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Original Article

Promotion of children's body weight control: serial album validation*

Promoção do controle de peso corporal infantil: validação de álbum seriado

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ABSTRACT

Objective: to semantically validate the serial album *De Olho no Peso* (Keeping an eye on weight), to promote children's body weight control. **Methods:** methodological study, of semantic analysis of educational technology, by 42 children aged seven to 10 years, through the individual application of a questionnaire. The minimum semantic concordance index of 0.80 was considered. **Results**: all items of the questionnaire (organization, content, attractiveness and persuasion) were validated. The children found the illustrations on the flipchart easy to understand except for two. Responses about having liked each illustration ranged from 47.6 to 100.0%. The average concordance index of the illustrations was 0.86. After analyzing the responses, changes were made to the flipchart. **Conclusion:** the serial album *De Olho no Peso* presented a semantic concordance index equal to 0.89, demonstrating to be a validated technology to mediate educational actions on prevention and control of infant body weight.

Descriptors: Body Weight; Obesity; Child; Educational Technology; Validation Studies.

RESUMO

Objetivo: validar semanticamente o álbum seriado De Olho no Peso, para promoção do controle de peso corporal infantil. **Métodos:** estudo metodológico, de análise semântica da tecnologia educativa, por 42 crianças de sete a 10 anos, por meio da aplicação individual de questionário. Considerou-se o Índice de Concordância Semântica mínimo de 0,80. **Resultados**: todos os itens do questionário (organização, conteúdo, atratividade e persuasão) foram validados. As crianças consideraram de fácil entendimento as ilustrações do álbum seriado exceto a, dois. As respostas sobre haver gostado de cada ilustração variaram de 47,6 a 100,0%. A média de índice de concordância das ilustrações foi 0,86. Após análise das respostas, realizaram-se alterações no álbum seriado. **Conclusão:** o álbum seriado De Olho no Peso apresentou índice de concordância semântica igual a 0,89, demonstrando ser tecnologia validada para mediar ações educativas sobre prevenção e controle do peso corporal infantil.

Descritores: Peso Corporal; Obesidade; Criança; Tecnologia Educacional; Estudos de Validação.

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Introduction

In the last decades, there has been an increase in overweight and obesity in all age groups and social groups. In this sense, childhood overweight is a cause for concern, due to the evidence that overweight children and adolescents are at higher risk of developing obesity and other chronic diseases, including diabetes mellitus, cardiovascular diseases and dyslipidemia in adulthood[1].

Therefore, there is a need to intervene in children's health, with regard to health promotion practices, with a focus on preventing overweight and obesity. And, in the meantime, it is evident that the development and validation of educational health technologies can favor and innovate the quality of educational actions[2].

In this context, the flipchart stands out for being a simple, low-cost visual technological tool that can be easily used by health professionals in educational practice. Formed by pages in sequence, developing a single message in a progressive and logical way, the flipchart has the advantage of enabling dialogue between the parties involved and allowing the immediate resumption of any presented sheet[3].

Thus, in view of the scarcity, in the literature, of educational material on excess child weight with the target audience composed of children, the researchers developed the serial album *De Olho no Peso* (Keeping an eye on weight), validated by specialists, in order to promote educational technology that awakens in children aged seven to 10 years the importance of healthy eating and physical activity, in addition to other healthy habits[4].

Thus, this study is relevant in providing health and education professionals with educational technology to be used in the guidance of promoting healthy weight, in the age group of seven to 10 years, both in outpatient settings and in other spaces, such as schools, contributing to the promotion of health of children and families. Thus, the objective was to semantically validate the serial album *De Olho no Peso*, to promote children's body weight control.

Methods

Methodological study, a semantic validation, of the serial album *De Olho no Peso*, conducted in July 2015, with 42 children, aged between seven and 10 years. In the semantic validation, the objective is to verify if the content of the flipchart is understandable to the audience for which it is intended[5].

