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Reproducibility of a questionnaire on psychosocial aspects related to the consumption of fruits and vegetables in adolescents

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Abstract

Objective: To perform cross-cultural adaptation and assess the reproducibility of a questionnaire on psychosocial aspects associated with fruit and vegetable consumption in adolescents. ***Methods:*** This is a test-retest study, carried out in 2015, with 92 adolescent students from a public school in Niteroi, Rio de Janeiro (Brazil). A cross-cultural adaptation of the questions related to the consumption of fruits and vegetables of the Costa Rican questionnaire "Psychosocial Aspects Associated with Nutrition and Activity Physics of Adolescents" which had five dimensions, distributed in 46 questions to evaluated the influence of self-efficacy, family, peers, body image, and media/environment on consumption. Reproducibility was assessed by comparing data obtained from two applications of the instrument. Kappa statistics and the intraclass correlation coefficient (ICC) were used. ***Results:*** The analyses showed that for 60% of the questions, the kappa value was statistically significant ($p<0.05$) and ranged between 0.21 and 0.52, indicating reasonable or moderate agreement. The psychosocial aspects that showed greater agreement were self-efficacy (ICC 0.75), family (ICC 0.59), body image (ICC 0.47), and peers (ICC 0.30). ***Conclusion:*** The questionnaire has good reproducibility and allows the assessment of specific psychosocial aspects related to fruit and vegetable consumption in adolescents. The tested questionnaire offers important support for the development and application of programs and actions aimed at promoting healthy eating among adolescents.

Keywords: Psychosocial aspects. Adolescents. Fruits. Vegetables. Reproducibility of results. Translation.

Resumo

Objetivo: Realizar adaptação transcultural e avaliar a reprodutibilidade de questionário sobre aspectos psicossociais associados ao consumo de frutas e hortaliças de adolescentes. ***Métodos***: Trata-se de estudo teste-reteste, realizado em 2015, com 92 adolescentes estudantes de escola pública de Niterói, Rio de Janeiro (Brasil). Realizou-se a adaptação transcultural das questões relativas ao consumo de frutas e hortaliças do questionário costarriquenho *"Aspectos Psicosociales Asociados a la Nutrición y Actividad Física de Adolescentes"*, o qual possuía cinco dimensões, distribuídas em 46 questões, que avaliavam a influência da autoeficácia, família, pares, imagem corporal e mídia/meio sobre o consumo. Avaliou-se a reprodutibilidade por meio da comparação de dados obtidos em duas aplicações do instrumento. Utilizaram-se a

estatística *kappa* e o coeficiente de correlação intraclasse (ICC). ***Resultados***: As análises mostraram que para 60% das questões, o valor do *kappa* foi estatisticamente significativo (p<0,05) e variou entre 0,21 e 0,52, indicando concordância razoável ou moderada. Os aspectos psicossociais que apresentaram maior concordância foram a autoeficácia (ICC 0,75), a família (ICC 0,59), a imagem corporal (ICC 0,47) e os pares (ICC 0,30). ***Conclusão***: O questionário apresenta boa reprodutibilidade e permite avaliar aspectos psicossociais específicos relacionados ao consumo de frutas e hortaliças em adolescentes. O questionário testado oferece subsídios importantes para o desenvolvimento e aplicação de programas e ações voltados para promoção da alimentação saudável entre adolescentes.

Palavras-chave: Aspectos psicossociais. Adolescentes. Frutas. Hortaliças. Reprodutibilidade de resultados. Tradução.

