

2.º CICLO

EDUCAÇÃO ALIMENTAR

# **Teacher self-efficacy scale for teaching nutrition: validation for the Portuguese population**

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**Teacher self-efficacy scale for teaching nutrition: validation for the Portuguese population.**

**Escala de autoeficácia do professor para o ensino de nutrição: validação para a população portuguesa**

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### *Abstract*

Food education from an early age is essential to promote healthy eating habits, with schools serving as key setting for teach about nutrition. Given the significant influence of self-efficacy beliefs on teacher's work, it is essential to better understand these beliefs. The aim of this study was to translate and validate the "Nutrition-Teaching Self-Efficacy Scale" for Portuguese kindergarten and schoolteachers. This scale assesses teacher's self-efficacy beliefs regarding the teaching of nutrition and food-related topics within a school context. The statistical analysis, which includes Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA), confirmed the two-factor structure of the scale, consistent with the original version, although some items exhibited differences in factor loadings. Following adjustments to the initial model, the fit indices improved significantly, although the RMSEA value remains above the ideal threshold. The NTSES shows potential as a tool for assessing teachers' self-efficacy beliefs in teaching nutrition, but further refinements are recommended. Future research should explore its application in different contexts and assess its validity over time.

### *Keywords*

*Teacher self-efficacy, nutrition teaching, scale validation, teachers*

## *Resumo*

A educação alimentar desde a infância é essencial para promover hábitos alimentares saudáveis e a escola representa um local privilegiado para o ensino de temas sobre nutrição e alimentação. Considerando o impacto das crenças de autoeficácia no desempenho dos professores, é importante conhecer essas crenças. Neste contexto, o presente estudo teve como objetivo traduzir e validar a “Nutrition-Teaching Self-Efficacy Scale” para educadores de infância e professores portugueses. Esta escala avalia as crenças de autoeficácia dos professores em relação ao ensino de temas sobre nutrição e alimentação em contexto escolar. A análise estatística, que inclui a Análise Fatorial Exploratória e Análise Fatorial Confirmatória, confirmou a estrutura de dois fatores da escala, consistente com a versão original, embora alguns itens tenham apresentado diferenças nas cargas fatoriais. Após ajustes no modelo inicial, os índices de ajuste melhoraram significativamente, embora o RMSEA permaneça acima do valor ideal. A NTSES mostra-se promissora para avaliar as crenças de autoeficácia dos professores no ensino da nutrição, mas ajustes adicionais são recomendados. Pesquisas futuras devem explorar a aplicação em diferentes contextos e avaliar a sua validade ao longo do tempo.

## **Palavras-Chave**

*Autoeficácia docente, ensino de nutrição, validação de escala, professores.*

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*List of Abbreviations*

DGE - Direção Geral da Educação

DGS - Direção Geral da Saúde

WHO - World Health Organisation

FAO - Food and Agriculture Organisation

NTSES - Nutrition-Teaching Self-Efficacy Scale

CFA - Confirmatory Factor Analysis

EFA - Exploratory Factor Analysis

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## *Introduction*

Eating habits formed during childhood and play a critical role in nutritional status and overall health. A poor nutritional state can significantly impact growth and development, increasing the risk of chronic diseases, and negatively affect academic performance in children and adolescents<sup>(1, 2)</sup>. Therefore, nutritional education from childhood is crucial to promote healthy eating habits and consequently promoting optimal health outcomes<sup>(3, 4)</sup>.

Although the teaching of topics related to nutrition and diet is not systematically integrated into the Portuguese curriculum of every school grade, considering the Referencial de Educação para a Saúde developed by the Direção Geral da Educação (DGE) and the Direção Geral da Saúde (DGS), topics related to nutrition and diet concern all levels of education, from preschool to secondary education<sup>(5)</sup>. On average, children spend at least 22.5 hours per week in the classroom, which represents an average of 5 hours per day, corresponding to 20% of the same. This value excludes time dedicated to breaks, study support sessions, complementary lessons, or extracurricular activities such as school sports<sup>(6, 7)</sup>. It is also known that peer influence plays a significant role in children's and adolescents' behaviours, including food choices. Therefore, as a place of group interaction, school presents itself as an excellent environment for food education<sup>(8, 9)</sup>.

Food education and the teaching of topics related to nutrition and diet are intricately linked but differ in their objectives and approaches. The teaching of nutrition and diet typically focuses on the dissemination of technical and scientific knowledge, while food education seeks to promote behavioural changes and healthy practices. According to the World Health Organisation (WHO), food

education is a process aimed at empowering individuals to make healthy and informed food choices, but which is not limited to knowledge about nutrients and healthy eating, as it encompasses all cultural, economic, and social aspects<sup>(10)</sup>. The Food and Agriculture Organisation of the United Nations (FAO) adds the concept of educational programs to this definition<sup>1</sup>.

Albert Bandura extensive research on self-efficacy beliefs<sup>(11-13)</sup>, defining this concept as “the beliefs individuals have about their ability to perform a specific tasks”<sup>(12)</sup>. This concept forms part of Bandura’s Social Cognitive Theory, also known as Social Learning Theory, which postulates that human behaviour is the result of interaction between three key factors: personal dimensions, such as (affective and cognitive variables), behaviours, and environmental influences<sup>(12, 14)</sup>.

When applied to the school context, particularly to teachers, and the teaching of nutrition and diet-related topics, self-efficacy beliefs can be described as the confidence teachers have in their ability to conduct tasks related to the teaching of nutrition and diet. Some studies suggest that teachers' self-efficacy beliefs significantly impact their practices, influencing collaboration with other colleagues, the time spent acquiring new knowledge, as well as the classroom time allocated to teaching nutrition-related subjects<sup>(15-18)</sup>.

Given the impact that self-efficacy beliefs have on teachers' performance, it is essential to understanding their perceptions of their ability to teach these subjects in order to identify potential gaps that may influence the quality of teaching in the school context.

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<sup>1</sup> Available in <https://www.fao.org/nutrition/education/en/> [Seen in 2024 July 20]

The "Nutrition-Teaching Self-Efficacy Scale" (NTSES) is a questionnaire validated in the state of Maryland, United States, designed to assess elementary school teachers' self-efficacy beliefs concerning the teaching of nutrition and diet topics, covering students aged between 5 and 10/12 years old<sup>(19)</sup>. The scale was developed based on two existing questionnaires aimed at measuring teachers' self-efficacy beliefs in health and science, the "Elementary Health Teaching Self-Efficacy Scale" and the "Elementary Teacher's Science Teaching Efficacy Belief Instrument," respectively<sup>(20, 21)</sup>. As far as we know, the NTSES has been used in other studies, however, no study to date has focused solely on translating and validating the scale for another language or population.

The NTSES is divided into two parts, each assessing different constructs: efficacy expectations, defined as "the beliefs individuals have about their ability to perform the desired tasks or behaviours" and outcome expectations, defined as "the beliefs individuals have about the capacity of their behaviour to produce the desired outcome"<sup>(11)</sup>.

Thus, the aim of this paper is to translate and validate the "Nutrition-teaching self-efficacy scale" for the Portuguese population of kindergarten teachers and schoolteachers.

### *Methods*

Nancy Brenowitz and Cynthia Tuttle developed the "Nutrition-teaching Self-Efficacy Scale" which consists of 20 Likert-scale items, ranging from "not confident" (score=1) to "very confident" (score=4). These items are divided into two subscales: efficacy expectations (14 questions) and outcome expectations (6

questions). The score on the scale can range from 20 to 80. Efficacy expectations can vary from 16 to 64 points, and outcome expectations from 6 to 24<sup>(19)</sup>.