In the album, aspects related to the importance of having healthy habits are addressed, through the story of a group of health professionals (nurse Ana, nutritionist Fernanda and physical educator Carlos) who visit a school where they study two brothers (Maria and Francisco), both overweight.

It is noteworthy that, previously, the serial album was validated by 33 specialists in educational technologies and/or overweight children[4]. After validation by specialists, adjustments were made to the flipchart, generating the second version of the material, submitted for evaluation by the target audience, consisting of 18 pages: cover, eight illustrations and the respective eight script sheets and technical sheet with the names of the developers.

The study population consisted of children aged seven to 10 years, enrolled in a municipal school, in Santa Cruz, Rio Grande do Norte, Brazil, selected for convenience. Therefore, for sample selection, the inclusion criteria were established: being between seven and 10 years old and being a student at the selected school. The exclusion criteria adopted were: having a disease that causes impairment of physical activity, such as cerebral palsy, and presenting secondary causes of obesity, such as Cushing's Syndrome.

With regard to the number of participants for validation, the recommendation of 25 to 50 subjects for the validation of instruments and technologies was followed[6]. The sampling process was simple random: the lists of enrolled students in the afternoon shift (shift selected for convenience), in groups of 1st to 5th school grade, were randomly selected 15 children from each of the four ages of the study (7, 8, 9 and 10 years), which added up to a higher number

than desired, for predicting possible losses.

Thus, the following ethical documents were sent to the parents of 60 children: Informed Consent Term, Consent Term and Authorization Term for Voice Recording. At the end, the sample consisted of 42 children, 12 of whom were eight years old and 10 of each other age (7, 9 and 10 years).

The first moment of data collection consisted of the application of the flipchart, by a single researcher, to groups of four to six participants of different ages, with an average time of 20 to 30 minutes. In the second moment of the research, immediately after the educational intervention, other researchers, properly trained, applied an instrument for evaluating the serial album (individual interviews lasting 10 to 15 minutes).

For data collection, we used a form containing questions corresponding to the evaluation of the flipchart in terms of organization, content, attractiveness, cultural acceptance, persuasion and appreciation and ease of understanding of each illustration of the material, according to the Likert scale. The scores adopted varied from one to three, corresponding to Yes (Y), More or Less (ML), No (N), and it is also up to the children to describe opinions about the items. Regarding the general opinion about the album, the score ranged from one to four, corresponding to Great (GR), Good (GO), More or Less (ML) and Bad (B). We chose to use terms that are easy to understand for children.

During the interviews, whose audios were recorded, children were provided with a A4 size serial album, so that they could review the illustrations if they felt the need. In addition, the data collection instrument had space for comments at the end of each block of objective questions. Also, it was questioned what the children liked and what they didn't like in the serial album.

The empirical material generated in the interviews was treated by the content analysis method, following the three proposed steps: floating reading of the transcript of the interviews recorded in digital media; exploration of the material, identifying the thematic units; and treatment and interpretation of results[7].

Quantitative data were entered into a spreadsheet and analyzed using the statistical program R. For each answer value in each question, distributions were constructed, containing 42 values. The normalities of the distributions were verified with the Shapiro-Wilk test. Also, homogeneities of variance between the distribution of answers in each question were analyzed with the Bartlett test. In order to verify if the differences in proportions were statistically significant, the Kruskal-Wallis non-parametric test was used. The level of significance was set at 5%.

To verify the semantic adequacy of the analyzed material, the Semantic Agreement Index (SAI) was used, calculated based on two mathematical equations: the semantic agreement index at the item level (I-SAI) and the average of the semantic agreement index at the scale level (S-SAI/Ave)[8]. In this study, the I-SAI was defined as the semantic agreement index of the individual items, calculated from the division between the number of positive responses to a given validation criterion of the flipchart over the total number of responses to the item. The S-SAI/Ave is understood as the average of the semantic agreement indexes for a set of validation criteria for the flipchart. Finally, the global semantic agreement index 9 S-SAI Global) of the flipchart was calculated, which represents the average of the I-SAIs for all validation criteria of the flipchart, for the 42 children.