INTRODUCTION

The eating habits of Brazilian adolescents are characterized by high consumption of foods rich in saturated fat, added sugar and sodium, and low consumption of vegetables and fruits.[1-3] High prevalence of inadequate intake of micronutrients, especially calcium, vitamins A, E, sodium, fatty acids, and free sugar has been observed in this population group.[3]

In the 2008-2009 National Dietary Survey (INA) no vegetable was mentioned among the 20 foods most consumed by Brazilian adolescents and only bananas were included in that list.[2] The results of the second INA, carried out after 10 years (2017-2018), reinforce the low consumption of fruits and vegetables in this population, since no fruit was included among the 20 most consumed foods and raw salad was reported by 15.7 % of Brazilian adolescents.[3]

Reduced fruit consumption is one of the main risk factors for increased morbidity and mortality, as evidenced in a study that evaluated the impact of dietary factors on the disease burden in 195 countries between 1990 and 2017,[4] and in analysis that showed the protective effect of fruit and vegetable consumption on all causes of mortality[5] and on the maintenance of the body.[6] Strategies aimed at promoting healthy eating with a focus on increasing the intake of fruits and vegetables[4] are necessary and pressing.

However, nutrition education initiatives focused on disseminating information about food and nutrition have not been successful in changing eating habits.[7] The failure of these actions is often attributed to the lack in considering the various factors that can influence adolescents' choices and eating habits,[8] among which self-efficacy for health behaviors, self-esteem, body image, family, peers[9] and media,[10,11] are included, in addition to socioeconomic conditions.[12]

Self-efficacy, considered a good predictor of eating behavior, is defined as the belief in the ability to organize and put into practice the necessary action plans to achieve a certain result.[13-15] Dissatisfaction with body image can lead to risky behaviors for health - for example, inadequate nutrition.[16-18] The family has a great influence on the eating habits of adolescents, which can mirror the habits of parents and family members. The family environment can also favor the availability of fruits and vegetables and encourage their consumption.[19,20] The influence of peers and the media is an important aspect of the adoption of inappropriate eating habits.[10,11]

Studies that explore the psychosocial factors involved in food choices have been developed in adolescents from other countries.[21,22] In Brazil, there is little literature addressing the psychosocial factors that favor or create barriers to healthy eating among adolescents, and there are no known instruments that assess these psychosocial aspects. Thus, the present study aimed to carry out cross-cultural adaptation and assess the reproducibility of questionnaire on psychosocial aspects associated with the consumption of fruits and vegetables in adolescents, which are highly relevant foods for health, strongly recommended in all food guides,[23] which consumption in adolescents is very low.[1-3,24]

To use instruments consolidated in a different cultural context, careful cross-cultural adaptation and the reproducibility evaluation are essential. One of the main psychometric aspects of questionnaires, this assessment is related to the ability to faithfully measure a construct, with the results being reproduced consistently in time and space, that is, how stable, consistent or accurate the instrument is,[25] thus ensuring, that the instrument is reliable and suitable for the group to be evaluated.[26-28]

METHOD

This is a test-retest study carried out with adolescents of both sexes from a municipal elementary school in Niterói, in the State of Rio de Janeiro.

Development and description of the instrument

The questionnaire used in the present study was adapted from the questionnaire "*Aspectos Psicosociales Asociados a la Nutrición y Actividad Física de Adolescentes*" (Psychosocial Aspects Associated with Nutrition and Physical Activity of Adolescents) developed by Monge-Rojas et al.[29] for Costa Rican adolescents, which allows the simultaneous assessment of five psychosocial aspects that can influence the consumption of vegetables and fruits.[29]

The questionnaire consists of 46 false/true questions that describe positive and negative behaviors related to the influence of the family (8 questions), peers (7 questions), body image (9 questions), self-efficacy (14 questions) and of the media/environment (10 questions) on the consumption of fruits and vegetables. To score the questionnaire, one (1) point is assigned when a positive behavior is classified as "true" or when a negative behavior is considered "false". In opposite situations, that is, if a positive behavior is marked as "false" or a negative behavior considered "true", a zero value is assigned to the question. The points of each dimension are summed to estimate the corresponding score.[29]

The process of translation and adaptation of the original questionnaire took place between 2014 and 2015, after permission from the author of the original questionnaire for its translation into Portuguese, following procedures proposed by Reichenheim and Moraes[26] and Beaton et al.[27]