The original author of the scale was contacted, and following their approval, as well as the favourable report of the Etic Commission of the Faculty of Nutrition and Food Sciences of the University of Porto (Comissão de Ética da Faculdade de Ciências da Nutrição e Alimentação da Universidade do Porto) (Opinion No. 143/2023/CEFCNAUP) and the authorization from the Directorate-General for Education (Direção-Geral de Educação) through the School Survey Monitoring System (Sistema de Monitorização de Inquéritos em Meio Escolar) (registration number 1455800001) (Appendix A), the scale was translated and adapted into Portuguese, in accordance with international recommendations. To produce the Portuguese version of the scale, the following steps were followed <sup>(22, 23)</sup>:

(1) The scale was translated into Portuguese by two individuals, both fluent in English and native Portuguese speakers (Appendix B);

(2) The translations were reviewed, and discrepancies were discussed, resulting in the development of the new version of the scale (V1) (Appendix C);

(3) A back-translation was carried out: a bilingual individual, a native English speaker with no prior knowledge of the instrument, translated the Portuguese version (V1) back into the original language (Appendix D);

(4) The back-translation was compared to the original version, and the differences found were not deemed significant;

(5) A pre-test was conducted by administering the version to three teachers and kindergarten educators in the form of a self-reported questionnaire. Each individual completed a set of sociodemographic data (Appendix E), the first

version of the scale (V1), and questions designed to access the comprehension of the scale. No issues were raised with this version.

The questionnaire, which included informed consent (Appendix F), sociodemographic data (Appendix E), the Portuguese Version (V1) (Appendix C), the General Self-Efficacy Scale, and the Professional Self-Concept Scale, was administered online via the “Inquéritos UP” platform between April 19 and June 29, 2024.

The administration of school cluster and non-clustered schools listed in Portaria n.º 18/2024 de 25 de janeiro were contacted via email, as well as the school directorates of the autonomous regions of the Azores<sup>2</sup> and Madeira<sup>3</sup>. Consequently, a convenience sampling method was employed, with the inclusion criterion being that the participants were actively engaged in the teaching practice at the time of data collection.

### *Statistical Analysis*

An exploratory factor analysis (EFA) using JASP software (JASP-0.15.0.1) was performed to explore the factor structure of the NTSES in a Portuguese sample of teachers. Parallel analysis was used based on factor analysis to determine the number of factors to extract<sup>(24)</sup>. A maximum likelihood analysis with an oblique rotation method was used since the factors were expected to correlate.

To test NTSES’s construct validity, confirmatory factor analyses (CFAs) were performed using JASP software (JASP-0.15.0.1) in an independent sample. Maximum likelihood was used to determine the model fit. Five goodness-of-fit

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<sup>2</sup> Available in [https://edu.azores.gov.pt/escolas/categorias\\_escolas/escolas-publicas/?cn-reloaded=1](https://edu.azores.gov.pt/escolas/categorias_escolas/escolas-publicas/?cn-reloaded=1) [Seen in 2024 May 20]

<sup>3</sup> Available in <https://www.madeira.gov.pt/draescolar/EstruturaOLD/Administra%C3%A7%C3%A3o-e-Gest%C3%A3o/Escolas-B%C3%A1sicas-e-Secund%C3%A1rias> [Seen in 2024 May 20]

indices were used: Chi-square ( $\chi^2$ ), the root mean square error of approximation<sup>(25)</sup> with a 95% confidence interval, the Bentler Comparative Fit Index<sup>(26)</sup>, the Tucker-Lewis Index<sup>(27)</sup>, and the Standardized Root Mean Square Residual<sup>(28)</sup>. Usually, RMSEA values between .05 and .08 and CFI values between .90 and .95, TLI values above .90 and SRMR values under .05 indicate acceptable model fit<sup>(29)</sup>.

McDonald's coefficients  $\omega$  were calculated to assess the internal consistency reliability<sup>(30)</sup> of the NTSES subscales. We performed Pearson correlations for both genders to evaluate the relationship between NTSES subscales and convergent validity variables. For the Professional Self-Concept Scale, the internal consistency values were competence (.88), relationships with colleagues (.80), relationship with students (.83), satisfaction (.85), acceptance of initiative and risk-taking (.71), and Self-acceptance (.80). For the General Self-Efficacy Scale, the total internal consistency was (.91).

The amount of missing data per item across all measures was small (<1%). The sample was randomly divided into two sub-sample. The first sample (sample A) was used for exploratory factor analysis (EFA,  $n = 339$ ). The second sample (sample B) was used for confirmatory factor analysis (CFA,  $n = 342$ ). These subsamples were not significantly different regarding age  $t(681) = .367$ ,  $p = .357$  and gender,  $\chi^2(3) = 5.204$ ,  $p = .157$ . The full sample was used to evaluate test validity.

The psychometric sensitivity of the items was assessed based on Kline's (2016) established criteria for skewness and kurtosis. In accordance with these guidelines, skewness values below 3.0 and kurtosis values below 8.0 were considered acceptable, suggesting that the items exhibited a normal distribution.

## Results

### *Participants*

The sample comprised 681 Portuguese teachers, of whom 162 were men and 515 were women (with 4 participants not reporting their gender), aged between 23 and 71 years ( $M = 52.41$ ,  $SD = 8.06$ ). Participants had between 1 and 45 years of teaching experience ( $M = 27.00$ ,  $SD = 9.38$ ). In terms of teaching levels, 11.7% taught kindergarten, 22% taught elementary school, 19.4% taught 5th and 6th grade (2nd level of basic education), 40.4% taught 7th to 9th grade (3rd level of basic education), and 41.6% taught secondary school. Note that some teachers may have taught at multiple levels simultaneously.

### *Preliminary Analysis*

Descriptive statistics for NTSES items are presented in Table 1. All the items presented skewness and kurtosis within normal parameters.

### *Exploratory Factor Analysis*

The results from EFA resulted in a 2-factor solution explaining 67.6% of the variance with a KMO of .95 with Bartlett's test of sphericity being significant  $\chi^2(190) = 6930.99$ ,  $p < .01$ . First factor (15 items) explained 49.8% of the variance, and the second factor (5 items) explained 17.8% additional variance. Table 2 shows factor loadings for both factors. Figure 1 shows scree plot.

### *Confirmatory Factor Analysis*

The initial CFA indicated a poor model fit for the two factors,  $\chi^2(168) = 1356.24$ ,  $p < .001$ , CFI = .837, TLI = 0.902, RMSEA = .143, SRMR = .073. Modification indices (MIs) were examined to determine if freeing the error covariances would

improve model fit. The MI between item #5 *“How confident are you that you can do a good job teaching students what the Food Guide Pyramid (FGP) is?”* and item #6 *“How confident are you that you can do a good job teaching students what food groups make up the FGP?”* indicated shared variance. After allowing those item error terms to covary, the model fit improved,  $\chi^2(168) = 1169.90$ ,  $p < .001$ , CFI = .863, TLI = 0.902, RMSEA = .132, SRMR = .072.

Another MI indicated that items #2 *“How confident are you that you understand nutrition concepts well enough to teach them to your students?”* and #3 *“How confident are you that you have the skills necessary to teach nutrition concepts effectively?”* shared variance. Therefore, allowing those item error terms to covary, the model fit improved,  $\chi^2(167) = 974.308$ ,  $p < .001$ , CFI = .889, TLI = 0.902, RMSEA = .119, SRMR = .071.

The MI between item #18 *“How confident are you that if you do a good job teaching nutrition, your students will change their nutrition-related attitudes?”* and item #19 *“How confident are you that if you do a good job teaching nutrition, your students will change their nutrition-related behaviours?”* indicated shared variance. After allowing those item error terms to covary, the model fit improved,  $\chi^2(166) = 883.302$ ,  $p < .001$ , CFI = .902, TLI = 0.902, RMSEA = .112, SRMR = .070.