Regarding the general opinion about the album, great and good were considered positive responses; more or less and bad, as negatives. For the other criteria for validating the flipchart, yes answers were classified as positive, as relative the responses marked as more or less, and as negative values marked as no. It is emphasized that the SAI varies from zero to one, and the serial album would be considered valid if it had an S-SAI Global value greater than or equal to 0.80[8].

The project was submitted via *Plataforma Brasil* (Platform Brazil), with Certificate Presentation of Findings Ethics nº 44372615.9.0000.5054,

and approved by the Research Ethics Committee of the Federal University of Ceará, according to opinion nº 1,108,890/2015. The standards for research with human beings, present in Resolution 466/2012, of the National Health Council of Brazil were fulfilled. In order to preserve anonymity, children were coded Child 1, Child 2, successively, according to the order of the interviews. In the caption of the statements, the child's age was identified.

Results

The sample's average age was 8.99 years (± 1.2 years). The predominant sex was male (57.1%). With regard to the school year, six students studied in the first year; six in the second; 15, in the third; five in the fourth; and 10 were in their fifth year.

In the evaluation of the flipchart, according to the children's opinion, all items inherent to the organization, content, attractiveness and persuasion were considered validated (Table 1). For all items, the proportion of positive responses was significantly greater than the proportions of relative and negative responses ($p<0.05$). No statistical difference was found between the proportions of relative and negative responses.

In regard to graphics, the number 4 is the one that presented the S-SAI/Ave less than 0.80. Illustration seven showed the highest level of agreement among children. The mean of the S-SAI/Ave in the illustrations was 0.86 (Table 2).

Table 1 – Assessment of children regarding the organization, content, attractiveness and persuasion of the serial album *De Olho no Peso*. Santa Cruz, RN, Brazil, 2015

Variables (Questions)	Answers			*I-SAI
	Positive n (%)	Relative n (%)	Negative n (%)	
Organization				
Does the cover show the subject of the album?	39 (92.8)	2 (4.8)	1 (2.4)	0.93
Do you think the number of artwork on the album is good?	35 (83.3)	5 (11.9)	2 (4.8)	0.83
Did you like the colors used in the album?	40 (95.2)	2 (4.8)	0 (0)	0.95
†S-SAI/Ave				0.90
Content				
Does the album show information about healthy habits?	41 (97.6)	1 (2.4)	0 (0)	0.98
Did the illustrations help you better understand the subject of the album?	41 (97.6)	1 (2.4)	0 (0)	0.98
S-SAI/Ave				0.98
Attractiveness				
Did the cover catch your eye?	41 (97.6)	1 (2.4)	0 (0)	0.98
Do you feel like talking about the album?	34 (81.0)	5 (11.9)	3 (7.1)	0.81
S-SAI/Ave				0.89
Persuasion				
Do you intend to follow the guidelines of the album?	41 (97.6)	1 (2.4)	0 (0)	0.98
If you had to inform another child about how to control their weight, would you use this album?	41 (97.6)	0 (0)	1 (2.4)	0.98
S-SAI/Ave				0.98

*I - SAI: Semantic Agreement Index of the item; †S-SAI/Ave: Average of the semantic agreement indexes for each block of criteria

Table 2 – Evaluation of children's responses to the illustrations of the serial album *De Olho no Peso*. Santa Cruz, RN, Brazil, 2015

