ABSTRACT

INTRODUCTION: Self-efficacy refers to the beliefs in the ability to organise and implement action plans needed to achieve a certain result and to the feeling of control over the behaviours and environment. Despite this construct having some degree of generalisation when considering related tasks or behaviours, as in eating behaviour, only the General Eating Self-Efficacy Scale assesses global features of eating self-efficacy. This instrument showed good psychometric properties among Portuguese higher education students.

OBJECTIVES: To study the psychometric properties of the General Eating Self-Efficacy Scale among female patients treating overweight and to study the relationship of eating self-efficacy with age, education and Body Mass Index.

METHODOLOGY: We studied a sample of 63 women attending Nutrition appointments to treat overweight: mean age of 40 years (SD = 11), mean education of 9 years (SD = 4) and mean Body Mass Index of 36.4 Kg/m² (SD = 7.0).

RESULTS: Similarly to the original study among higher education students, the scale showed good reliability (α = 0.864) and a unifactorial structure, with the extracted factor explaining 67.4% of the overall variance. The associations with other instruments revealed good convergent and discriminant validity. General Eating Self-Efficacy Scale score did not significantly correlate with either age (r = -0.004, p = 0.973), years of education (r = -0.223, p = 0.090) or Body Mass Index (r = -0.164, p = 0.215).

CONCLUSIONS: The results of this study show that the General Eating Self-Efficacy Scale presents good psychometric properties among females treating overweight and that it appears to be a useful tool for use in clinical settings.

KEYWORDS

Eating behaviour, Eating self-efficacy, Overweight, Psychometric properties, Scale
INTRODUCTION
The concept of self-efficacy refers to (a) the beliefs in the ability to organise and implement action plans needed to achieve a certain result and (b) the feeling of control over the behaviours and environment (1-3). This judgment on the individual's own competence and on the ability to overcome difficulties does not necessarily correspond to the person's real competences regarding a certain task (3). Self-efficacy determines the initiation, maintenance and cessation of strategies or behaviours (2, 4, 5), and it has been shown that it is a good predictor of several health-related behaviours, namely eating behaviour.

The definition of self-efficacy implies that it is a specific feature for each task (2, 3, 6) and, as such, its assessment should be task-specific (7). Nevertheless, self-efficacy has some degree of generalisation when considering related tasks or behaviours, as in eating behaviour (7-9). Moreover, people have difficulties discriminating the circumstances under which they have problems controlling their eating behaviour, or those problems tend to be broad (10). Self-efficacy is a dimension of self-concept, which corresponds to the person's own image, while self-esteem is the evaluative component of self-concept (11-14). Self-efficacy is also related to (internal) locus of control, which refers to an allocation of responsibility or cause (internal or external) regarding a certain domain or behaviour (15).

Regarding eating self-efficacy, several scales have been proposed, and one of them assesses global features of food self-efficacy, the General Eating Self-Efficacy Scale (GESES) (16), while most refer to specific clinical conditions or to the consumption of certain foods (e.g., 17-20). GESES' psychometric properties have been studied among Portuguese higher education students (16), where it showed good convergent and discriminant validity with the "Self-Concept Clinical Inventory" (SCCI) (21) and the Health Locus of Control Scale (22). However, this does not allow to extrapolate such properties to clinical settings, where this instrument may be useful. Hence, it is relevant to study its psychometric properties in clinical samples.

OBJECTIVES
To study the psychometric properties of the GESES in a sample of female patients attending Nutrition appointments to treat overweight and to study the relationship of eating self-efficacy with age, education and Body Mass Index (BMI) among those patients.

METHODOLOGY
Procedures
This study is part of the project "Aspectos cognitivos e comportamentais da alimentação: Elementos para uma compreensão integrada", approved by the Ethics Committee of the Centro Hospitalar Universitário de São João (CHUSJ). It was conducted on a convenience sample of outpatients attending Nutrition appointments to treat overweight in CHUSJ (a central hospital in Porto, Portugal). The inclusion criteria were: age between 18 and 65 years, and the absence of diseases with dietary therapy different from the recommended for treating overweight. Data collection took place between May 2011 and September 2013. Potential participants were invited, and the study’s aims and procedures were explained before obtaining their written informed consent. Sociodemographic and clinical data were gathered from clinical records. BMI was calculated based on measured height and weight. All procedures were standardized prior to data collection. The participants were given the project’s protocol for later filling, as well as a prepaid envelope to return the questionnaires.

