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Concordance and reliability of an electronic body image questionnaire in university students

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ABSTRACT

Objective: analyze the prevalence of dissatisfaction with body image and concordance and reliability of the printed version and the electronic version of a body image instrument in university students.

Method: A total of 117 university students of both sexes were evaluated. The validated questionnaire was the body figure scale. Data were compared using a *t*-test for paired samples, concordance between versions was tested by the kappa index, and reliability by the intraclass correlation coefficient and the percentage of agreement, using the Statistical Package for the Social Sciences 15.0 software.

Results: The percent agreement and intraclass correlation coefficient values ranged from low to high according to version, sex and the item analyzed. The kappa index was higher than 0.60, indicating good correlation.

Conclusions: The version of the questionnaire does not modify the assessment of body image.

Keywords: Students, Body image, Questionnaire, Online system.

Concordancia y fiabilidad de un cuestionario electrónico de imagen corporal en estudiantes universitarios

RESUMEN

Objetivo: Analizar la prevalencia de insatisfacción con la imagen corporal y la concordancia y confiabilidad de la versión impresa y de la versión electrónica de un instrumento de imagen corporal en universitarios.

Método: Se evaluaron un total de 117 estudiantes universitarios de ambos sexos. El cuestionario validado fue la escala de figuras corporales. Los datos fueron comparados utilizando la prueba *t* para muestras pareadas, la concordancia entre las versiones fue probada por el índice kappa y la confiabilidad por el coeficiente de correlación intraclase y el porcentaje de concordancia, utilizando el software *Statistical Package for the Social Sciences 15.0*.

Resultados: El porcentaje de concordancia y los valores del coeficiente de correlación intraclase varían de abajo a alto de acuerdo con la versión, el sexo y el ítem analizado. El índice kappa fue superior a 0.60, indicando buena correlación.

Conclusiones: La versión del cuestionario no modifica la evaluación de la imagen corporal.

Palabras clave: Estudiantes, Imagen corporal, Cuestionario, Sistema en línea

Concordância e confiabilidade de um questionário eletrônico de imagem corporal em estudantes universitários

RESUMO

Objetivo: Analisar a prevalência de insatisfação com a imagem corporal e a concordância e confiabilidade da versão impressa e da versão eletrônica de um instrumento de imagem corporal em universitários.

Método: Um total de 117 estudantes universitários de ambos os sexos foram avaliados. O questionário validado foi a escala de figuras corporais. Os dados foram comparados utilizando-se o teste *t* para amostras pareadas, a concordância entre as versões foi testada pelo índice kappa e a confiabilidade pelo coeficiente de correlação intraclasse e o percentual de concordância, utilizando-se do software *Statistical Package for the Social Sciences 15.0*.

Resultados: O percentual de concordância e os valores do coeficiente de correlação intraclasse variaram de baixo o alto de acordo com a versão, o sexo e o item analisado. O índice kappa foi superior a 0.60, indicando boa correlação.

Conclusões: A versão do questionário não modifica a avaliação da imagem corporal.

Palavras-chave: Estudantes, Imagem corporal, Questionário, Sistema online

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Introduction

Body image (BI) can be defined as an illustration in one's mind of the size, appearance and shape of one's body and of the emotional responses associated with it.¹ The increasing offer of high-calorie foods and low or no practice of physical activity promotes the development of obesity.² The impossibility to achieve esthetic body models, skinny and muscular body for women and men, respectively, may induce a negative BI. Thus, the assessment of BI becomes important in order to identify the prevalence of population groups susceptible to the development of food disorders since dissatisfaction with BI is associated with a higher probability of developing such disorders.³

Several instruments have been developed to assess BI, as the body figure scale proposed by Stunkard et al.⁴, which has been widely used in Brazil^{5,6} and international surveys^{7,8} due to its rapid application, data collection and tabulation compared to other subjective measures.⁹ However, how this scale consists of flat figures, the application of it in printed form may not provide a good visualization. On this basis, the use of electronic questionnaires tends to provide a better visualization due to the presence of the screen support.¹⁰ In addition, it involves lower costs and rapid data tabulation and can be applied to a larger number of persons.¹¹

However, we found no studies in the literature evaluating the concordance and reliability of an instrument applied electronically in university students. Several attempts to use electronic questionnaires have led to controversies.¹²⁻¹⁴ Boyes et al.¹², when compared the agreement between anxiety, depression and supportive care needs data obtained using a touch screen computer survey with traditional pen-and-paper surveys observed moderate agreement between the two modes of survey administration. Bernabe-Ortiz et al.¹⁴, in a study assessing the quality of sexual behavior data collected from adults, detected a high level of agreement between the results obtained with a paper questionnaire and those obtained electronically.