Illustrations	Reported to like the illustration (Response)			Reported to understand the illustration (Response)			*S- SAI/Ave
	Positive n (%)	Relative n (%)	Negative n (%)	Positive n (%)	Relative n (%)	Negative n (%)	
1	37 (88.1)	4 (9.5)	1 (2.4)	34 (81.0)	5 (11.9)	3 (7.1)	0.84
2	41 (97.6)	0 (0)	1 (2.4)	29 (69.0)	11 (26.2)	2 (4.8)	0.83
3	33 (78.6)	4 (9.5)	5 (11.9)	35 (83.3)	5 (11.9)	2 (4.8)	0.81
4	20 (47.6)	4 (9.5)	18 (42.9)	36 (85.8)	3 (7.1)	3 (7.1)	0.67
5	36 (85.7)	4 (9.5)	2 (4.8)	38 (90.4)	2 (4.8)	2 (4.8)	0.88
6	38 (90.5)	4 (9.5)	0 (0)	39 (92.8)	1 (2.4)	2 (4.8)	0.92
7	42 (100.0)	0 (0)	0 (0)	41 (97.6)	1 (2.4)	0 (0)	0.99
8	40 (95.2)	2 (4.8)	0 (0)	40 (95.2)	2 (4.8)	0 (0)	0.95
Average							0.86

*S-SAI/Ave: Average of the Semantic Concordance Indexes of each illustration

Upon questioning about "liking" the illustration, the images three and four were the only ones with percentage of positive responses below 80.0%. And the children considered the illustrations to be easy to understand, except for illustration two, which 69.0% of them pointed out as easy, as they did not understand the image of a health professional measuring the abdominal circumference of the character on the flipchart.

In all evaluations of the illustrations, the proportion of positive responses was significantly greater than the proportions of relative and negative responses. There was no statistical difference between the proportions of relative and negative responses. The only exception was for the "like" criterion in illustration four, where the proportion of negative responses was significantly higher than the proportion of relative responses; and the difference between the proportions of positive and negative responses was not significant.

When asked why they didn't like, or partially liked, illustration four, the children pointed out the characters' unhealthy habits. *I didn't like it, because it shows that they don't have healthy habits* (Child 21, 8 years old). *The girl is eating a lot of pizza and soda, watching TV. She's not eating healthy things* (Child 22, 9 years old).

Of the 42 children, 16 (38.1%) rated the serial album as excellent; 25 (59, 5%), good; and one (2.3%) responded more or less. No child considered the album bad. Thus, the serial album *De Olho no Peso* obtained, in this criterion, I-SAI equal to 0.98. In the end, the serial album *De Olho no Peso* presented S-SAI Global of 0.89, and the semantics were considered validated by the participating children.

The children's final comments on the flipchart showed that, in general, they liked the educational technology and understood the images. *I thought it was good, because people* (Maria and Francisco) *started to have healthy habits* (Child 23, 9 years old). *Because it teaches the way the person eats, the way the person has to eat* (Child 26, 7 years old). *It is great that it shows that we should eat better and exercise* (Child 14, 10 years old).

After analyzing the responses, changes were made to the cover *layout* and illustrations, such as increasing the size of the letters, changing the color of the cover and removing or changing images that were difficult for children to understand. In illustration two, the image of a boy swimming was replaced by another, in which a child appears running. In this way, the final version of the flipchart illustrations was produced (Figure 1).

Figure 1 – Cover and illustrations of the second and last versions of the serial album *De Olho no Peso*. Santa Cruz, RN, Brazil, 2015

With regard to the content of educational technology, Maria's age was changed from eight to nine years, in order to bring the age of this character closer to that of the highest target audience, 10 years, and Francisco's age was changed from six for seven years, to suit the age group of the target audience, which includes children from seven years old.

In addition, other changes were made: the text on the body mass index was removed, due to the difficulty of most children to understand, the non-specification of the amount of water ingested per day, as the Ministry of Health does not specify it for the age group children, and the replacement of physical activity time from 30 to 60 minutes daily, following the recommendation of the World Health Organization on the practice of physical activity for children aged five to 17 years.

Finally, there was a need to include a presentation page for the flipchart, containing information about the educational technology: objective, target au-

dience, university to which the researchers are linked and explanation about the composition of the script sheets.