The MI between item #12 *“How confident are you that you can do a good job teaching students about reducing fat and salt in their diets?”* and item #13 *“How confident are you that you can do a good job teaching students about increasing fruits, vegetables, and grains in their diets?”* indicated shared variance. After allowing those item error terms to covary, the model fit improved,  $\chi^2(165) = 836.322$ ,  $p < .001$ , CFI = .908, TLI = 0.902, RMSEA = .109, SRMR = .075.

The MI between item #1 “*How confident are you that you have adequate training to teach nutrition?*” and item #4 “*How confident are you that you can answer students’ nutrition-related questions?*” indicated shared variance. After allowing those item error terms to covary, the model fit improved,  $\chi^2(164) = 810.872$ ,  $p < .001$ , CFI = .911, TLI = 0.902, RMSEA = .107, SRMR = .069.

### *Convergent Validity*

The correlation coefficients between the NTSES factors and other study variables are displayed in Table 3. The efficacy expectations’ subscale was positively, but weakly correlated to all the validity measures, as well as the results expectations’ subscales.

### *Internal consistency reliability*

The coefficient McDonald’s omegas were .97 for efficacy expectations, and .91 for results expectations. These results revealed good reliability of both subscales.

### *Discussion*

Although the original scale was developed for elementary school teachers in the United States, corresponding to the 1st and 2nd school level of Basic Education and preschool education in Portugal, the decision to expand the population to include the 3rd school level of Basic Education and Secondary Education was based on two main factors. Firstly, the authors of the original scale recommended expanding its use to populations that correspond to these educational levels in Portugal. Secondly, an analysis of various regulatory and guidance documents identified the presence of nutrition and food-related topics

**Table 1**  
*Descriptive statistics for NTSES items*

| NTSES items                                                                                                                                                                                                                                                                                          | M    | SD   | Skewness | Kurtosis |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|----------|----------|
| 1. How confident are you that you have adequate training to teach nutrition?<br>Qual o seu grau de confiança de que tem a formação necessária para ensinar sobre nutrição                                                                                                                            | 2.62 | .828 | -.387    | -.365    |
| 2. How confident are you that you understand nutrition concepts well enough to teach them to your students?<br>Qual o seu grau de confiança de que percebe os conceitos de nutrição bem o suficiente para os ensinar aos estudantes?                                                                 | 2.70 | .810 | -.404    | -.226    |
| 3. How confident are you that you have the skills necessary to teach nutrition concepts effectively?<br>Qual o seu grau de confiança de que possui as competências necessárias para ensinar os conceitos de nutrição de maneira eficaz?                                                              | 2.54 | .867 | -.091    | -.653    |
| 4. How confident are you that you can answer students' nutrition-related questions?<br>Qual o seu grau de confiança de que consegue responder às questões dos estudantes sobre nutrição?                                                                                                             | 2.82 | .753 | -.366    | -.030    |
| 5. How confident are you that you can do a good job teaching students what the Food Guide Pyramid (FGP) is?<br>Qual o seu grau de confiança de que faz um bom trabalho a ensinar os alunos sobre a roda dos alimentos mediterrânica?                                                                 | 2.95 | .873 | -.635    | -.166    |
| 6. How confident are you that you can do a good job teaching students what food groups make up the FGP?<br>Qual o seu grau de confiança de que faz um bom trabalho a ensinar os estudantes sobre os grupos alimentares presentes na Roda dos Alimentos?                                              | 2.98 | .863 | -.673    | -.064    |
| 7. How confident are you that you can do a good job teaching students about eating a balanced diet?<br>Qual o seu grau de confiança de que faz um bom trabalho a ensinar os estudantes sobre como praticar uma alimentação saudável?                                                                 | 3.15 | .749 | -.689    | .353     |
| 8. How confident are you that you can do a good job teaching students which foods belong to each food group in the FGP?<br>Qual o seu grau de confiança de que faz um bom trabalho a ensinar os estudantes sobre quais alimentos pertencem a cada grupo alimentar presente da Roda dos Alimentos?    | 3.01 | .868 | -.648    | -.180    |
| 9. How confident are you that you can do a good job teaching students which nutrients come from each food group in the FGP?<br>Qual o seu grau de confiança de que faz um bom trabalho a ensinar os estudantes sobre quais nutrientes estão presentes em cada grupo alimentar da Roda dos Alimentos? | 2.73 | .918 | -.263    | -.750    |
| 10. How confident are you that you can do a good job teaching students about fat, sugar, and salt in fast foods and snack foods?<br>Qual o seu grau de confiança de que faz um bom trabalho a ensinar os alunos sobre gordura, açúcar e sal nas comidas tipo <i>fast food</i> e <i>snack</i> ?       | 3.11 | .813 | -.627    | -.171    |
| 11. How confident are you that you can do a good job teaching students what the Dietary Guidelines are?<br>Qual o seu grau de confiança de que faz um bom trabalho a ensinar os estudantes sobre as Recomendações Alimentares?                                                                       | 3.03 | .783 | -.604    | .133     |
| 12. How confident are you that you can do a good job teaching students about reducing fat and salt in their diets?<br>Qual o seu grau de confiança de que faz um bom trabalho a ensinar os estudantes sobre como reduzir o consumo de gordura e sal na sua alimentação?                              | 3.03 | .808 | -.626    | .038     |

|                                                                                                                                                                                                                                                                                                                                                                                 |      |      |       |       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|-------|-------|
| 13. How confident are you that you can do a good job teaching students about increasing fruits, vegetables, and grains in their diets?<br>Qual o seu grau de confiança de que faz um bom trabalho a ensinar os estudantes sobre como aumentar o consumo de frutas, vegetais e grãos na sua alimentação?                                                                         | 3.13 | .789 | -.758 | .322  |
| 14. How confident are you that you can do a good job teaching students about ways to keep foods safe?<br>Qual o seu grau de confiança de que faz um bom trabalho a ensinar os estudantes sobre Higiene Alimentar?                                                                                                                                                               | 2.96 | .839 | -.542 | -.219 |
| 15. How confident are you that you can interest students in the subject of nutrition?<br>Qual o seu grau de confiança de que consegue promover o interesse dos estudantes nos temas sobre nutrição?                                                                                                                                                                             | 2.79 | .754 | -.284 | -.155 |
| 16. How confident are you that if you do a good job teaching nutrition, your students will be interested in nutrition?<br>Qual o seu grau de confiança de que se fizer um bom trabalho a ensinar sobre nutrição, os seus estudantes ficarão interessados no tema nutrição?                                                                                                      | 2.91 | .765 | -.397 | -.090 |
| 17. How confident are you that if you do a good job teaching nutrition, your students will increase their nutrition knowledge?<br>Qual o seu grau de confiança de que se fizer um bom trabalho a ensinar sobre nutrição, os seus estudantes vão aumentar os seus conhecimentos sobre nutrição?                                                                                  | 3.10 | .752 | -.678 | .437  |
| 18. How confident are you that if you do a good job teaching nutrition, your students will change their nutrition-related attitudes?<br>Qual o seu grau de confiança de que se fizer um bom trabalho a ensinar sobre nutrição, os seus estudantes vão mudar as suas atitudes relacionadas com a nutrição?                                                                       | 2.67 | .748 | -.105 | -.307 |
| 19. How confident are you that if you do a good job teaching nutrition, your students will change their nutrition-related behaviours?<br>Qual o seu grau de confiança de que se fizer um bom trabalho a ensinar nutrição, os seus estudantes vão modificar o seu comportamento alimentar?                                                                                       | 2.59 | .742 | -.015 | -.322 |
| 20. How confident are you that if you teach more hours of nutrition, you will have a greater impact on your students' nutrition related knowledge, attitudes, and behaviours?<br>Qual o seu grau de confiança de que se ensinar mais horas sobre nutrição, vai ter um maior impacto no conhecimento, atitudes e comportamentos dos seus estudantes relacionados com a nutrição? | 2.70 | .800 | -.281 | -.314 |

