given to the open question, 11 suggestions were made by the specialists, 9 of which were accepted (Figure 1).

Table 2 – Appearance validity index of the digital educational technology, according to the experts. Cuiabá, MT, Brazil, 2024

Items	n (%)	AVI-I*
1. Illustrations are appropriate for the target audience	7 (77.7)	0.77
2. Illustrations are clear and easy to understand	8 (88.8)	0.88
3. Illustrations are relevant to the target audience's understanding of the content	7 (77.7)	0.77
4. The colors of the illustrations are appropriate for the type of material	8 (88.8)	0.88
5. The forms of the illustrations are appropriate for the type of material	8 (88.8)	0.88
6. The illustrations depict the daily life of the target audience of the intervention	6 (66.6)	0.66
7. The images are arranged in harmony with the text	8 (88.8)	0.88
8. Illustrations clarify the educational contents of the material	8 (88.8)	0.88
9. Illustrations help show the topic and follow a logical sequence	8 (88.8)	0.88
10. There is a good amount of illustrations in the educational materials	8 (88.8)	0.88
11. The size of illustrations is appropriate in the educational material	8 (88.8)	0.88
12. Illustrations help change behaviors and attitudes in the target audience	7 (77.7)	0.77
Total-AVI		0.83

*AVI-I: Appearance Validity Index per item

Suggestions	Accepted	Conducts
I suggest replacing the term "phase" to define adolescent with, for example, life cycle.	Yes	Change made to page 3.
Too much text in the booklet.	Yes	The number of words was reduced throughout the booklet.
Use more teens throughout the material, in the style of the cover.	Yes	Characters were replaced in pages 1, 4, and 7.
On page three, there is the Brazilian expression that translates to "something wrong is not right". I suggest replacing it with a more updated expression.	No	No appropriate replacement was found, and the expression was simply excluded.
In page 13, the term "body protection system" is used, but page 08 says "immune system". I suggest using "body protection system". The term in the entire material.	Yes	The change was made to page 8, replacing immune system with body protection system.
In page 14 it is worth noting that unwanted pregnancy and sexually transmitted infections are indirect consequences in the Reproductive System, resulting from Risky Behavior, that is, Risky Sexual Behavior are the direct consequence.	Yes	We decided to remove unwanted pregnancy and risk of sexually transmitted infections, adding risky sexual behavior to page 14.
Address the prejudice of recreational use.	No	We believe that the elements already in the booklet address this suggestion.
In the emotional first aid page, I suggest adding the website "podefalar.org.br".	Yes	It was included in page 22.
Include the movie "Léo - O Lagarto" (Leo - The Lizard)	Yes	Replaced in page 24
Carry out a Portuguese revision before publishing.	Yes	The booklet was reviewed.
I think it is important to highlight the age group of adolescents according with the World Health Organization.	Yes	The age group was inserted in page 3.

Figure 1 – Suggestions of expert comments made to the digital educational technology. Cuiabá, MT, Brazil, 2024

Note: the illustrations above (screenshots from the mobile app) were only available in Portuguese.

Figure 2 – Final version of the Digital Educational Technology - Emotional health and alcohol use in adolescents. Cuiabá, MT, Brazil, 2024

The semantic evaluation was carried out by 6 adolescents, most of whom were female, from 15 to 18 years old. All students were in high school, and five participated in the earlier research to develop the DET.

The semantic validation index in the domains writing style, appearance, and motivation was 0.83, while in the organization domain, it was 0.95. Thus, the total semantic validation index (T-SVI) was 0.87.

The instrument given to the target audience received one answer to its open question, regarding the fact that the words were going beyond the margins of the booklet. After the suggestion was analyzed, tests were made in this regard, and the error could not be reproduced. Furthermore, in the questionnaires, we mentioned the importance of the initiative and the visibility of the topic in society, the good development of the interactive approach of the topic, as well as the fact it is self-explanatory and educates on the topic well.

Finally, after all adjustments suggested were implemented, the final version of the DET (Figure 2) was made. It was copyrighted in April 2025 and made available in the link https://www.canva.com/design/DAGNz9OC5JY/8_LhyL4UcLKmTfLSqlZ8Yw/view?utm_content=DAGNz9OC5JY&utm_campaign=designshare&utm_medium=link2&utm_source=uniquelinks&utlId=hc06de61b90#1.

Discussion

The validation of the educational content reached results above the literature recommendations of at least 0.80 in all domains, showing that the DET is valid and suitable to its target audience[15,17].

Nonetheless, the T-CVI of 0.97 stands out, as it almost met the highest possible score in the instrument, showing how well the content was transmitted in the domains evaluated[17]. This shows that the information discussed in the booklet is objective, well-structured, and relevant in the unanimous opinion of the evaluators[17]. Thus, it links public health concerns with this national and international epidemic of growing alcohol intake in adolescents[1-2].

Moreover, despite the growing development of educational technologies in Brazilian literature, there is no consensus regarding the ideal scientific methods of these technologies. The most used to this end in national literature is the adherence to methodological studies and the validation with specialists and target audience[19].

Thus, the mistaken use of content assessment instruments to evaluate appearance is usually adopted to evaluate new technologies. However, this practice makes it more difficult to carry out a reliable evaluation of aesthetic aspects. Therefore, it is necessary to use validated instruments to evaluate appearance and improve these materials, since appearance is responsible for 43% of the attention given to the content[18].

