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Factor structure and normative data of the Greene Climacteric Scale among postmenopausal Portuguese women

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ABSTRACT

Objectives: The purposes of the present study were to assess the factorial structure and reliability of the Greene Climacteric Scale (GCS), and provide normative data for a sample of postmenopausal Portuguese women.
Methods: A sample of 401 Caucasian women, with ages between 47 and 91 years, divided into four age groups (47–57: 31.4%, 58–68: 40.4%, 69–79: 21.4% and ≥80: 6.7%), voluntarily participated in the study. The Greene Climacteric Scale aims to measure psychological symptoms divided into anxiety and depression, somatic and vasomotor symptoms with a total of 21 items. Data were analyzed by reliability, correlation and confirmatory factor analyses. Age group differences in the raw and the standardized scores of symptoms clusters were investigated by means of ANOVA procedures.
Results: The CFA performed supported the 4-factor structure specified by Greene (*CFI = 0.937; SRMR = 0.046; *RMSEA (90%IC) = 0.050 (0.042–0.058). The computed internal consistency estimates ranged from 0.73 to 0.90. Vasomotor symptoms (hot flushes and sweating at night) were experienced most frequently by the younger age group (47–57 years) while nonspecific symptoms (e.g. difficulty in concentrating, feeling tired or lacking in energy, breathing difficulties) were reported more frequently by the older age groups.
Conclusions: Our results suggest that the Portuguese version of the GCS is a reliable and a valid instrument for the measurement of climacteric-related factors in postmenopausal women.

1. Introduction

Menopause is one of the emerging areas of studies on women's health. The increased number of women involved in health studies facilitated knowledge development in areas previously not considered as a priority. An example of these areas is the climacteric. Climacteric is a normal transitional phase in the life span characterized by a gradual transition from being reproductive to non-reproductive, while menopause refers to a more circumscribed physiological process occurring within the longer climacteric phase characterized by a permanent cessation of menstruation [1,2].

The symptoms associated to a reduction of the estrogen levels, at the vasomotor level, are hot flashes, night sweats, and skin flushing. Somatic symptoms such as insomnia, headaches, joint aches and pains, are among the most referred. Along with these discomfort other manifestations tend to be present such as heart pounding, vaginal dryness and discomfort during sexual intercourse. Among the psychological symptoms, depression, anxiety and feelings of unhappiness are of particular relevance. The intensity of these symptoms is culturally mediated [3] and has a negative effect on women's quality of life [4]. The frequency and intensity of these climacteric-related symptoms are quite evident in perimenopause, and remain high during the postmenopause [5–7], especially when the term of the menstrual cycle and ovulation cycle are induced [8,9], as well as in the absence of hormone therapy [5,10].

Among the several menopause-related instruments available [2], the Greene Climacteric Scale (GCS) [1] seems to be the most widely used by researchers. The original GCS was a self-report instrument developed in 1976 [11], based on a check list of 30 menopausal symptoms developed by Neugarten and Kraines [12]. A principal factor analysis procedure was elected as the statistical method used to identify the most relevant items and establish coherent/comprehensive dimensions. From the initial pool of the 30 items, only 21 items were retained based on statistically factor loadings and three factors emerged representing psychological,

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somatic and vasomotor symptoms. In 1998, Greene examined seven factor analytic studies with similar types of climacteric symptoms. This consensus-oriented review originated the replacement of four of the original 21 items, while other four items were worded differently. In addition, a probe item related to loss of sexual interest was added and the psychological dimension was subdivided in two subscales – anxiety and depression. This review process originated a "standard" GCS [1], which has been used as a climacteric/menopausal index [4] or as a quality of life measure [13].

Although the development of this scale was based on factor analyses procedures, few studies have applied exploratory (EFA) and/or confirmatory factor analysis (CFA) in order to examine its construct validity. Chattha et al. [14] explored the factor structure of the GCS in perimenopausal Indian women. EFA provided mixed results according to the selected extraction factors method. An oblique (oblimin) rotation produced three factors which supported the original 3-factor model. Using an orthogonal (varimax) rotation, results revealed that the psychological factor was divided in the two expected domains (anxiety and depression), yielding a total of four factors. Additionally, it was verified that the probe item was clearly associated with the vasomotor dimension, either oblique or orthogonal rotations were performed. More recently, Chen et al. [15] developed the only known study that has tested the GCS's factor structure using CFA procedures. Results supported the construct validity of this instrument in a community sample of Hong Kong women.