**Table 2.**  
Factor loadings

|          | Factor 1 | Factor 2 |
|----------|----------|----------|
| NTSES_8  | 0.865    |          |
| NTSES_9  | 0.861    |          |
| NTSES_11 | 0.859    |          |
| NTSES_10 | 0.851    |          |
| NTSES_5  | 0.849    |          |
| NTSES_7  | 0.847    |          |
| NTSES_6  | 0.839    |          |
| NTSES_13 | 0.822    |          |
| NTSES_3  | 0.821    |          |
| NTSES_2  | 0.808    |          |
| NTSES_12 | 0.801    |          |
| NTSES_1  | 0.789    |          |
| NTSES_4  | 0.785    |          |
| NTSES_14 | 0.751    |          |
| NTSES_15 | 0.519    |          |
| NTSES_18 |          | 0.949    |
| NTSES_19 |          | 0.923    |
| NTSES_20 |          | 0.802    |
| NTSES_16 |          | 0.705    |
| NTSES_17 |          | 0.676    |

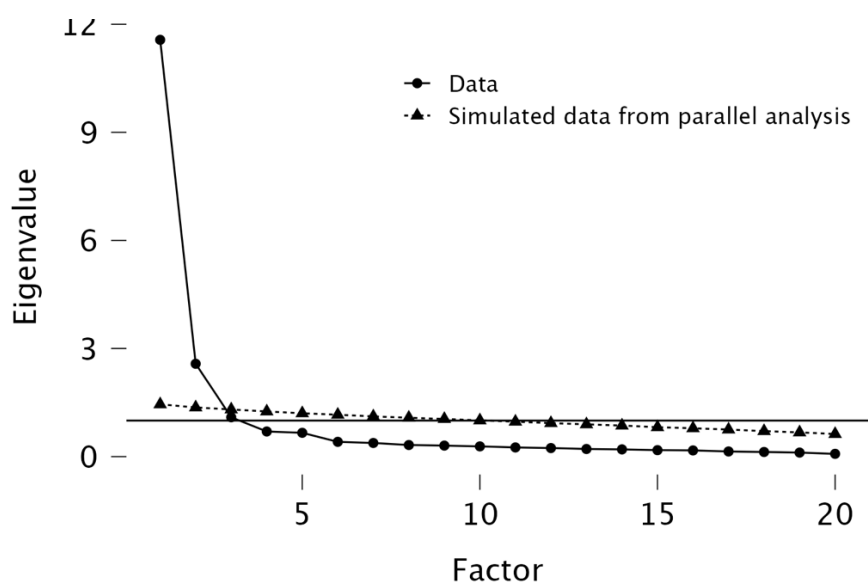


Fig.1 Scree plot

**Table 3.****Convergent Validity**

|                |                     | <b>Correlations</b> |              |             |                |         |               |               |
|----------------|---------------------|---------------------|--------------|-------------|----------------|---------|---------------|---------------|
|                |                     | PSCS_COM            | PSCS_REL_COL | PSCS_REL_ST | PSCS_AC_IN_RIS | PSCS_SA | NTSES_EFI_EXP | NTSES_OUT_EXP |
| PSCS_COM       | Pearson Correlation | 1                   | ,667**       | ,710**      | ,590**         | ,761**  | ,188**        | ,181**        |
|                | Sig. (2-tailed)     |                     | <,001        | <,001       | <,001          | <,001   | <,001         | <,001         |
|                | N                   | 677                 | 677          | 677         | 677            | 675     | 677           | 677           |
| PSCS_REL_COL   | Pearson Correlation | ,667**              | 1            | ,601**      | ,495**         | ,662**  | ,193**        | ,209**        |
|                | Sig. (2-tailed)     | <,001               |              | <,001       | <,001          | <,001   | <,001         | <,001         |
|                | N                   | 677                 | 678          | 677         | 678            | 676     | 678           | 678           |
| PSCS_REL_ST    | Pearson Correlation | ,710**              | ,601**       | 1           | ,540**         | ,676**  | ,235**        | ,280**        |
|                | Sig. (2-tailed)     | <,001               | <,001        |             | <,001          | <,001   | <,001         | <,001         |
|                | N                   | 677                 | 677          | 678         | 677            | 675     | 678           | 678           |
| PSCS_AC_IN_RIS | Pearson Correlation | ,590**              | ,495**       | ,540**      | 1              | ,680**  | ,182**        | ,241**        |
|                | Sig. (2-tailed)     | <,001               | <,001        | <,001       |                | <,001   | <,001         | <,001         |
|                | N                   | 677                 | 678          | 677         | 678            | 676     | 678           | 678           |
| PSCS_SA        | Pearson Correlation | ,761**              | ,662**       | ,676**      | ,680**         | 1       | ,257**        | ,254**        |
|                | Sig. (2-tailed)     | <,001               | <,001        | <,001       | <,001          |         | <,001         | <,001         |
|                | N                   | 675                 | 676          | 675         | 676            | 676     | 676           | 676           |

|               |                     |        |        |        |        |        |        |        |
|---------------|---------------------|--------|--------|--------|--------|--------|--------|--------|
| NTSES_EFI_EXP | Pearson Correlation | ,188** | ,193** | ,235** | ,182** | ,257** | 1      | ,551** |
|               | Sig. (2-tailed)     | <,001  | <,001  | <,001  | <,001  | <,001  |        | <,001  |
|               | N                   | 677    | 678    | 678    | 678    | 676    | 681    | 681    |
| NTSES_OUT_EXP | Pearson Correlation | ,181** | ,209** | ,280** | ,241** | ,254** | ,551** | 1      |
|               | Sig. (2-tailed)     | <,001  | <,001  | <,001  | <,001  | <,001  | <,001  |        |
|               | N                   | 677    | 678    | 678    | 678    | 676    | 681    | 681    |

\*\* . Correlation is significant at the 0.01 level (2-tailed).

*PSCS\_COM Professional Self-Concept Scale - competence; PSCS\_REL\_COL Professional Self-Concept Scale – Relationship with colleague; PSCS\_REL\_ST Professional Self-Concept Scale- Relationship with student; PSCS\_AC\_IN\_RIS Professional Self-Concept Scale – Acceptance of initiative and risk-taking; PSCS\_SA Professional Self-Concept Scale – Self-acceptance; NTSES\_EFI\_EXP Nutrition-Teaching Self-Efficacy Scale – Efficacy Expectations; NTSES\_OUT\_EXP Nutrition-Teaching Self-Efficacy Scale – Outcome Expectations*

at educational levels beyond those covered by the original scale, alongside guidelines on food education at all levels of education<sup>(5-7)</sup>.

Regarding the cultural adaptation, the most significant alteration involves the transition from the “Food Guide Pyramid (FGP)” to the “Roda dos Alimentos mediterrânica” in items #5, #6, #8 and #9. This adjustment it is in accordance with the recommendations made by government institutions<sup>(5)</sup>.

Regarding the pre-test, due to time constraints, it was necessary to conduct it with a small group of 3 participants. This pre-test was conducted in an exploratory manner, with the aim of identifying critical issues in comprehending the items. Given the simplicity of the scale and the clarity of the construct it aimed to measure, it was considered that a pre-test with 3 participants would be sufficient to ensure adequate comprehension of the items<sup>(22, 31)</sup>. The sample obtained was heterogeneous, consisting of kindergarten teachers, teachers from the 1st and 3<sup>rd</sup> school levels of Basic Education, and Secondary Education, with professional experience ranging from 5 to 21 years. The responses obtained were consistent, indicating that the scale was clear and understandable.