That said, the appearance of the items and of the instrument as a whole had a positive result. The AVI-I (≥ 0.66) and the AVI-T (0.83) met excellence levels, according to our theoretical framework[18]. That said, an individual evaluation of the appearance and content by specific instruments is needed, as the results found allow verifying the harmony between these two essential aspects of this technology.

Additionally, the data showed that the DET met semantic validation criteria in all domains of the instrument, even reaching above the parameters adopted by this study, which were of 0.70[15-16]. Therefore, this result confirms that the materials were understood and appropriate in regard to organization, writing style, appearance, and motivation to the adolescents.

This shows how important the participation of the adolescents is to build and validate technologies for them[20], as this approach enables us to analyze the same aspect from the perspective of the target audience and the specialists, in addition to significant differences, such as those found in Item 6 "The illustrations depict the daily life of the target audience of the intervention", which presented the lowest AVI-I (0.66), while the evaluation of the target audience in the appearance domain reached an SVI of 0.83.

In this context, adding interactive elements is essential for adolescents to adhere to the DET, as it

enables engagement and addresses the content in a more dynamic way[21]. The inclusion of images that transmit the information being communicated to the public increases adherence to the content and, therefore, behavioral change[22].

Additionally, it is worth highlighting the importance of using the digital environment to create and make available care technologies to the teenagers, due to the potential of these technologies to attract them and enable new experiences. This was reiterated by the specialists that evaluated the technology proposed here, as they pointed out that interactivity is essential for the adherence of this public to the DETs[23]. The low cost and ease of transmission also mean that these digital technologies increase the adherence of health workers[21].

Furthermore, the school environment stands out as the appropriate place for the development of educational technologies for this public, as it encourages contact with different social and emotional dimensions, while enabling contact with the agents that are part of them[24]. This is also a favorable environment to apply these technologies, aimed at increasing the effectiveness of care.

That said, the findings of this study corroborate current national literature about the potential of the technological development of nursing, especially in topics that involve the prevention of health issues and health promotion, as well as the improvement of emotional intelligence[23-25]. That said, the validation of educational technologies, such as the one developed here, help foster new studies that directly integrate the teen population, to prevent the use of psychoactive substances in addition to alcohol[26].

The development of technologies such as this is always needed, especially considering the current epidemiological setting of alcohol consumption in adolescents[1-2]. Digital means are likely to become more common as a place for actions to promote and prevent teen health, seeing as these are digital natives who spend more and more of their time in this space as technologies advance[27].

Furthermore, it is worth noting that the pedagogical sequence built in the booklet was created by strategies developed in the brief intervention, which is based on educational actions to foster reflection on the risks associated with the intake of psychoactive substances, in order to motivate behavior changes[28]. Evidence also portrays the impact of the brief intervention with audiovisual materials on the consumption patterns[28], which is similar to the interactive visuals in the chart this study developed.

Finally, nursing is the main category in the field of health that develops artifacts for the education in health of adolescents. However, despite the diversity of materials available to inform about health/mental health of adolescents, few of them went through the validation process, which is an essential stage to ensure the reliability of the educational materials[19,27]. Additionally, although the impact of non-validated materials is not measured, they represent gaps in the reliability of constructs regarding adolescent health care[27]. Thus, the findings of this study give support to further studies to build technologies, with expert validation and testing by their target audience.

Study limitations

Finally, it is worth highlighting that this study has limitations. The expert selection in the Lattes platform yielded a small number of researchers that could be contacted, especially considering the small number of researchers, especially due to the lack of contact information in the curricula on the platform. That said, it became necessary to use intentional sampling, addressing only the specialists that were accessible and in accordance with the criteria established. This choice, despite being justified by our goal to gather experts with an appropriate technical profile, may have limited the potential diversity of perspectives about the content evaluated. Additionally, the instruments used to evaluate validity were instruments made available online, which demanded access to the Internet and devices that could access it, which was an

issue for the adolescents at the time of data collection. It is worth noting that, due to the particularities of online applications, some experts may have answered faster to finish their participant in line with the time they had available, which may also have contributed for the high CVI levels found.

Contributions to practice

We believe that the process of content validation of this booklet significantly helps improve its credibility, coherence, and suitability when addressing the topic of alcohol use prevention in adolescents.

The validation allowed checking whether it was in line with the needs of the adolescents and technical-scientific guidelines, in addition to ensuring that its language and proposal are accessible and effective. Thus, if this booklet is understood and applied by nursing workers, it can support the ability of the nurse to propose educational technologies to prevent alcohol use in adolescents, as it develops/enhances socioemotional skills.

Conclusion

The interactive booklet "Emotional health and alcohol use in adolescents", a digital educational technology for teens from 12 to 18 years old, showed evidence of its validity in its content, and can be used by nurses with adolescents to prevent alcohol use by strengthening the emotional skills of self-control and self-knowledge.

Authors' contribution

Conceptualization, design, analysis, and data interpretation: Ribeiro AJS, Bittencourt MN. Relevant critical review of the intellectual content, final approval of the version to be published, and responsibility for all aspects of the text, ensuring the accuracy and integrity of any part of the manuscript: Ribeiro AJS, Bittencourt MN, Campos DS, Santos Junior DF, Moraes MS, Souza ARL, Félix IRS.

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