In view of the above considerations, there is a clear need to compare the results obtained with the application of a printed questionnaire to those obtained with an electronic one, especially regarding BI, in order to clarify how the characteristics of the instrument or its use can determine the nature of the data collected and help researchers to select the most suitable technique for investigation. In order to make available an instrument via the internet based on a consistent and appropriate method for the measurement of BI, the objective of the present study was to analyze the prevalence of dissatisfaction with BI and the concordance and reliability of the printed version (PV) and the electronic version (EV) in university students.

Methods

Subjects

A total of 117 university students, men and women, enrolled in the 1st and 2nd phase of the Physical Education course for the Bachelor's and undergraduate degree of UFSC in 2009 were studied. They were divided into two groups: a) 58 students (32 males) with a mean age of 21.7 (± 3.8) years first responded to the PV of the questionnaire and 7 days later to the EV; b) 59 students (31 males) with a mean age of 21.2 (± 3.8) years first responded to the EV and 7 days later to the PV. This was a cross-sectional study approved by the Research Ethics Committee of the Universidade Federal de Santa Catarina (UFSC) (Protocol No. 096/2007).

Experimental Design

The printed instrument used as the reference method was the body figure scale proposed by Stunkard et al.⁴ This questionnaire was translated and validated for Brazilian by Scagliusi et al.¹⁵,

yielding correlations of 0.72 between BMI and current figure and of 0.76 between BMI and score of the difference between the current figure value and the ideal value.

This instrument consists of a set of human figures numbered from one, that represents thinness, to nine (severe obesity) for both sexes. The instrument was applied following the guidelines proposed in the original study,⁴ which require the subject to indicate the figure that best represents his/her current physical figure and the one he/she would like to have (ideal figure). In addition, the subjects were asked to indicate the figure they judged to be ideal for the opposite sex. Dissatisfaction with BI was determined by subtracting the value of the current figure from the ideal one. Positive values represent dissatisfaction due to excess weight, negative values dissatisfaction due to thinness, and zero value satisfaction.

Data were collected in August 2009 in an informatics room under the guidance of the investigator and of three Physical Education teachers previously trained for this function. During the application, the investigator presented the questionnaire to the students with a concise exposure of the objectives of the questionnaire and a description of how it should be filled out. All subjects gave written informed consent to participate in the study.

The EV of the BI questionnaire was elaborated using an internet application (web) based on the programming language Hypertext Preprocessor (PHP) 5¹⁶ and Java Script.¹⁷ The instrument has a graphic interface that permits the users to interact employing Adobe Flash technology. The instrument was located on the <http://www.moodle.ufsc.br> site and the form could be accessed with internet navigators by providing user information and a password.

The electronic instrument has the same structure as the printed one, differing only in the interface mode for giving the responses. A system for the management of data banks was added for the storage of information by the MySQL 5 method,¹⁶ which permits the generation of reports that can be exported to electronic spreadsheets in the Excel for Windows (xls) format. During the application, the students were instructed to insert in the parenthesis the numbers which represent their response for current and ideal figure and the ideal figure for the opposite sex (Figure 1).

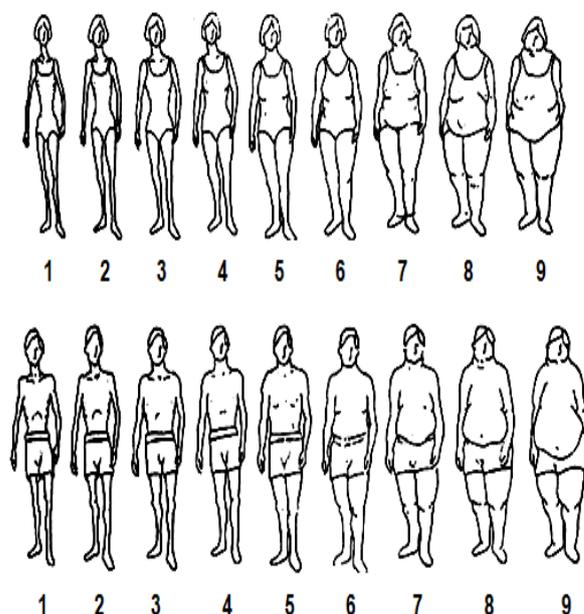


Figure 1. Body figure scale proposed by Stunkard, Sorensen and Schulsinger (1983).