Some authors have recommended conducting a test-retest, which involves administering the questionnaire to the same sample at two different moments to assess the reproducibility of the scale, which would allow for understanding the level of stability in responses over time. However, this stage requires ensuring that participants have not been influenced in any way that could alter the domains being evaluated. In this case, self-efficacy beliefs are a highly volatile construct, as they can easily be modified by lived experiences. Furthermore, this stage would require a greater time investment from the professionals, which could lead to

lower participation rates, and consequently, a smaller sample size, potentially compromising the results obtained<sup>(32)</sup>.

The constructs of self-efficacy beliefs related to nutrition and food education, general self-efficacy, and teachers' professional self-concept are closely related. Although studies are not entirely consistent regarding the relationship between general and specific self-efficacy beliefs, Albert Bandura (1997) considers that these may be related, even though they are independent of each other. In other words, a teacher who feels confident in their general professional practice may not necessarily feel equally capable when the topic is nutrition and food, although the two may influence each other<sup>(12)</sup>.

Carl Rogers (1959)(1969) defined self-concept as 'the set of beliefs, perceptions, and feelings that a person has about themselves', meaning it is the set of beliefs, perceptions, and feelings that a teacher has about themselves as a professional<sup>(33)</sup>. Although distinct, the concepts of self-efficacy beliefs and self-concept are closely related and can influence each other. Teachers with higher levels of self-efficacy tend to have a more positive professional self-concept<sup>(33-35)</sup>.

The choice to use the Portuguese adaptation of the 'Teacher Self-Concept Evaluation Scale'<sup>(36)</sup> and the 'General Self-Efficacy Scale'<sup>(37)</sup>, is justified by the theoretical relationship between these constructs and the fact that they have been validated for the same population as that of the present study.

Item 15 (NTSES\_15) ("*How confident are you that you can interest students in the subject of nutrition?*") (Table 2), allocated to Factor 2 (Outcome expectations) with factor loading of .629 in the original scale<sup>(19)</sup>, in the present study exhibited a higher loading factor in Factor 1 (.519) (Efficacy Expectations), suggesting a different interpretation by the present sample. This reallocation may

be attributed to the overlap between the constructs “Self-efficacy beliefs” and “Outcome expectations”<sup>(11)</sup>, as previously noted, as well as to intrinsic factors specific to the present sample, such as context and culture, which may have contributed to a different interpretation of the item. Furthermore, the relatively low factor loading suggests that this item may capture dimensions of both constructs<sup>(38)</sup>.

The results of the CFA indicate that there is variance among the identified items, meaning that these same items measure, at some extent, the same underlying construct. This implies that the sample perceives these items as highly similar, leading to comparable responses, particularly for items #5 and #6, #2 and #3, #18 and #19, #12 and #13, as well as #1 and #4. When the covariance between the errors of these items, perceived as similar, is allowed for, there is an improvement in the CFI and RMSEA, suggesting that allowing for such covariance enhances the overall fit of the model, thus providing a more accurate reflection of the sample’s and the underlying structure<sup>(38)</sup>. Although the results of the CFA indicate that the model is not entirely optimal, particularly with RMSEA values slightly exceeding the ideal threshold, the overall statistical findings, especially concerning internal consistency, exploratory factor analysis, and convergent validity, substantiate the suitability and reliability of this scale in assessing teachers' self-efficacy beliefs<sup>(22, 23)</sup>.

Further studies should consider the isolated analysis of the different school levels, considering the characteristics of each of them. The kindergarten and first level of basic education we see a single-teacher instruction model, while in the subsequent grades, a more directed and specialized teaching approach is implemented. When examining the school curricula across various grades, a

notable presence of topics related to the teaching of nutrition in observed in subjects such as “Estudo do meio” e “Ciências naturais”<sup>4</sup>. Additionally, food education is also integrated whitig the “Cidadania e Desenvolvimento” curriculum. It is important to note that this subject may be taught by educators whose expertise lies outside of nutrition-focused disciplines, such as science or biology<sup>(39)</sup>.

Regarding limitations, there are a few available instruments designed to assess teacher’s self-efficacy in teaching topics related to food and nutrition. To date, no existing studies have been identified that share the same characteristics as this research, limiting the ability to engage in more comprehensive discussion of the results. Additionally, while the small sample size of the pre-test is acknowledged as a limitation, it does not appear to have adversely affected the final outcomes of the study.

### *Conclusions*

This study translated and validated the Nutrition-teaching Self-Efficacy Scale (NTSES) for the Portuguese kindergarten and schoolteacher, adhering to the recommended methodology to this type of work. The statistical analysis, including the EFA and CFA, indicated that the scale maintains a two-factor structure consistent with the original version, although certain items showed differences in factor loadings.

The CFA results revealed that the initial model demonstrated as unsatisfactory fit. However, after allowing for covariance between item errors,

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<sup>4</sup> Available in <https://www.dge.mec.pt/curriculo-nacional-documentos-curriculares> ; [Seen in 2024 September 20]

there was a notable improvement. While these adjustments improved the overall fit, the RMSEA values remains slightly above the ideal threshold ( $<0.08$ ), suggesting that further refinement of the model may enhance its fit. These findings, supported by strong internal consistency, EFA and convergent validity, suggest that, despite the need for further refinement of the model, the scale retains its validity for the population under study

Despite these limitations, the results suggest that NTSES is a promising tool for accessing self-efficacy beliefs among Portuguese teacher in educational setting. However, further adjustments may be necessary to optimize the model's fit. Future research could explore the application of the scale in different contexts and investigate its longitudinal validity.