Instruments
In this study, data from three questionnaires were used: the GESES (16), the SCCI (21) and the Health Locus of Control Scale (22). The GESES was developed based on the factor "self-efficacy" of the SCCI. It comprises five items, answered in a 5-point scale ranging from “Don’t agree” to “Agree a lot”. Each item is scored from 0 to 4 points (item 1 is quoted reversely) and the overall score is obtained by the sum of the scores in all items, leading to a total of 0 to 20 points, with higher scores corresponding to higher eating self-efficacy. The final version of this scale may be found in Poínhos et al. (2013) (16). SCCI is a Likert-like scale that assesses emotional and social self-concept features, composed of 20 items scored from 1 to 5. Each item is composed of a sentence that the respondent must classify from "Don’t agree" to "Agree a lot". Besides its overall score, SCCI allows the valuation of six factors; factor 2 is composed of items related to the individual’s ability to face and solve problems and difficulties, being called “self-efficacy factor”. In each item, factor and overall score, higher scores correspond to higher self-concept (21). SCCI was used to study both convergent and discriminant validity. Due to the transversality of self-concept, positive associations with SCCI scores were expected. The association with SCCL's self-efficacy factor was expected to be the highest, but not with a determination coefficient above 50% ($r < 0.707$), in order to assure a specific assessment of eating self-efficacy.

The study of the discriminatory validity also included the study of the associations with locus of control. Besides the conceptual discrepancy between self-efficacy and locus of control, this analysis supplies the need to assure that the use of control-related expressions when adapting GESES' items from SCCI didn’t generate an excessive approximation to internal locus of control. The instrument used to assess locus of control was the Health Locus of Control Scale (22), composed of 14 items with seven possible answers (from "totally disagree" to “totally agree”), and scored 1 to 7. The overall score corresponds to the sum of the score in all items, and higher scores correspond to internal locus of control.

Sample
A total of 185 individuals (67.9% females) were invited, all of which accepted to participate in the study. From the initial sample, 85 participants (77.6% females) returned the protocol (devolution rate of 45.9%). Due to the low number of males who completed their participation, the analysis was performed only for females. From the 66 female participants, data from three were further excluded due to incomplete filling of the General Eating Self-Efficacy Scale, and thus the reliability analysis and the factorial analysis were performed in a sample of 63 women. Another four participants had incomplete data in the ICAC or the Health Locus of Control Scale, and were therefore not included in the study of convergent and discriminant validity.

Statistical Analysis
The statistical analysis was performed in IBM SPSS version 27.0 for Windows. The reliability of the scale was assessed using the tau-equivalent reliability, usually called Cronbach’s α. The scale was submitted to factorial analysis through principal component extraction (without rotation). The factorial analysis models were validated using the sampling adequacy measure of Kaiser-Meyer-Olkin (KMO) and Bartlett’s test, and analyzed through the scree plots method (23). Pearson’s correlation coefficient was used to measure the association between pairs of variables. Results were considered statistically significant when $p < 0.05$. 
RESULTS
The sample had a mean age of 40 years (SD = 11) and a mean education of 9 years (SD = 4). Participants had BMI values between 24.5 and 60.8 Kg/m² (mean = 36.4, SD = 7.0). The application of GESES required a small amount of time to be completed (about one minute), and had absence of doubts and a reduced rate of incompleteness (4.5%). Moreover, the scale showed good reliability (α = 0.864). Table 1 presents the values of Cronbach’s α, item-total correlations and the value of α if each item is excluded. All item-total correlations are above 0.4 and the exclusion of most items would decrease the value of α. The exclusion of item 1 would increase the value of α, but given the initial α value we decided to maintain all five items.

A factorial analysis (principal components extraction method) was performed (Table 2). The results of both the KMO and Bartlett’s test show good sample adequacy. Only one factor with eigenvalue higher than 1 was extracted, explaining about two thirds (67.4%) of the overall variance. The scree plot analysis also suggested a unifactorial structure. All items presented an association above 0.5 with the extracted factor. Table 3 presents the associations of GESES total score with the SCCI (overall score and factors) and the Health Locus of Control Scale. GESES had a positive association with SCCI’s overall score, and the association with the self-efficacy factor was higher than with any other factor. The determination coefficient of that correlation was of 33.5%, and thereby below the predefined criterion of r² < 50%. The association with the Health Locus of Control Scale was not significant.

GESES's score had very weak and non-statistically significant negative correlations with age (r = -0.004, p = 0.973), years of education (r = -0.223, p = 0.090) and BMI (r = -0.164, p = 0.215). The analysis showed good psychometric properties of the GESES tool in clinical settings.

