



## Arabic versions of the sleep timing questionnaire and the composite scale of morningness



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### ABSTRACT

**Objectives:** To develop Arabic versions of English language questionnaires to estimate morningness/eveningness and sleep variables.

**Methods:** We translated the Composite scale of morningness (CSM) and the sleep timing questionnaire (STQ) [with added siesta questions] into Arabic; the Arabic versions were then back translated. The revised Arabic and the original English versions were next administered to bi-lingual Egyptians using a crossover design ( $n = 25$ ). The Arabic versions of both scales were subsequently administered to an independent Egyptian sample ( $n = 79$ ) and the siesta variables examined in relation to the CSM.

**Results:** Satisfactory correlations were present between the English and Arabic versions for total CSM scores (Spearman's  $\rho = 0.90$ ,  $p < 0.001$ ). All but one of the STQ variables were significantly correlated (Spearman's  $\rho = 0.45$ – $0.88$ ,  $p \leq 0.05$ ). In the Arabic version, the frequency of siesta naps per week was significantly correlated with the total CSM score, with evening types taking more naps (Spearman's  $\rho = -0.23$ ,  $p \leq 0.05$ ).

**Conclusions:** Arabic versions of the STQ and CSM have been developed in Egypt, and are freely available. They can be used for behavioral research related to sleep and circadian function and can be adapted for use in other Arab speaking populations.

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## 1. Introduction

Circadian variation entrained to the 24 h rotation of the planet is a fundamental property of many biological systems in most living organisms (Korf et al., 2003). In humans, the sleep wake cycle is closely regulated by, and is related to circadian processes (Shaw and Franken, 2003; Zavada et al., 2009). Detailed evaluation of these processes ideally requires lengthy evaluations in carefully controlled settings, such as sleep laboratories to reduce the influence of external factors or zeitgebers that may affect these rhythms (Monk et al., 2003). On the other hand, it may be desirable to retain

the impact of zeitgebers in certain field settings, e.g., the design of work schedules (Harma, 1993), athletic performance (Smith et al., 1997), academic performance (Testu, 1992), and to ensure health and psychological well-being (Bohle and Tilley, 1989). Sleep laboratory studies may also be simply impractical in many situations. Hence, investigators have developed convenient pen and paper tests that reflect preferred circadian timing and are also correlated with sleep variables. These scales estimate variables that should be considered as proxies for circadian variation as would be estimated using more costly and time consuming physiological measures (Rogers et al., 1993).

One of the most popular ratings scales is based on the notion that individuals belong to a continuum from 'morningness' to 'eveningness', with reference to their preferred times of day for optimal efficiency. 'Morning' type individuals arise fully alert in the early morning but are tired in the evening and go to bed early. In contrast, 'evening' type individuals are more active in the later part

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of the day and prefer to go to bed late. Eveningness is associated with higher heart rate, systolic blood pressure (Roeser et al., 2012) and suppression of nocturnal melatonin levels (Reiter et al., 2007). Eveningness has been linked with lower endurance (Jankowski, 2012), life satisfaction (Diaz-Morales et al., 2013), and mood (Jankowski, 2014). Morningness on the contrary is associated with life satisfaction (Randler, 2008a), less stress (Buschgens et al., 2010). This variation is partly governed by heritable factors (Hur and Bouchard, 1998; Klei et al., 2005). It is correlated with circadian phase and reflects important physiological and psychological variables (Carrier and Monk, 2000; Folkard et al., 1985; Kerkhof, 1985; Webb, 1982). The morningness–eveningness (M/E) continuum can be conveniently evaluated using pen and paper, as well as web based questionnaires (Greenwood, 1994; Horne and Ostberg, 1976; Natale et al., 2003; Zavada et al., 2005). The morningness–eveningness questionnaire (MEQ), popular questionnaire comprises a 19 item rating scale (Horne and Ostberg, 1976). Smith et al. (1989) created the composite scale of morningness (CSM) by using the most validated questions from the MEQ and the diurnal type scale (Smith et al., 1989). Subsequent studies have corroborated its reliability and validity (Bohle et al., 2001; Brown, 1993; Caci et al., 2005, 1999; Diaz-Morales and Sanchez-Lopez, 2005; Greenwood, 1994). We have found that it discriminates circadian variation among patients with bipolar disorder from control individuals in the US (Mansour et al., 2005; Wood et al., 2009); others have reported similar results from Korea (Ahn et al., 2008). The CSM has been translated into several languages, including French (Caci et al., 1999), Korean (Ahn et al., 2008), Spanish (Diaz-Morales and Sanchez-Lopez, 2005), Italian (Natale et al., 2005), Thai (Pornpitakpan, 1998), Argentinean (Gil et al., 2008), German (Randler, 2008c), Romanian (Voinescu et al., 2010), Norwegian (Thun et al., 2012), Hindi (Bhatia et al., 2013), and Turkish (Onder et al., 2013).