First, to proceed the cross-cultural adaptation, the questionnaire was translated into Portuguese by two researchers in the field of Nutrition fluent in Spanish and Portuguese. After this translation, a third researcher, not linked to the present study, back-translated the Portuguese version into Spanish. A comparison was carried out between the first version of the questionnaire and the back-translated version, to redefine the questionnaire in Portuguese. This version was submitted to scrutiny by specialists in the fields of Nutrition and Psychology, in order to verify the semantic equivalence and adequacy of the instrument's content to Brazilian food culture. New modifications and revisions were made regarding spelling correction and the use of colloquial language common among Brazilian adolescents, to improve the understanding of the questionnaire. This third version of the questionnaire was submitted to a group of nutritionists who are researchers in food consumption and, after specific modifications, it was considered adequate to be applied in Brazilian adolescents. Finally, the final version was approved by the instrument's original author.

After this stage, the questionnaire was pre-tested in 30 adolescents, aged between 10 and 12, students in the 5th year of elementary school in a public school in Rio de Janeiro-RJ, in order to verify its adequacy. It was decided to apply the questionnaire in this age group, as this group could present greater difficulty in understanding the instrument, as they have less cognitive development and a lower level of education. In this pre-test, it was observed that some words were still difficult to understand for the population to be studied, and they were modified to make the questionnaire more understandable, as it would be self-completed.

Sample size and participant selection

The definition of the sample size and the selection of test-retest study participants followed the recommendations of Browner et al.[30] To calculate the sample size of 100 students, α of 5% was considered, test

power of 95% and expected correlation coefficient of 0.35. Considering the possibility of non-response, there was a 30% increase in the sample size, totaling 130 adolescents.

Adolescents (10 to 19 years old) students from the 5th to 9th grade at a municipal school selected by convenience were eligible to participate in the study. Participants were randomly selected so that all eligible classes in the school under study were included in the sample.

Data collection

Data collection was carried out in August 2015 by a trained team, consisting of nutrition students and nutritionists. The adolescents completed a self-administered questionnaire (on paper) in the classroom after they had been instructed on how to answer the questions. During the filling in, the researchers remained available to clarify any doubts. To minimize possible errors, in the second application of the questionnaire, students were exposed to the same environment and to the same researchers as in the first application. The average interval between the two applications of the questionnaire was 30 days.

Statistical analysis

Descriptive statistics were used to summarize demographic variables. The *kappa* was estimated to verify the agreement of each statement in the questionnaire. The intraclass correlation coefficient (ICC) was applied to assess the agreement of the scores attributed to each psychosocial factor evaluated. According to Altman,[31] to interpret the *kappa* coefficients, as well as the ICC values, the following scale was adopted: poor agreement (0 to 0.20), fair agreement (0.21 to 0.40), moderate agreement (0.41 to 0.60), good agreement (0.61 to 0.80), and very good agreement (0.81 to 1.00). Statistical significance was considered for p-values ≤0.05.

Confirmatory factor analysis (CFA), using the SAS program (Statistical Analysis System, 2016), was used to test the multidimensional structure of the instrument, that is, to assess whether the statements represented the dimension in which they were originally inserted.[32]

Ethical Considerations

This research was approved by the Research Ethics Committee of the Institute of Social Medicine of the State University of Rio do Janeiro, on August 17, 2015 (Registration number: 10471313200005260). Participation in the research was conditioned to the signing of the Free and Informed Consent Form by a responsible person or by the individual aged 18 years and older.

RESULTS

Of the 130 students initially selected to participate in the study, 92 (71%) adolescents completed the two questionnaires for the analysis of reproducibility, these were aged between 10 and 16 years (mean age = 13 years, SD = 1.52), and 55% were male.

Table 1 shows the results of the agreement analysis evaluated by the *kappa* for each question. Overall, 60% of the 46 questions included in the questionnaire had significant *kappa* values (p≤0.05) ranging between 0.21 and 0.52 that is, indicating reasonable or moderate agreement. For self-efficacy, 70% of the fourteen questions had significant *kappa* ranging between 0.25 and 0.52, and for six questions the *kappa* values were greater than 0.40,

indicating moderate agreement. For body image, 55% of the nine questions had significant *kappa* ranging between 0.21 and 0.41. A significant *kappa* ranging between 0.23 and 0.52 was estimated for 50% of the ten questions related to media/environment. Regarding the influence of peers, 43% of the seven questions were associated with significant *kappa* values between 0.21 and 0.36. For family influence, kappa values between 0.26 and 0.34 were estimated in 40% of the eight questions.