## References

1. Inchley J, Currie D, Jewell J, Breda J, Barnekow V. Adolescent obesity and related behaviours: trends and inequalities in the WHO European Region, 2002-2014: observations from the Health Behaviour in School-aged Children (HBSC) WHO collaborative cross-national study. Copenhagen: World Health Organization; 2017. Disponível em: <https://iris.who.int/handle/10665/329417>.
2. Cesare MD, Sorić M, Bovet P, Miranda JJ, Bhutta Z, Stevens GA, et al. The epidemiological burden of obesity in childhood: a worldwide epidemic requiring urgent action. *BMC Medicine*. 2019; 17:212.
3. Contento IR. Nutrition education: linking research, theory, and practice [Review]. *Asia Pacific Journal of Clinical Nutrition*. 2008; 17(1):176-79.
4. Briggs M, Safaii S, Beall DL, Association AD, Education SfN, Association ASFS. Position of the American Dietetic Association, Society for Nutrition Education, and American School Food Service Association—Nutrition services: An essential component of comprehensive school health programs. *Journal of the American Dietetic Association*. 2003; 103(4):505-14.
5. Carvalho Á, Matos C, Minderico C, Almeida CTd, Abrantes E, Mota EA, et al. Referencial de Educação para a Saúde. Direção-Geral da Saúde; Direção-Geral da Educação; 2017. Disponível em: [https://www.dge.mec.pt/sites/default/files/Esaude/referencial\\_educacao\\_sau\\_de\\_vf\\_junho2017.pdf](https://www.dge.mec.pt/sites/default/files/Esaude/referencial_educacao_sau_de_vf_junho2017.pdf).
6. Decreto-Lei n.º 176/2014, de 2 de Dezembro. [citado em: 2024 january 25].
7. Decreto-Lei n.º 139/2012 de 5 de julho. [citado em: 2024 january 25].
8. Pinheiro MC, Gentil PC. Manual operacional para profissionais de saúde e educação: promoção da alimentação saudável nas escolas. Brasil: Ministério da Saúde; 2008. [citado em: 2024 april 07]. 152. Disponível em: [https://bvsms.saude.gov.br/bvs/publicacoes/manual\\_operacional\\_profissionais\\_saude\\_educacao.pdf](https://bvsms.saude.gov.br/bvs/publicacoes/manual_operacional_profissionais_saude_educacao.pdf).
9. Galisa M, Nunes AP, Garcia L, Chemin S. Educação Alimentar e Nutricional: da teoria à prática. Brasil: Roca; 2014.
10. Organization WH. Global Strategy on Diet, Physical Activity and Health. World Health Assembly. Geneva: World Health Organization; 2004. [citado em: 2024 february 01]. Disponível em: [https://iris.who.int/bitstream/handle/10665/43035/9241592222\\_eng.pdf?sequence=1](https://iris.who.int/bitstream/handle/10665/43035/9241592222_eng.pdf?sequence=1).
11. Bandura A. Self-efficacy: toward a unifying theory of behavioral change. *Psychological Review*. 1977; 84(2):191-215.
12. Bandura A. Self-Efficacy: The Exercise of Control. 1 ed. New York; 1997.
13. Bandura A, Azzi RG, Polydoro S. Teoria Social Cognitiva: Conceitos básicos. Porto Alegre: Artmed; 2008.
14. Azevedo M. A teoria cognitiva social de Albert Bandura. Lisboa: Faculdade de Ciências da Universidade de Lisboa; 1997. [citado em: 2024 february 20]. Disponível em: [https://webpages.ciencias.ulisboa.pt/~mdazevedo/materiais/ME&TES/Aprendiz\\_02CognitSocial.pdf](https://webpages.ciencias.ulisboa.pt/~mdazevedo/materiais/ME&TES/Aprendiz_02CognitSocial.pdf).
15. Holzberger D, Philipp A, Kunter M. Predicting teachers' instructional behaviors: The interplay between self-efficacy and intrinsic needs. *Contemporary Educational Psychology*. 2014; 39:100-11.

16. Teig N, Scherer R, Nilsen T. I Know I Can, but Do I Have the Time? The Role of Teachers' Self-Efficacy and Perceived Time Constraints in Implementing Cognitive-Activation Strategies in Science. *Frontiers in Psychology*. 2019; 10
17. Silva JC, Silva MM. Colaboração entre professores e autoeficácia docente: Qual relações? *Revista Portuguesa de Educação*. 2015. 87-109.
18. Mo S. Teacher Well-being: A Literature Review. *Lecture Notes in Education Psychology and Public Media*. 2024; 54(1):326-37.
19. Brenowitz N, Tuttle CR. Development and Testing of a Nutrition-Teaching Self-Efficacy Scale for Elementary School Teachers. *Journal of Nutrition Education and Behavior*. 2003; 35:308-11.
20. Everett SA, Price JH, Telljohann SK, Durgin J. The Elementary Health Teaching Self-Efficacy Scale. *American Journal of Health Behavior*. 1996; 20(1):90-97.
21. Riggs IM, Enochs LG. Toward the development of an elementary teacher's science teaching efficacy belief instrument. *Science Education*. 1990; 74(6):625-37.
22. Boateng GO, Neilands TB, Frongillo EA, Melgar-Quinonez HR, Young SL. Best Practices for Developing and Validating Scales for Health, Social, and Behavioral Research: A Primer. *Frontiers in Public Health*. 2018; 6:1-18.
23. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine*. 2000; 25(24):3186-91.
24. Horn JL. A rationale and test for the number of factors in factor analysis. *Psychometrika*. 1965; 30(2):179-85.
25. Steiger JH. Structural Model Evaluation and Modification: An Interval Estimation Approach. *Multivariate Behavioral Research*. 1990; 25(2):173-80.
26. Bentler PM. Comparative fit indexes in structural models. *Psychological Bulletin*. 1990; 107(2):238-46.
27. Tucker LR, Lewis C. A reliability coefficient for maximum likelihood factor analysis. *Psychometrika*. 1973; 38(1):1-10.
28. Jöreskog KG, Sörbom D. LISREL 7: User's Reference Guide. Chicago: Scientific Software International; 1989.
29. Hu Lt, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. 1999; 6(1):1-55.
30. McDonald RP. The theoretical foundations of principal factor analysis, canonical factor analysis, and alpha factor analysis. *British Journal of Mathematical and Statistical Psychology*. 1970; 23(1):1-21.
31. Sousa VD, Rojjanasrirat W. Translation, adaptation and validation of instruments or scales for use in cross-cultural health care research: a clear and user-friendly guideline. *Journal of Evaluation in Clinical Practice*. 2011; 17(2):268-74.
32. Ferreira PL, Marques FB. Avaliação Psicométrica e Adaptação Cultural e Linguística de Instrumentos de Medição em Saúde: Princípios Metodológicos Gerais Coimbra CdEeSdUd. Coimbra: Centro de Estudos e Investigação em Saúde da Universidade de Coimbra; 1998. [citado em: 2024 january 28]. Disponível em: <https://hdl.handle.net/10316/9968>.
33. Rogers C. Freedom to Learn: A View of What Education Might Become.: Merrill; 1969.

34. Guo Y, Piasta SB, Justice LM, Kaderavek JN. Relations among preschool teachers' self-efficacy, classroom quality, and children's language and literacy gains. *Teaching and Teacher Education*. 2010; 26(4):1094-103.
35. Caprara GV, Barbaranelli C, Steca P, Malone PS. Teachers' self-efficacy beliefs as determinants of job satisfaction and students' academic achievement: A study at the school level. *Journal of School Psychology*. 2006; 44(6):473-90.
36. Veiga F, Gonçalves V, Caldeira MJ, Roque P. Representação dos professores acerca de si mesmo: adaptação portuguesa da escala "teaching self-concept evaluation scale". In: XIV Colóqui da AFIRSE; Lisboa. Faculdade de Psicologia e de Ciências da Educação da Universidade de Lisboa (FPCEUL); 2006. [citado em: 2024 march 15].
37. Araújo M, Moura O. Estrutura factorial da General Self-Efficacy Scale (Escala de Auto-Eficácia Geral) numa amostra de professores portugueses. *Laboratório da Psicologia*. 2011; 9(1):95-105.
38. Brown TA. *Confirmatory Factor Analysis for Applied Research*. Second ed. New York: The Guilford Press; 2015.
39. Grupo de Trabalho de Educação para a Cidadania. *Estratégia Nacional de Educação para a Cidadania*. Ministério da Educação; 2016. [citado em: 2024 august 17].

## *Appendix*

### *Appendices index*

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## Appendix A - School Survey Monitoring System report

### Dados adicionais

Estado:

Aprovado

Avaliação:

Exmo.(a) Senhor(a) Amélia Catarina Fernandes Ribeiro

Cumpre-nos informar que o pedido de realização de inquérito em meio escolar é aprovado uma vez que, submetido a análise, cumpre os requisitos, devendo atender-se às observações aduzidas.

Com os melhores cumprimentos

José Carlos Sousa

Diretor de Serviços

DGE

Observações:

a) A aplicação dos instrumentos de notação em meio escolar deve ser autorizada pelas Direções dos Agrupamentos de Escolas do ensino público que serão contatadas para a realização do estudo. É importante prestar atenção especial ao modo, momento e condições em que o instrumento de recolha de dados será aplicado no ambiente escolar. Esse processo deve ser realizado em estreita colaboração com as Direções dos Agrupamentos e com os encarregados de educação/ representantes legais dos alunos e demais participantes.

b) É necessário seguir a legislação vigente sobre anonimato dos participantes, garantindo que eles não possam ser identificados, além de assegurar a confidencialidade, proteção e segurança dos dados coletados neste estudo. Devem ser previstas medidas adequadas para proteger os direitos e interesses fundamentais dos titulares dos dados, garantindo que o tratamento dos dados seja legal e conforme os procedimentos e leis aplicáveis.