The sleep timing questionnaire (STQ) is another self-report instrument (Monk et al., 2003) that conveniently estimates sleep timing, sleep duration, sleep latency and wake after sleep onset (WASO). Separate estimates are derived for work-nights (work-week) and rest-nights (weekends). The STQ is a useful single administration questionnaire for accurately assessing the habitual timing of a person's sleep. STQ measures of sleep timing showed good reliability and validity, correlating well with both wrist actigraphy-based and two week diary-based measures (Monk et al., 2003).

Trans-cultural factors are likely to be important zeitgebers that may contribute to differences in circadian function (Randler, 2008b). A particularly important cultural variant is the siesta, which is commonly used in countries with very hot climates. Whether siestas contribute to human health is unclear (Monk et al., 2001). A recent study suggested that a 30 min siesta at least three times a week lowers the risk of heart-related death by 37% (Naska et al., 2007). On the other hand, Stang et al. (2007) suggested that daily napping for more than 1 h leads to a higher prevalence of coronary artery disease risk factors. Among men, an increased risk for sub-clinical atherosclerosis was reported. Additionally, long siesta naps are associated with depressed mood, nocturnal sleep disturbances and poor self-perceived health status (Stang et al., 2007). It is possible that the duration and the timing of the siesta nap determine its usefulness (Dinges et al., 1987). Others have reported beneficial effects of siesta naps on cortisol levels in the blood (Vgontzas et al., 2007).

Most studies of circadian behavior or sleep using pen and paper rating scales have been conducted in developed countries and in English. To enable similar studies to be performed in the Middle East, we aimed to develop Arabic versions of the CSM (Smith et al., 1989) and the STQ (Monk et al., 2003). Further, we report basic estimates of siesta nap patterns in an urban Egyptian setting.

## 2. Methods

The study was carried out by faculty psychiatrists at the Department of Psychiatry, Mansoura University Hospitals (MUH), Mansoura, Egypt. It was approved by the Institutional Review Boards (IRB) at Mansoura University and the University of Pittsburgh. Verbal consent was obtained from all participants, per Mansoura University IRB regulations.

### 2.1. Phase I

The CSM and STQ were translated into Arabic by bi-lingual faculty psychiatrists at MUH. The scales were then back translated by other bilingual psychiatrists who had not been involved in the initial translation. The original and the back translated English versions were compared for discrepancies, which were then corrected. Next, the revised Arabic and the original English versions of the CSM and STQ were administered to bi-lingual adult Egyptian individuals with 1–2 weeks gap between the administration of each rating scale ( $n = 25$  participants).

### 2.2. Phase II

The Arabic versions of the CSM and STQ were completed by Arabic speaker participants from Mansoura, Egypt. This sample was independent of the participants in phase I ( $n = 79$ ; age range 17–62, mean age  $32.0 \pm 10.4$ ; males  $n = 31$ ; females  $n = 48$ ). All participants were professionals with over 14 years of education.

### 2.3. Statistical analysis

The Statistical Package for Social Sciences (SPSS, version 19.0 for Windows) was used for all analyses.

## 3. Results

No participants dropped out of the study. Among the participants in phase I ( $n = 25$ ), ten individuals completed the Arabic versions of the STQ and the CSM first, followed by the English version, while the rest completed the English versions first. The average lag between the first and second administration was 12 days (range 7 to 19).

### 3.1. CSM

The total scores of the Arabic and English versions of the CSM obtained from phase I were very highly correlated (Spearman's  $\rho = 0.90$ ,  $p < 0.001$ ). These analyses were repeated using intraclass correlation (ICC), and similar results were obtained (see Supplemental data).

### 3.2. STQ

A total score cannot be derived for the STQ, hence individual variables were compared. The variables in the Arabic and English versions were significantly correlated (Spearman's  $\rho = 0.47$ – $0.90$ ,  $p < 0.001$  or better) (Table 1). Only the first question was not significantly correlated (On the night before a work day or school day, what is your earliest Good Night Time and what is your latest Good Night Time?) ( $\rho = 0.33$ ,  $p = 0.1$ )

### 3.3. Order effects

There were no significant order effect (which version is used first) as regards the lag period, age, total scores or score of individual questions except for one item (work night good night time, difference between earliest and latest, data not shown). This

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