Table 1. *Kappa* coefficient for questions of fruit and vegetable consumption of reproducibility analysis. Adolescents (n=92). Niterói, Rio de Janeiro, 2015.

Statements	*Kappa*	p-value
Influence of self-efficacy		
I usually don't eat fruit.	0,26[a]	0,01
I have a vegetable salad or vegetables available every day in my house.	0,52[a]	<0,01
I hardly ever eat vegetables because I don't like them.	-0,47	<0,01
I've learned with my friends to eat fruits and vegetables almost every day.	0,36[a]	<0,01
I only eat vegetables in my house.	0,25[a]	0,02
My friends and I enjoy vegetables	0,30[a]	0,04
I eat fruits and vegetables daily because it's healthy.	0,41[a]	<0,01
I don't miss eating vegetables.	-0,05	0,65
I highly enjoy eating vegetables.	0,46[a]	<0,01
At school, I prefer to buy food that fills me up rather than fruit.	0,34[a]	<0,01
Adolescents should eat fruits and vegetables daily to prevent cancer and heart attacks in their adult life.	0,31[a]	<0,01
My parents taught me to eat fruits and vegetables from a young age.	0,43[a]	<0,01
My family always make fruit and vegetable available, but I don't like to eat them.	0,45[a]	<0,01
Fruits and vegetables should be part of adolescents' daily meals.	0,01	0,36
Influence of media/environment		
Only girls should eat fruit to stay in shape.	-0,01	0,88
I don't eat fruits and vegetables sold in the street because I don't think they're clean.	0,26[a]	<0,01
I have a vegetable salad available at home every day.	0,52[a]	<0,01
We hardly ever buy fruit at home because they're costly.	0,13	0,21
In my circle of friends, we usually say that fruit is for girls, so when we are together, only girls eat fruit.	0,32[a]	<0,01
Fruit is sold at my school.	-0,53	0,62
When I go out with my friends, we don't bring any fruit.	0,31[a]	<0,01
I haven't been informed of the amount of fruit and vegetable I'm supposed to eat every day to maintain good health.	0,06	0,60
It's easy to find a good variety of fruit and vegetable where I live.	0,23[a]	0,02
There are always advertisements on tv, radio, and the internet suggesting we should eat fruit and vegetable every day.	0,19	0,08
Influence of family		
No one in my house enjoys eating fruits and vegetables every day.	-0,14	0,14
Salad or fruit and vegetable is a must on my family meals.	0,27[a]	0,01
I enjoy salad and cooked vegetables although we hardly ever eat them in my house.	0,34[a]	<0,01
In my family, we don't eat salad and steamed vegetables daily.	0,14	0,18
I've learned with my family, from a young age, to eat all kinds of vegetables	0,26[a]	0,01
In my family, fruits and vegetables are not part of a daily meal.	0,10	0,34
My parents seldomly buy fruits and vegetables because they don't like them.	0,13	0,14
In my family, we've always been used to eating fruit on a daily basis.	0,14	0,13
Influence of body image		
Famous people are slim because they eat fruits and vegetables.	0,21[a]	0,04
People with a fit body don't need to eat fruits and vegetables almost every day.	0,10	0,34
Fruits and vegetables are for fat people.	0,18	0,05

Table 1. *Kappa* coefficient for questions of fruit and vegetable consumption of reproducibility analysis. Adolescents (n=92). Niterói, Rio de Janeiro, 2015.(Continues)