In order to characterize the sample the following sociodemographic variables were analyzed: sex (male and female),

age range (>20 years and ≤20 years), socioeconomic level (>6 minimum wages and ≤6 minimum wages), mother's and father's schooling (>8 years and ≤8 years), marital status (married and single), and paid work (yes and no).

Statistical Analysis

Descriptive statistical analysis (absolute and relative frequencies) was used for sample characterization. The agreement between PV and EV results was calculated using the kappa index. The reference values for this analysis are: <0.40, weak correlation; 0.40 to 0.60, moderate correlation; 0.60 to 0.80, good or substantial correlation, and >0.80, almost perfect or very good correlation.¹⁸ For the analysis of reliability, the mean difference between the scores obtained with the electronic questionnaire and the printed one for the test and retest was determined using at-test for paired samples since the data showed normal distribution when analyzed by the Kolmogorov-Smirnov test. Percent agreement and the intraclass correlation coefficient (ICC) were also use. The analyses were performed using the Statistical Package for the Social Sciences (SPSS)[®] version 15.0, with the level of significance set at 5%.

Results

Among all university students investigated 52.1% of them were males, older than 20 years (65.8%), with a family income of up to six minimum wages (51.3%), and with mother's (73.5%) and father's schooling (67.5%) of more than 8 years, single (96.6%) and did not hold a paid job (53.8%).

Table 1 shows the results obtained with the PV and EV according to sex for those who first responded to the PV. The perception was similar regardless of the version used (p>0.05) for both sexes. In the reliability analysis, among the three items analyzed, the ideal figure for the opposite sex showed the lowest percent agreement and ICC for males (59.0%; ICC: 0.54) and females (61.5%; ICC: 0.74). No significant differences (p>0.05) were detected regarding the values obtained for the current and ideal figure and the ideal figure for the opposite sex regardless of the version used, for either males or females, for those whose answered the EV first. Analysis of reliability revealed that the ideal figure for males (45.2%; ICC: 0.80) and the ideal figure for the opposite sex for women (53.3%; ICC: 0.50) showed the lowest percent agreement and ICC values, respectively.

As can be seen in Table 2, the kappa index values ranged from moderate to strong mainly for females, indicating agreement between the responses from PV and EV in the group that responded first to the PV. For the group that responded first to the EV the kappa index presented moderate to strong agreement between the EV and PV responses, which was higher for females.

Discussion

A previous review of the literature did not detect any study considering the concordance and reliability of an electronic instrument for the assessment of BI. Thus, this study contributed to the body of knowledge in this area, demonstrating good concordance and reliability of the EV of the body figure scale.

The reliability of the EV of the body figure scale was found to be good, with ICC values ranging from 0.50 to 0.95 according to sex, the item analyzed and the method of application. In general, the current figure item showed the highest values (> 0.80) for both sexes. These results agree with another study¹⁹ that tested in other populations the reliability of the PV of the body figure scale proposed by Stunkard et al.⁴. Lo et al.¹⁹, in a study analyzing the reliability of the body figure scale in Chinese adolescents of both sexes, detected a correlation of 0.78 among girls and of 0.72 among boys, indicating good reliability for current body figure.

Comparison of the values obtained here in the analysis of reliability of the scores for ideal figure and those of the current figure revealed lower ICC values for the ideal body figure. This outcome has been identified in other studies using instruments consisting of body figures^{20,21} and may be explained by the presence of transient factors, such as recent exposure to media messages and mood status, which may temporarily affect the judgment of ideal size.²⁰ However, even though lower ICC values were detected for the ideal figure item, the values were considered to be moderate, (>0.60) for men and women.²²

Table 1. Means, standard deviation, concordance and correlation obtained for the application of the printed version followed by the electronic version according to sex of first-year Physical Education students of UFSC.