Discussion

The impossibility of evaluating the effectiveness of the flipchart in clinical practice to increase the adequacy of knowledge, attitude and practice was the main limitation of this study, emerging as a future research perspective. In addition, the semantic validation of the flipchart represented a regional, cultural and historical aspect and, therefore, its use in other contexts may generate difficulties for children to understand the language and appearance of the educational material. With regard to historical limitation, based on the updating of scientific knowledge, the flipchart will need constant revisions.

Regarding the illustrations of the flipchart, illustration seven stands out for having the best evaluation, both from the point of view of children and specialists[4]. In the case of illustration two, the replacement of the type of physical activity is justified by the fact that swimming is rarely practiced by the children in this study, with a walking/jogging considered one of the most practiced activities in the age juvenile band, in part, due to its need for few resources to perform it[9].

There was a low acceptance of illustration three by the target audience, due to the presentation of images of overweight children. The media interference in imposing the thin body as a standard of beauty is reflected in children and adolescents, who spend several hours watching TV or using the internet[10].

In illustration four, the exclusion of the image of Francisco sleeping in the classroom was based on the observation that the association between sleep and obesity was not easy to understand for all children. Although this relationship is widely known in the scientific community, a study identified that more than 60.0% of parents of overweight adolescents were unaware of the benefits of adequate sleep for body weight control[11].

Thus, it is confirmed that the serial album, entitled *De Olho no Peso*, was considered educational material that presents semantics understandable to the audience it is intended for. As the results indicated, it was noticed how essential this step was to verify the legibility and clarity of the content that one wishes to convey, enabling changes to be made to the serial album, based on the reality experienced with the children.

The use of the flipchart as an educational tool has been shown to be effective in the learning and quality of health care, since a horizontal relationship is established between the mediator and the participants, with the exchange of knowledge and experiences, thus enabling mutual learning and continuous[12].

In a study developed with 112 women, the educational intervention using the serial album *Eu Posso Amamentar Meu Filho* (I can breastfeed my child) had a positive impact on the self-efficacy scores for breastfeeding and on the maintenance of exclusive breastfeeding in the intervention group[13]. Similarly, the use of the serial album *Alimentos Regionais Promovendo a Segurança Alimentar* (Regional Food Promoting Food Security), applied to 62 family members of preschool children, increased 59.7% in knowledge, 51.6% in attitude and 50.0% in practice in relation to regional foods[12].

In this context, a study identified that nurses use playful strategies to address the issue of overweight in health education actions with children. However, the use of validated educational technology on the subject has not been reported[14].

In this perspective, the development of the serial album *De Olho no Peso* sought to provide health professionals with instructive educational material, which facilitates the guidelines to be provided with scientific basis and that brings together coherent and appropriate content, in addition to illustrations that are comprehensible to children aged seven to 10. Ye-

ars and can be used in individual or group interventions.

Allied to this, as it is a story, the strategy tends to attract the attention of children. In addition, as the serial album visible to children is essentially composed of illustrations, this factor facilitated the understanding of the target audience, given that some of them possibly did not feel safe with the ability to read text.

Thus, it is emphasized that the serial album achieved one of the objectives: to encourage the target audience to reflect on unhealthy habits. Therefore, the main purpose of the study came from the concern with childhood obesity, and not, in any way, from the need to transmit a culturally acceptable standard of beauty.

In this sense, the difficulty of working with children was identified as a theme permeated by prejudices against obese and very thin individuals, which generates psychological and social suffering for them[15]. The importance, however, of giving these children a voice as a means of improving educational material for addressing body weight control, also points to the need for further studies on the construction and validation of technologies on this topic that have other target audiences, such as family, school and educators.

Conclusion

The serial album on prevention and control of body weight, entitled *De Olho no Peso*, was recognized with valid semantics by children aged seven to 10 years, and thus proves to be a device to promote health and mediate education actions in health on individuals or groups of children.

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Collaborations

Saraiva NCG and Araujo TL contributed to the design of the project, analysis and interpretation of data, writing of the article, relevant critical review of the intellectual content and in the final approval of the version to be published. Cavalcante LM collaborated with the writing of the article and relevant critical review of the intellectual content.

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