Statements	*Kappa*	p-value
Influence of body image		
I eat fruits and vegetables almost every day to maintain my weight and feel good about myself.	0,30 [a]	<0,01
To maintain my figure, I eat fruits and vegetables almost every day.	0,41 [a]	<0,01
I only eat fruits and vegetables when I want to lose weight.	0,10	0,37
I'd rather be fat than eat fruits and vegetables.	0,11	0,24
I have to eat fruits and vegetables almost every day so as not to get fat and become a laughing stock among my friends.	0,34 [a]	<0,01
Eating fruits and vegetables makes no sense if you have a fit body.	0,40[a]	<0,01
Influence of peers		
I've learned with my friends to eat fruits and vegetables almost every day.	0,36[a]	<0,01
When I eat with my friends, fruits and vegetables are not part of the meal.	0,10	0,44
My friends and I think that young people don't need to eat fruits and vegetables.	0,21	0,05
My friends and I don't eat fruits and vegetables every day although we know that they're good for your health.	0,14	0,16
When I go out with my friends, we don't bring any fruit.	0,14	0,19
My friends don't like to eat fruit on a daily basis.	0,11	0,30
Eating fruits and vegetables is trendy at the moment among adolescents.	0,21[a]	0,04

[a] *kappa* 0,21-0,60 = significance reasonable - moderate

Table 2 shows the ICC values for each psychosocial factor present in the tested questionnaire. It can be observed that the aspects that had the greatest agreement were self-efficacy (ICC= 0.78; p<0.01), followed by family (ICC= 0.59; p<0.01) and body image (ICC= 0 .48; p<0.01), being considered with moderate to good reproducibility. Regarding the influence of peers, there was reasonable agreement (ICC=0.31; p=0.03). For media /environment, the ICC did not reach statistical significance.

Table 2. Intraclass correlation coefficient (ICC) values according to the psychosocial aspects of the questionnaire. Adolescents (n=92), Niteroi, Rio de Janeiro, 2015.

Psychosocial aspects	ICC	p-value
Self-efficacy	0,78	≤ 0,01
Family	0,59	≤ 0,01
Body image	0,48	≤ 0,01
Peers	0,31	0,03
media/environmet	0,20	0,10

The results of the confirmatory factor analysis (CFA) showed that question 31 of the questionnaire under test (chart 1) was not confirmed in the "media/environment" dimension in which it was originally inserted. Based on the assessment of a committee of experts, this statement was allocated to the dimension "peers", being considered consistent in CFA carried out after the change. However, after this change, the CFA indicated that questions 2, 27, 30 and 41 were not confirmed in their respective dimensions (media/environment, family, peers, and body image). A

new round of evaluation by the expert committee indicated that question 2 would move to the "body image" dimension. After this change, the questionnaire was evaluated again by a CFA, which indicated that questions 2 and 41 were consistently maintained in the "body image" dimension and question 27 was consistently maintained in the "family" dimension. The expert committee verified that no other changes should be made to the questionnaire, as additional changes would compromise its overall performance. Thus, the main changes made to the questionnaire were the transfers of questions 2 and 31 from the "media/environment" dimension to the "body image" and "peers" dimensions, respectively.

Chart 1. Questionnaire adapted according to the psychosocial aspects evaluated.

