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Original article

Reliability of the Spanish version of the Composite Scale of Morningness

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Abstract

***Aim.* –** The aim of this study was to examine the reliability of the Spanish version of Composite Scale of Morningness (CSM) and its ability to measure the circadian typology.

***Subjects and methods.* –** Voluntary and unpaid psychology students ($N = 391$; 132 men and 259 women), aged between 17 and 33, completed the questionnaire between the months of September and December.

***Results.* –** The total score was independent of age and gender, with a close to normal distribution and a non-significant negative skewness. The internal consistency was high (Cronbach's $\alpha = 0.87$) and factor analysis extracted three factors labeled *Time of Retiring* (items 2 and 7), *Activity Planning* (items 8, 9, and 13) and *Morning Affect* (items 3–6, and 10–12). With the 10th and 90th percentiles as cut-off scores, scorers below 22 ($N = 40$; 10.2%) are classified as evening-types and scorers above 39 as morning-types ($N = 28$; 7.2%).

***Conclusion.* –** The Spanish questionnaire shares most of the good psychometric properties of other versions of the CSM, and thus can be used for Spanish-speaking student samples. Nevertheless, further studies of normative data in workers and aged subjects are needed in order to validate CSM.

Keywords: Chronobiology; Circadian rhythms; Chronotype; Morningness; Eveningness; Questionnaire; Gender differences

1. Introduction

A pervasive characteristic of mammals is the existence of rhythmic changes that can be observed on several levels of organization from basic cellular phenomena to complex behaviors. The endogenous mechanisms, also called pacemakers, are adjusted (i.e. synchronized) to environmental cycles, chiefly the light–dark cycle [16,23,34]. The morningness–eveningness dimension is a continuum on which individuals can be arranged from the morning-type or "lark" to the evening-type or "owl", with a larger intermediate group. It is associated with interindividual differences in rhythmic expression, such as academic, professional and sport performance [12,23,41], and is also related to personality traits and to psychopathologic risk factors at adolescence and adulthood [10–12,17,23].

Circadian typology is assessed by means of self-rating questionnaires; the first constructed and the most widely used is the Morningness–Eveningness Questionnaire (MEQ) [22]. Some of the criticisms addressed to the MEQ are that the total score may not be appropriate to measure a multidimensional construct [31], and that small subsets of items may convey most of the total variance of the measure [1,15]. Two other questionnaires have been proposed about which similar criticisms have been raised: the Circadian Type Questionnaire (CTQ) [21], the Diurnal Type Scale (DTS) [19,39]. With this in mind Smith et al. [36] developed a new questionnaire they called the Composite Scale of Morningness (CSM) which is composed by the 'best' items of the MEQ (nine items) and the CTQ (four items). Several studies have demonstrated the good CSM test–retest reliability [9,20], and an adequate external validity when considering different variables. The total score ranges from 13 (extreme evening-type) to 55 (extreme morning-type). The authors arbitrarily proposed to retain the 10th and 90th percentiles as cut-off scores to classify the subjects into one of the above three categories, which correspond to the scores of 22 and 44, respectively, in their sample. On the other hand, Alzani and Natale [4] proposed a fixed

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cut-off approach dividing the theoretical range of the total score (i.e. 55 – 13 = 42) in three equal parts: 13 + (55–13)/3 = 27 and 27 + (55 – 13)/3 = 41. Unfortunately, international research has established that the centiles do vary across samples [35], e.g. 27 and 44, respectively, in Australia [20], or 27 and 41, respectively, in Italy [30], or 30 and 45, respectively, in France [9]. Consequently the blind conversion of the total score into a typology using whatever cut-off scores implies that one ignores this critical point. One solution may be to establish normalized cut-off scores with regard to nationality, age and gender before using the questionnaire in smaller groups or individually.