Variable	Printed Mean (SD)	Electronic Mean (SD)	Concordance n (%)	p-value*	ICC (95%CI)
Printed version followed by the electronic version					
Male					
Current figure	4.09 (1.20)	4.16 (1.18)	20 (62.5)	p=0.64	0.89 (0.76 – 0.94)
Ideal figure	3.94 (0.62)	3.94 (0.62)	23 (71.9)	p=1.00	0.66 (0.31 – 0.83)
Ideal figure for the opposite sex	3.50 (0.67)	3.59 (0.71)	19 (59.0)	p=0.50	0.54 (0.06 – 0.78)
Female					
Current figure	3.42 (1.14)	3.42 (1.14)	20 (76.9)	p=1.00	0.95 (0.89 – 0.98)
Ideal figure	3.12 (0.52)	3.10 (0.63)	21 (80.8)	p=0.66	0.82 (0.60 – 0.92)
Ideal figure for the opposite sex	3.54 (0.76)	3.42 (0.81)	16 (61.5)	p=0.42	0.74 (0.42 – 0.88)
Electronic version followed by the printed version					
Male					
Current figure	4.03 (1.11)	4.00 (1.15)	20 (64.5)	p=0.50	0.92 (0.84 – 0.96)
Ideal figure	4.00 (0.81)	3.97 (0.79)	14 (45.2)	p=0.48	0.80 (0.59 – 0.90)
Ideal figure for the opposite sex	3.42 (0.76)	3.39 (0.71)	22 (71.0)	p=0.25	0.84 (0.67 – 0.92)
Female					
Current figure	3.17 (1.26)	3.13 (1.18)	23 (76.7)	p=0.71	0.91 (0.81 – 0.96)
Ideal figure	3.07 (0.98)	3.03 (0.81)	18 (60.0)	p=0.77	0.83 (0.64 – 0.92)
Ideal figure for the opposite sex	3.83 (0.70)	3.73 (0.69)	16 (53.3)	p=0.45	0.50 (0.40 – 0.74)

SD: standard deviation; ICC: intraclass correlation; 95% CI: 95% confidence interval. * t-test for paired samples.

Table 2. Concordance of the measures of body image perception between the questionnaires applied in the printed and electronic version according to sex of Physical Education students of UFSC (Florianopolis, Brazil).

Type of application	Satisfied % (n)	Dissatisfied due to excess weight % (n)	Dissatisfied due to thinness % (n)	p-value*	Kappa index
Printed version followed by the electronic version					
Male					
Printed	21.9 (7)	53.1 (17)	25.0 (8)	0.65	0.76
Online	34.4 (11)	40.6 (13)	25.0 (8)		
Female					
Printed	15.4 (4)	57.7 (15)	26.9 (7)	1.00	0.86
Online	11.5 (3)	57.5 (15)	30.8 (8)		
Electronic version followed by the printed version					
Male					
Online	22.6 (7)	35.5 (11)	41.9 (13)	0.68	0.61
Printed	29.0 (9)	32.3 (10)	38.7 (12)		
Female					
Online	40.0 (12)	36.7 (11)	23.3 (7)	0.77	0.80
Printed	40.0 (12)	33.3(10)	26.7 (8)		

t-test for paired samples.

In view of the above considerations, electronic questionnaires are considered to have good internal consistency and stability, suggesting their promising use in research due to lower costs, rapidity and the ability to reach specific populations.¹¹ In addition, the presence of screen support such as the use of icons, images or

pictures for obtaining an opinion permits a better and more attractive visualization compared to figures in printed questionnaires.¹⁰

Regarding the analysis of concordance between the two versions, no significant differences were detected in the prevalence of satisfaction with BI or dissatisfaction due to excess weight or thinness between the application of the PV and EV. In general, divergent results have been reported in the literature for the comparison of different methods for the application of questionnaires, i.e., EV and PV.^{13,23} Van DenKerkhof et al.¹³, comparing the efficiency of the application of the Pre-Admission Adult Anesthetic Questionnaire in the printed form and online, did not observe significant differences between the electronic interface and the printed questionnaire applied to adults from Kingston, Canada. Similarly, Legnani et al.²⁴ didn't find significant differences in the physical activity scores obtained with the PV and EV (48.6 vs 46.8) of the WEBDAFA, with a significant ICC being obtained for all types of physical activity ($p < 0.05$).

The 60% prevalence of dissatisfaction with BI observed in the present study was high, in agreement with the literature,²⁵ with men showing more dissatisfaction due to thinness and women showing more dissatisfaction due to excess weight.²⁵ These results reflect the differences in body patterns propagated by the mass media, i.e., extremely thin bodies for women and muscular bodies for men.² In view of these findings, there is a clear need to formulate reflexive actions in the university environment in order to discuss strategies for the improvement of BI and self-acceptance.

The main limitation of the present study are the sample size that is small and the convenience sample consisted of university students, a fact that prevents the extrapolation of the data to persons of lower educational level due to their lower degree of comprehension. However, we emphasize the importance of the present results since they provide information aiding investigators about the choice of the method for the application of a questionnaire based on the characteristics of their study.

On the basis of the present results, we may conclude that the body figure scale applied in the electronic form does not modify the assessment of BI. Thus, its use becomes a suitable alternative for research since it permits economy of paper, rapid data collection, and automatic formulation of a database, thus preventing tabulation errors.

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