Os documentos anexados detalham as obrigações de proteção de dados que o responsável pelo estudo se compromete a cumprir. Essas obrigações devem ser comunicadas a todos os participantes e a todos os envolvidos na recolha e tratamento de dados. É obrigatório obter o consentimento claro, informado e explícito dos participantes.

Recomenda-se que o Encarregado de Proteção de Dados da entidade responsável pelo estudo apoie todo o processo, considerando a implementação de medidas de segurança previstas na lei para proteger os dados pessoais e garantir a proteção adequada dos titulares.

c) No caso em questão, ao utilizar uma plataforma tecnológica para o registro de dados, é importante garantir que apenas o destinatário pretendido responda às questões apresentadas pelos instrumentos de inquérito ou registro. Isso pode ser feito identificando o endereço de e-mail pessoal do destinatário e garantindo que a pesquisa seja realizada por meio de um único acesso, utilizando o link da plataforma fornecido. Isso pode envolver o uso de um ou mais computadores disponibilizados na escola para esse fim, ou outra abordagem considerada apropriada para esse propósito.

No entanto, se o instrumento estiver disponível para acesso livre a qualquer pessoa, a Direção-Geral da Educação (DGE) não tem competência para autorizar a sua aplicação, uma vez que qualquer pessoa poderá responder.

d) Alerta-se para o seguinte: a recolha de dados só poderá ocorrer após a validação dos documentos por parte da Direção-Geral da Educação. Nesse âmbito, a data de início do período de recolha de dados deverá ser ajustada.

Outras observações:

Sem observações.

*Appendix B - Portuguese version (A and B)*

| <b>Expectativas de Eficácia</b>                                                |                                                                                                                                                     |
|--------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Até que ponto esta confiante de que / Qual seu grau de confiança de que</b> |                                                                                                                                                     |
|                                                                                | Teve treinamento adequado para ensinar sobre nutrição?                                                                                              |
|                                                                                | Percebe os conceitos de nutrição bem o suficiente para ensinar-lhos aos estudantes?                                                                 |
|                                                                                | Possui as habilidades necessárias para ensinar os conceitos de nutrição de maneira eficaz?                                                          |
|                                                                                | Consegue responder as perguntas dos estudantes sobre nutrição?                                                                                      |
|                                                                                | Faz um bom trabalho ao ensinar os estudantes sobre a Roda dos Alimentos (Mediterrânea)?                                                             |
|                                                                                | Faz um bom trabalho ao ensinar os estudantes sobre os grupos alimentares presentes na Roda dos Alimentos?                                           |
|                                                                                | Faz um bom trabalho ao ensinar os estudantes sobre a prática de uma alimentação saudável?                                                           |
|                                                                                | Faz um bom trabalho ao ensinar os estudantes sobre quais alimentos pertencem a cada grupo alimentar presente da Roda dos Alimentos?                 |
|                                                                                | Faz um bom trabalho ao ensinar os estudantes sobre quais nutrientes estão presentes em cada grupo alimentar da Roda dos Alimentos?                  |
|                                                                                | Faz um bom trabalho ao ensinar os estudantes sobre a presença de gorduras, açúcar, e sal nos alimentos ultraprocessados (snacks) e fast food?       |
|                                                                                | Faz um bom trabalho ao ensinar os estudantes sobre as Recomendações Alimentares?                                                                    |
|                                                                                | Faz um bom trabalho ao ensinar os estudantes sobre como reduzir o consumo de gordura e sal na sua alimentação?                                      |
|                                                                                | Faz um bom trabalho ao ensinar os estudantes sobre como aumentar o consumo de frutas, vegetais e grãos na sua alimentação?                          |
|                                                                                | Faz um bom trabalho ao ensinar os estudantes sobre Higiene Alimentar?                                                                               |
| <b>Outras Expectativas</b>                                                     |                                                                                                                                                     |
| <b>Até que ponto esta confiante de que / Qual seu grau de confiança de que</b> |                                                                                                                                                     |
|                                                                                | Consegue promover o interesse dos estudantes sobre nutrição?                                                                                        |
|                                                                                | Se fizer um bom trabalho ao ensinar nutrição, seus estudantes ficarão interessados no tema nutrição?                                                |
|                                                                                | Se fizer um bom trabalho ao ensinar nutrição, seus estudantes irão construir conhecimentos sobre nutrição?                                          |
|                                                                                | Se fizer um bom trabalho ao ensinar nutrição, seus estudantes irão modificar sua atitude em relação a nutrição?                                     |
|                                                                                | Se fizer um bom trabalho ao ensinar nutrição, seus estudantes irão modificar seu comportamento alimentar?                                           |
|                                                                                | Se ensinar nutrição por mais horas, terá um impacto maior nos conhecimentos, atitudes e comportamentos relacionados a nutrição dos seus estudantes? |

---

**Expectativas de eficácia**


---

**Quão confiante se sente**

- que tem a formação necessária para ensinar sobre nutrição?
- que conhece os conceitos de nutrição bem o suficiente para ensiná-los aos seus estudantes?
- que tem as ferramentas necessárias para ensinar os conceitos relacionados com a nutrição de forma eficaz?
- que consegue responder questões dos estudantes sobre nutrição
- que consegue fazer um bom trabalho a ensinar os alunos sobre a pirâmide dos alimentos?
- que consegue fazer um bom trabalho a ensinar os alunos sobre os grupos da pirâmide dos alimentos?
- que consegue fazer um bom trabalho a ensinar sobre uma alimentação equilibrada
- que consegue fazer um bom trabalho a ensinar os alunos sobre que alimentos pertencem a cada um dos grupos da pirâmide dos alimentos?
- que consegue fazer um bom trabalho a ensinar os alunos sobre que nutrientes estão presentes em cada um dos grupos da pirâmide dos alimentos?
- que consegue fazer um bom trabalho a ensinar os alunos sobre gordura, açúcar e sal nas comidas tipo fast food e snack?
- que consegue fazer um bom trabalho a ensinar os alunos sobre o que são as guidelines alimentares?
- que consegue fazer um bom trabalho a ensinar os alunos sobre diminuição do teor de gordura e sal na sua dieta?
- que consegue fazer um bom trabalho a ensinar os alunos sobre aumentar consumo de frutas, vegetais e grãos na sua dieta?
- que consegue fazer um bom trabalho a ensinar os alunos sobre estratégias para manter os alimentos seguros?

**Expectativas de resultados****Quão confiante se sente que:**

- consegue promover o interesse dos estudantes nos temas sobre nutrição?
- se fizer um bom trabalho a ensinar sobre nutrição, os alunos vão ter interesse em nutrição?
- se fizer um bom trabalho a ensinar sobre nutrição, os alunos vão aumentar os seus conhecimentos sobre nutrição?
- se fizer um bom trabalho a ensinar sobre nutrição, os alunos vão mudar as atitudes relacionadas com a nutrição?
- se fizer um bom trabalho a ensinar sobre nutrição, os alunos vão mudar os comportamentos relacionados com a nutrição?
- se ensinar mais horas sobre nutrição, vai ter um maior impacto no conhecimento, atitudes e comportamentos dos alunos relacionados com nutrição?