Many studies have pointed out that age and gender both influence morningness. In adults the trend toward morningness increases with age [13,18,38,43], and women show a greater trend toward morningness than men in their rhythm expression [3,32]. But the relation between gender and morningness scores remains controversial: some researchers did not obtain significant differences between men and women [2,8,15,20] while others did using larger samples [3]. Moreover, like what is reported for some other personality traits, the relationship between age and morningness may not be linear across the age span [3,14,29]. It could be of interest to [25,31,42] analyze more accurately the potential differences between men and women in morningness–eveningness scores on the CSM.

In the last decade, the use of CSM has progressively increased as the questionnaire was translated into several languages [4,8,30,33]. Regarding the structure of CSM, a three-factor solution was found in three independent English-speaking samples. The factors were called *Morningness/Effort*, *Evening*, and *Morning Affect*, this latter being the more robust factor [6,36]. The Thaï version also obtained three components with some differences from the English version [33]. Although the authors of the Italian version retained a one-factor solution in both a student and a shiftworker samples, they also provided a plot of the eigenvalues suggesting the appropriateness of a three-factor solution [4]. In France, a one-factor solution was provisionally accepted [8] but a three-factor solution emerged later [9,10]. A transcultural work with large samples (Australia, France, Italy, Spain, and Thailand) also obtained a three-factor solution in all five countries [7].

The aim of this study is to examine the reliability of the Spanish version of the CSM in student subjects, including the analysis of the factor structure, and to take into account the potential gender differences in the structure and the raw scores. The typology will be determined following previous works [30,36] to establish the optimal categorization system.

2. Materials and methods

2.1. Subjects

Participants were 391 undergraduate students (132 men and 259 women), aged between 17 and 33 (19.94 ± 2.22 years). All were voluntary, anonymous and unpaid. As expected in student samples, the Shapiro–Wilk tests indicate that age is positively albeit slightly skewed in total sample ($W = 0.883$, $P < 0.001$) and for both genders (men: $W = 0.870$, $P < 0.001$; women: $W = 0.892$, $P < 0.001$). In fact, 65.7% of the subjects were younger than 21. Men were about 9 months older than women ($Z = 2.71$, $P < 0.007$).

2.2. Measures and procedure

The CSM was translated into Spanish and then back translated into English by two bilingual English speakers to ensure translation quality (see Appendix 1 for the Spanish version). Following we briefly described each one of the 13 items included in the CSM: 1 (At what time would you get up?), 2 (At what time would you go to bed?), 3 (How easy do you find getting up in the morning?), 4 (How alert do you feel during the first half hour after awakening?), 5 (How tired do you feel during the first half hour after awakening?), 6 (Physical exercise at early morning), 7 (At what time in the evening do you feel tired and in need of sleep?), 8 (Hour of peak for mental performance), 9 (Self-assessment of circadian typology), 10 (When would you prefer to rise?), 11 (If you were always to rise at 6:00 a.m. what were would you be like?), 12 (How long a time does it take before you "recover your senses" after rising?), and 13 (To what extent is an individual oriented toward morning or evening).

Subjects completed the CSM in a morning session of a Psychology course at the University of Barcelona between the months of September and December. The CSM was administered to 400 students (a sample-size adequate to the aim of the study) ranged into five class-group. Before the administration of the CSM, students received a brief introduction about the nature of research, ethical requirements for confidentiality and voluntary participation. No informed consent was required. The response rate was close to 100% of the subjects present in each class and we have information about all the items since we control missing values.

2.3. Statistical analysis

Scores are expressed as mean, standard deviation (S.D.) and range, and their distribution shapes were assessed for normality with the Shapiro–Wilk test. The reliability of the scores was estimated by the unstandardized unit-weighted Cronbach's α coefficient. The CSM total score was submitted to an ANCOVA with gender as factor and age as covariate. Gender differences on item scores were tested by the two-sample Wilcoxon rank-sum test since the item responses are on an ordinal scale.

We explored the structure underlying the 13 items of the CSM by exploratory factor analysis. Because the item scores are not normal by nature, we used the Weighted Least Squares estimator with Mean- and Variance-adjustment (WLSMV) [26]. The number of factors to extract was determined by Cattell's scree test and an oblique PROMAX rotation was applied.