Questions	Original dimension	Dimension after evaluating the multidimensional structure*
1. I usually don't eat fruit.	Self-efficacy	Self-efficacy
2. Only girls should eat fruit to stay in shape.	Media/environment	Body image
3. I don't eat fruits and vegetables sold in the street because I don't think they're clean.	Media/environment	Media/environment
4. I have a vegetable salad or vegetables available every day in my house.	Self-efficacy/ Media/environment	Self-efficacy/ Media/environment
5. I hardly ever eat vegetables because I don't like them.	Self-efficacy	Self-efficacy
6. I've learned with my friends to eat fruits and vegetables almost every day.	Self-efficacy/Peers	Self-efficacy/Peers
7. I only eat vegetables in my house.	Self-efficacy	Self-efficacy
8. No one in my house enjoys eating fruits and vegetables every day.	Family	Family
9. My friends and I enjoy vegetables.	Self-efficacy	Self-efficacy
10. When I eat with my friends, fruits and vegetables are not part of the meal.	Peers	Peers
11. I eat fruits and vegetables daily because it's healthy.	Self-efficacy	Self-efficacy
12. Famous people are slim because they eat fruits and vegetables.	Body image	Body image
13. Salad or fruit and vegetable is a must on my family meals.	Family	Family
14. I don't miss eating fruits.	Self-efficacy	Self-efficacy
15. My friends and I think that young people don't need to eat fruits and vegetables.	Peers	Peers
16. I enjoy salad and cooked vegetables although we hardly ever eat them in my house.	Family	Family
17. We hardly ever buy fruit at home because they're costly.	Media/environment	Media/environment
18. People with a fit body don't need to eat fruits and vegetables almost every day.	Body image	Body image
19. In my family, we don't eat salad and steamed vegetables daily.	Family	Family
20. Fruits and vegetables are for fat people.	Body image	Body image
21. I highly enjoy eating vegetables.	Self-efficacy	Self-efficacy
22. I eat fruits and vegetables almost every day to maintain my weight and feel good about myself.	Body image	Body image
23. In my circle of friends, we usually say that fruit is for girls, so when we are together, only girls eat fruit.	Media/environment	Media/environment
24. To maintain my figure, I eat fruits and vegetables almost every day.	Body image	Body image
25. Fruit is sold at my school.	Media/environment	Media/environment
26. I only eat fruits and vegetables when I want to lose weight.	Body image	Body image
27. I've learned with my family, from a young age, to eat all kinds of vegetables.	Family	Family
28. In my family, fruits and vegetables are not part of a daily meal.	Family	Family
29. At school, I prefer to buy food that fills me up rather than fruit.	Self-efficacy	Self-efficacy

Chart 1. Questionnaire adapted according to the psychosocial aspects evaluated. (Continues)

Questions	Original dimension	Dimension after evaluating the multidimensional structure*
30. My friends and I don't eat fruits and vegetables every day although we know that they're good for your health.	Peers	Peers
31. When I go out with my friends, we don't bring any fruit.	Media/environment	Peers
32. Adolescents should eat fruits and vegetables daily to prevent cancer and heart attacks in their adult life.	Self-efficacy	Self-efficacy
33. My parents seldomly buy fruits and vegetables because they don't like them.	Family	Family
34. My parents taught me to eat fruits and vegetables from a young age.	Self-efficacy	Self-efficacy
35 I haven't been informed of the amount of fruit and vegetable I'm supposed to eat every day to maintain good health.	Media/environment	Media/environment
36. I'd rather be fat than eat fruits and vegetables.	Body image	Body image
37. When I go out with my friends, we don't bring any fruit.	Peers	Peers
38. My family always make fruit and vegetable available, but I don't like to eat them.	Self-efficacy	Self-efficacy
39. I have to eat fruits and vegetables almost every day so as not to get fat and become a laughing stock among my friends.	Body image	Body image
40. My friends don't like to eat fruit on a daily basis.	Peers	Peers
41. Eating fruits and vegetables makes no sense if you have a fit body.	Body image	Body image
42. In my family, we've always been used to eating fruit on a daily basis.	Family	Family
43. It's easy to find a good variety of fruit and vegetable where I live.	Media/environment	Media/environment
44. There are always advertisements on tv, radio, and the internet suggesting we should eat fruit and vegetable every day.	Media/environment	Media/environment
45. Eating fruits and vegetables is trendy at the moment among adolescents.	Peers	Peers
46. Fruits and vegetables should be part of adolescents' daily meals.	Self-efficacy	Self-efficacy

DISCUSSION

The present study evaluated the reproducibility of a questionnaire designed to assess psychosocial aspects associated with the consumption of fruits and vegetables among adolescents, which resulted from the cross-cultural adaptation of the questions related to these foods from the questionnaire "*Aspectos Psicosociales Asociados a la Nutrición y Actividad Física de Adolescentes* " (Psychosocial Aspects Associated with Nutrition and Physical Activity of Adolescents).[29]