Moreover, several studies have provided normative data for different populations, namely: Scottish [16], Dutch [4], Ecuadorian [6], Australian [7], Brazilian [17], and Indian [14], among others. However, it appears that no normative data has been reported for Portuguese samples, based on a GCS's validated version for this population.

The aims of the present study were twofold: (i) to examine the psychometric properties (reliability and factorial validity) of a Portuguese version of the Greene Climacteric Scale, and (ii) to provide normative data for a sample of postmenopausal Portuguese women.

2. Materials and methods

2.1. Participants

A sample of 401 Caucasian women, with ages between 47 and 91 years, divided into four age groups: 47–57 ($n = 126$, 31.4%), 58–68 ($n = 162$, 40.4%), 69–79 ($n = 86$, 21.4%) and ≥80 ($n = 27$, 6.7%). All agreed to participate voluntarily. All women had experienced amenorrhea for at least 12 months by natural reasons ($n = 324$, 80.8%) or induced by surgery ($n = 77$, 19.2%). More detailed sociodemographic characteristics of the sample are presented in Table 1. Participants were randomly recruited from two regions of the northern and central regions of Portugal.

2.2. Instrument

Initially, women completed a sociodemographic form including age, marital status, employment situation, residential area, annual income, educational level, number of children living at home, current hormone therapy use, regular practice of physical activity, smoking and alcohol habits. General health perception was measured using a single-item responded to on a ten-point scale, ranging from 1 (poorest health) to 10 (best health).

Secondly, participants responded to a Portuguese translation of the GCS [1]. This self-report instrument contains a total of 21 symptoms responded on a 4-point scale ranging from 0 (not at all) to 3 (extremely). The GCS asks respondents to rate the frequency/severity of experienced symptoms at the "present" moment. Symptoms 1–11 address psychological symptoms divided in a measure of anxiety (a sum of items 1–6) and of depression (a sum of items 7–11). Somatic symptoms refer to items 12–18 and vasomotor symptoms to items 19 and 20. Item 21 explores sexual dysfunction. Previous studies have reported acceptable reliability estimates for each factor/cluster [2].

2.3. Procedures

The cultural adaptation process of the GCS followed several practical guidelines reported in the literature [18]: translation, back-translation and pre-test. Initially, the original version of the questionnaire was translated by two bilingual (Portuguese and English) professional bilingual translators who were instructed to focus in achieving the conceptual equivalence rather than the literal/linguistic translation. This initial version was then backward-translated and reviewed by a panel of four experts (obstetrician/gynecologists) in order to identify inadequate expressions/concepts and resolve possible discrepancies between versions. Subsequently, the pre-testing of questionnaire comprised a sample of 57 postmenopausal women (35 from rural areas and 22 from urban areas) which suggested minor changes to the wording of some items (1, 2, 7, 10, 14, 18 and 19) and layout of the questionnaire.

Prior to responding to the instrument, all participants were informed of the study's objectives and signed an informed consent. The present study is part of a larger research project that has already received ethical approval (POCI/DES/59049/2004). The American Psychological Association's ethical principles of psychologists and code of conduct were followed.

2.4. Model description

Six measurement models were specified and tested according to the several nested factor models reviewed in the scholarly literature [1,14,15]. Model 1 concerns a unidimensional model composed by all the 21 items. Models 2 and 3 represent, respectively, a correlated (oblique) and uncorrelated (orthogonal) three-factor original model (item 21 was not included). Model 4 is an oblique quadripartite measurement model with the psychological factor divided in the anxiety and depression subscales (item 21 was not included). Model 5 represents the same factor structure of the previous model, plus a higher order factor concerning the anxiety and depression dimensions (item 21 was not included). Model 6 is an oblique three-factor solution without item 1 in the psychological factor, which was suggested by Chattha et al. [14].

2.5. Statistical analysis

Descriptive statistics (mean, SD and percentage) were calculated for the GCS's items and scores. Skewness and kurtosis coefficients were computed for univariate normality analysis purposes. The internal consistency of the measured scales and total score was estimated using the Cronbach's alpha. Inter-scale associations were calculated using Pearson product-moment correlation coefficients. One-way analysis of variance (ANOVA) was used to investigate differences between age groups on the scores of symptoms clusters. Partial eta-squared (ηp^2) was reported as a measure of the effect size between groups according to the following rule of thumb: small (>0.01), medium (>0.06) and large (>0.14). All of these statistical analyses were conducted using SPSS (version 16.0, SPSS Inc., Chicago, Illinois).

The EQS software (version 6.1, Multivariate Software, Inc., Encino, California) was selected to analyze the competing (nested) models of the latent structure of the GCS. Given