CONCLUSIONS
GESES presented good psychometric properties among female patients treating overweight and it was not significantly correlated with age, education or BMI. Thus, this instrument appears to be a useful tool in clinical settings.

FUNDING
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CONFLICTS OF INTEREST
None of the authors reported a conflict of interest.

Table 1
Reliability analysis (n = 63)

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>CRONBACH'S α = 0.864</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ITEM-TOTAL CORRELATION</td>
</tr>
<tr>
<td></td>
<td>0.426</td>
</tr>
<tr>
<td>1 – Desisto de controlar a minha alimentação quando encontro dificuldades</td>
<td>0.627</td>
</tr>
<tr>
<td>2 – Sou rápido(a) a tomar decisões e a implementar medidas para controlar a minha alimentação</td>
<td>0.850</td>
</tr>
<tr>
<td>3 – Enfrento e resolvo os problemas relativos ao controlo da minha alimentação</td>
<td>0.847</td>
</tr>
<tr>
<td>4 – Sou persistente a resolver as dificuldades em controlar a minha alimentação</td>
<td>0.740</td>
</tr>
<tr>
<td>5 – Encontro sempre energia para vencer as dificuldades em controlar a minha alimentação</td>
<td>0.850</td>
</tr>
</tbody>
</table>

Table 2
Factorial analysis through principal component extraction (without rotation) (n = 63)

| Kaiser-Meyer-Olkin | 0.815 |
| Bartlett's test (p) | < 0.001 |
| Largest eigenvalue | 3.372 |
| Variance explained by the first factor (%) | 67.4 |
| Correlation with the first factor | Item 1 0.565 |
| | Item 2 0.785 |
| | Item 3 0.931 |
| | Item 4 0.920 |
| | Item 5 0.850 |

Table 3
Associations with self-concept and health locus of control (n = 59)

<table>
<thead>
<tr>
<th>SELF-CONCEPT CLINICAL INVENTORY</th>
<th>r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall score</td>
<td>0.357</td>
<td>0.006</td>
</tr>
<tr>
<td>Factor 1: Social acceptance/rejection</td>
<td>0.097</td>
<td>0.466</td>
</tr>
<tr>
<td>Factor 2: Self-efficacy</td>
<td>0.579</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Factor 3: Psychological maturity</td>
<td>0.171</td>
<td>0.196</td>
</tr>
<tr>
<td>Factor 4: Impulsiveness-activity</td>
<td>0.259</td>
<td>0.048</td>
</tr>
<tr>
<td>Factor 5</td>
<td>0.267</td>
<td>0.041</td>
</tr>
<tr>
<td>Factor 6</td>
<td>0.019</td>
<td>0.884</td>
</tr>
</tbody>
</table>

r: Pearson's correlation coefficient

DISSCUSION OF THE RESULTS
The analysis showed good psychometric properties of the GESES in our sample composed of female outpatients attending Nutrition appointments to treat overweight. We highlight its good reliability and the fact that the associations with other measures show its convergent and discriminant validity. The factorial analysis revealed that the scale has a unifactorial structure; given the theoretical and conceptual assumptions on which it was developed, this result evidences its construct validity. We also highlight the high proportion of variance explained by the extracted factor. Moreover, the scale showed to be easy and quick to apply.

In this sample, the level of eating self-efficacy didn’t present an association with age, education or BMI. The comparison of these results with prior research is conditioned by the previously referred lack of studies using scales that assessed general features of eating self-efficacy. A recent paper presenting the development of an eating self-efficacy scale revealed a negative relationship with BMI (24). However, the correlation between them was very weak and, indeed, very similar in strength to the association found in the present study.

The main limitation of this study is that it was carried out in a convenience sample from only one clinical site and only among females. Nevertheless, the convergence of results with those from the original study, carried out in a sample of higher education students from both sexes (16), indicates the adequacy of the use of this instrument in different groups and contexts.

None of the authors reported a conflict of interest.

PSYCHOMETRIC PROPERTIES OF THE GENERAL EATING SELF-EFFICACY SCALE AMONG FEMALES TREATING OVERWEIGHT
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None of the authors reported a conflict of interest.
AUTHORS’ CONTRIBUTIONS

RP, BMPMO and FC: Were responsible for the conceptualization and design of the study; RP, JMG, SP and FC: Were responsible for data collection; RP, EC and BMPMO: Were responsible for the design, analysis and interpretation of the data; RP and EC: Were responsible for writing the first draft of the manuscript, and all authors contributed to and agreed with the final version.

REFERENCES