## Appendix C - Portuguese Final Version (V1)

| Expectativas de eficácia                                                                                                           |                       |                        |                                   |                        |
|------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------------------------|-----------------------------------|------------------------|
| Qual o seu grau de confiança de que                                                                                                | 1 - nada<br>confiante | 2 - pouco<br>confiante | 3 -<br>moderadamente<br>confiante | 4 - muito<br>confiante |
| Tem a formação necessária para ensinar sobre nutrição?                                                                             |                       |                        |                                   |                        |
| Percebe os conceitos de nutrição bem o suficiente para os ensinar aos estudantes?                                                  |                       |                        |                                   |                        |
| Possui as competências necessárias para ensinar os conceitos de nutrição de maneira eficaz?                                        |                       |                        |                                   |                        |
| Consegue responder às questões dos estudantes sobre nutrição?                                                                      |                       |                        |                                   |                        |
| Faz um bom trabalho a ensinar os alunos sobre a roda dos alimentos mediterrânica?                                                  |                       |                        |                                   |                        |
| Faz um bom trabalho a ensinar os estudantes sobre os grupos alimentares presentes na Roda dos Alimentos?                           |                       |                        |                                   |                        |
| Faz um bom trabalho a ensinar os estudantes sobre como praticar uma alimentação saudável?                                          |                       |                        |                                   |                        |
| Faz um bom trabalho a ensinar os estudantes sobre quais alimentos pertencem a cada grupo alimentar presente da Roda dos Alimentos? |                       |                        |                                   |                        |
| Faz um bom trabalho a ensinar os estudantes sobre quais nutrientes estão presentes em cada grupo alimentar da Roda dos Alimentos?  |                       |                        |                                   |                        |
| Faz um bom trabalho a ensinar os alunos sobre gordura, açúcar e sal nas comidas tipo <i>fast food e snack</i> ?                    |                       |                        |                                   |                        |
| Faz um bom trabalho a ensinar os estudantes sobre as Recomendações Alimentares?                                                    |                       |                        |                                   |                        |
| Faz um bom trabalho a ensinar os estudantes sobre como reduzir o consumo de gordura e sal na sua alimentação?                      |                       |                        |                                   |                        |
| Faz um bom trabalho a ensinar os estudantes sobre como aumentar o consumo de frutas, vegetais e grãos na sua alimentação?          |                       |                        |                                   |                        |
| Consegue promover o interesse dos estudantes nos temas sobre nutrição?                                                             |                       |                        |                                   |                        |
| Expectativas de resultados                                                                                                         |                       |                        |                                   |                        |
| Qual seu grau de confiança de que                                                                                                  | 1 - nada<br>confiante | 2 - pouco<br>confiante | 3 -<br>moderadamente<br>confiante | 4 - muito<br>confiante |
| Se fizer um bom trabalho a ensinar sobre nutrição, os seus estudantes ficarão interessados no tema nutrição?                       |                       |                        |                                   |                        |
| Se fizer um bom trabalho a ensinar sobre nutrição, os seus estudantes vão aumentar os seus conhecimentos sobre nutrição?           |                       |                        |                                   |                        |
| Se fizer um bom trabalho a ensinar sobre nutrição, os seus estudantes vão mudar as suas atitudes relacionadas com a nutrição?      |                       |                        |                                   |                        |

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Se fizer um bom trabalho a ensinar nutrição, os seus estudantes vão modificar o seu comportamento alimentar?

Se ensinar mais horas sobre nutrição, vai ter um maior impacto no conhecimento, atitudes e comportamentos dos seus estudantes relacionados com a nutrição?

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## Appendix D - Back-translated version

| Self-Efficacy Expectations                                                                                                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------|
| To what degree are you confident that:                                                                                                            |
| You have enough training to teach Nutrition?                                                                                                      |
| You understand the concepts of Nutrition well enough to teach them to students?                                                                   |
| You have the necessary skills to efficiently teach the concepts of Nutrition?                                                                     |
| You can answer students' questions about Nutrition?                                                                                               |
| You do a good job teaching students about the Mediterranean Diet Wheel?                                                                           |
| You do a good job teaching students about the different food groups in the Food Wheel?                                                            |
| You do a good job teaching students about how to practice a balanced diet?                                                                        |
| You do a good job teaching students about which foods belong to each food group in the Food Wheel?                                                |
| You do a good job teaching students about which nutrients are present in each food group of the Food Wheel?                                       |
| You do a good job teaching students about the fat, sugar and salt in fast food and snacks?                                                        |
| You do a good job teaching students about food recommendations?                                                                                   |
| You do a good job teaching students about how to reduce the consumption of fat and salt from their diet?                                          |
| You do a good job teaching students about how to increase the consumption of fruits, vegetables, and grains in their diet?                        |
| You do a good job teaching students about food hygiene?                                                                                           |
| Result Expectations                                                                                                                               |
| To what degree are you confident that:                                                                                                            |
| You can promote students' interest in Nutrition topics?                                                                                           |
| If you do a good job teaching Nutrition, your students will become interested in the topic of Nutrition?                                          |
| If you do a good job teaching Nutrition, your students will increase their knowledge about Nutrition?                                             |
| If you do a good job teaching Nutrition, your students will change their attitudes towards Nutrition?                                             |
| If you do a good job teaching Nutrition, your students will change their eating behaviour?                                                        |
| If you spend more time teaching Nutrition, it will have a bigger impact on your students' knowledge, attitudes, and behaviours towards Nutrition? |
| Back-translated version by Catherina Jonsson                                                                                                      |

## *Appendix E - Sociodemographic data*

### **Dados Sociodemográficos**

#### **Idade**

#### **Gênero**

- Masculino
- Feminino
- Não-binário
- Prefiro não dizer

#### **Distrito de residência**

### **Informação profissional**

#### **Anos de experiência**

Por favor, indique há quantos anos leciona.

#### **Qual o nível de ensino que leciona?**

Selecione todos os níveis que, atualmente, se enquadrem com a sua atividade profissional.

- Jardim de infância
- 1º ciclo do ensino básico
- 2º ciclo do ensino básico
- 3º ciclo do ensino básico
- Ensino secundário

#### **Disciplina que leciona**

Por favor, indique, todas as disciplinas que leciona atualmente nos respetivos níveis de ensino.

1º ciclo do ensino básico

2º ciclo do ensino básico

3º ciclo do ensino básico

Ensino secundário

*Appendix F - Informed Consent***Consentimento informado**

No âmbito da Dissertação de Mestrado em Educação Alimentar, a decorrer na Faculdade de Ciências da Nutrição e Alimentação e Faculdade de Psicologia e Ciências da Educação da Universidade do Porto, decorre um estudo que visa traduzir, adaptar culturalmente e validar para a população o questionário "Nutricion teaching self-efficacy scale" (Brenowitz N, Tuttle CR, 2003). Este questionário avalia as crenças de autoeficácia dos professores acerca do ensino das temáticas nutrição e alimentação.

Este estudo tem como população alvo todos os educadores de infância e professores dos diferentes ciclos de escolaridade que estejam a lecionar no momento do preenchimento do questionário.

De ressaltar que os dados ficarão guardados numa nuvem digital, em que apenas os investigadores terão acesso através de uma palavra-passe, até um período máximo de 2 anos.

Se pretender algum esclarecimento sobre este estudo, ou ter acesso aos resultados, por favor, contacte a mestranda Amélia Catarina Ribeiro pelo e-mail [up202203378@fcna.up.pt](mailto:up202203378@fcna.up.pt)

Percebi as informações transmitidas e aceito fazer parte da investigação

Sim ☐ Não ☐



**Teacher self-efficacy scale for teaching  
nutrition: validation for the Portuguese  
population**

Amélia Catarina Ribeiro

SEDE ADMINISTRATIVA    FACULDADE DE CIÊNCIAS DA NUTRIÇÃO E ALIMENTAÇÃO  
FACULDADE DE PSICOLOGIA E DE CIÊNCIAS DA EDUCAÇÃO