The reproducibility analyses using the ICC revealed that the instrument has moderate to good test-retest reliability for three of the psychosocial aspects evaluated (self-efficacy, family, and body image), fair for peer influence and poor for media/environment influence, while the agreement assessed by *kappa* was considered to be fair to good. Confirmatory factor analysis (CFA) showed that the adapted instrument was consistent with the original in terms of the dimensions evaluated. In this study, self-efficacy was the psychosocial factor that showed greater internal consistency, followed by family, body image, and peers. These results are in line with other studies, which have reported the correlation of self-efficacy and parental behavior with the consumption of fruits and vegetables in children, young people, and adults.[15,33]

Similar studies carried out with questionnaires that assessed the psychosocial determinants of fruit and vegetable consumption in children and adolescents showed results compatible with those of the present study.[34-36]

Ochoa-Meza et al.,[34] when determining the content and construct validity of the Mexican version of the Pro Children Project questionnaire, which assesses psychosocial factors associated with fruit and vegetable consumption in adolescents, found *kappa* values ranging from 0.63 and 0.93. Similarly, Tassitano et al.,[35] when carrying out a study whose objective was to translate, adapt and test the psychometric properties of psychosocial scales to change the behavior of consumption of fruits and vegetables, they found that the scale of the self-efficacy construct, family support and friends had good internal consistency, with Cronbach's alpha values greater than 0.70, and intraclass correlation values greater than 0.60.

Kadioglu et al.,[36] when examining the psychometric properties of the Turkish version of the situational self-efficacy scale for vegetable and fruit consumption in adolescents, using Pearson's correlation to assess test-retest reliability and the item total correlation and the alpha of Cronbach for internal consistency, found high reliability and good content and construct validity.

The CFA indicated the need to reallocate two questions that belonged to the "media/environment" dimension, which were transferred to the "body image" and "peers" dimensions. Furthermore, the "media/environment" dimension did not show acceptable reproducibility. The fact that the original questionnaire was developed more than a decade ago may explain why the influence of the media/environment did not show satisfactory results. The time lag possibly did not allow capturing all the changes that occurred in media resources in recent years. Thus, despite this psychosocial aspect being one of the current factors influencing food consumption in children and adolescents,[10,11,37-39] the affirmatives referring to it were taken from the final version of the adapted questionnaire, which will have 39 questions. Instruments to assess the influence of the "media/environment" on the food consumption of adolescents need to be in tune with technological advances.

A limitation of this study is the fact that it was developed with adolescents from a single public school, which could eventually compromise the generalization of the results.

As a strong point, the use of robust statistical techniques such as the CFA stands out, one of the main tools in the development, evaluation and refinement of questionnaires. In general, factor analysis aims to assess how a certain number of items can be grouped into a smaller number of latent variables (factors) that explain their interrelationships.[40] CFA is understood as a confirmatory technique, since that the researcher needs to predetermine the structure to be evaluated. It refers to a type of structural equation modeling aimed specifically at measurement models, and can be used in a complementary way, in order to assess the plausibility of a given factor structure.[34,41]

CONCLUSION

The adapted questionnaire is a useful instrument for identifying psychosocial aspects that influence fruit and vegetable consumption in adolescents, allowing understanding the factors that can interfere with the impact of nutritional interventions focused on promoting healthy eating in this population group, especially because few Brazilian studies use tools for this purpose.

The present study highlighted that the adapted questionnaire has good reproducibility and can be used to assess the role of self-efficacy, body image, and the influence of family and peers on fruit and vegetable consumption by adolescents. Thus, it is believed that it can provide important support for the development and application of programs and actions aimed at promoting healthy eating among Brazilian adolescents in a more effective way.

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Contributors

Vasconcelos TM participated in the collection, typing and analysis of data, interpretation of the results and writing the manuscript. Monteiro LS participated in the analysis and interpretation of data and in the text review. Cunha DB participated in the analysis and interpretation of data and in the text review. Sichieri R coordinated the research, participated in the analysis and interpretation of data and in the writing and final review of the manuscript. Pereira RA idealized the manuscript, participated in the analysis and interpretation of data and in the writing and final review of the manuscript.

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