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Does impression management impact the relationship between morningness–eveningness and self-rated sleepiness?

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ABSTRACT

We examined the psychometric properties and construct validity for the Morning Affect (MA) scale; this scale is a subset of the morningness factor from the Composite Scale of Morningness (CSM). We also addressed some problems with this literature. First, we employed an older working sample that was not gender biased. Second, we argued whether self-reported dependent variables that are used to assess construct validity may be biased by impression management; an intentional attempt to be perceived favourably. The psychometric properties of the MA were comparable to the CSM. Confirmatory factor analysis supported the four-item posited model structure of the MA scale. As expected morning types were more alert during the early hours of the day and evening types toward the latter period of the day ($p < .001$). Participants that scored high on impression management also rated themselves to be significantly more alert during the morning hours only ($p < .05$). No interaction was observed between morningness–eveningness and impression management suggesting that the self-reported sleepiness ratings were an appropriate indicator to demonstrate construct validity.

1. Introduction

A good deal of work has recently been undertaken on developing and refining self-report instruments that measure diurnal preference (Di Milia, Folkard, Hill, & Walker, 2011; Oginska, 2011; Smith et al., 2002). Morningness–eveningness is used to describe a preference for human activity such as waking up, eating breakfast or going to bed at an earlier (morning type) or at a later time of the day (evening type). The mechanism that may explain morningness–eveningness activity is the misalignment between the biological clock and the environment (Natale & Adan, 1999).

The initial research interest in morningness–eveningness was centred on whether it was an explanatory variable that could predict adjustment to job schedules that involved night work (Horne & Östberg, 1976). This literature has provided a wealth of evidence that morningness–eveningness differences can be found in both physiological and psychological markers. In this vein, morning types have been reported to have higher concentrations of cortisol on waking (Kudielka, Federenko, Hellhammer, & Wust, 2006; Randler & Schaal, 2010), earlier peaks in melatonin (Duffy, Dijk, Hall, & Czeisler, 1999) and in core body temperature of approximately 2–3 h (Kerkhof & van Dongen, 1996; Waterhouse et al., 2001). Similarly using self-report measures morning types are routinely found to be more alert during the early part of the day (Di Milia, Wikman, & Smith, 2008), to have earlier bed and wake-up times (Taillard, Philip, Chastang, & Bioulac, 2004), and regular sleep habits (Taillard, Philip, & Bioulac, 1999).

A brief review highlights that morningness–eveningness has now also attracted the attention of other disciplines. A number of studies have reported the educational performance of young teenagers (Goldstein, Hahn, Hasher, Wiprzycka, & Zelazo, 2007), high school (Besoluk, 2011) and university students (Guthrie, Ash, & Bendapudi, 1995) is best when testing occurs at a time of day that coincides with their morningness–eveningness preference. A recent large meta-analysis reported a positive correlation between morning types and academic achievement (.16) but a negative relationship (−.14) for evening types (Preckel, Lipnevich, Schneider, & Roberts, in press). Chelminski and her colleagues (1999) found evening type students had significantly higher 'depressive' scores on three separate measures. In a study that controlled for some confounding factors, participants with diagnosed bipolar disorder and others with elevated depressive mood scores were more likely to be evening types (Wood et al., 2009). Other findings suggest that evening types tend to score higher on sensation seeking (Tonetti et al., 2010), impulsivity (Caci, Mattei, et al., 2005) and are more likely to be addicted to legal and illegal substances (Prat & Adan, 2011). Schmidt and Randler (2010) found that after controlling for age and body-mass-index, evening types scored significantly higher on measures of bulimia, drive for thinness and body dissatisfaction in 12–17 year old females. Similarly evening types were significantly more likely to be found

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among adult females diagnosed with eating disorders compared with matched controls (Natale, Ballardini, Schumann, Mencarellei, & Magelli, 2008).

The link between morningness–eveningness and a range of outcomes suggests it is an important construct and as such, it is important that its measurement properties are reliable and valid. The Composite Scale of Morningness (CSM, Smith, Reilly, & Midkiff, 1989) is one of the most widely used measures and was developed following a psychometric assessment of three self-report tools that were found to be lacking. The CSM consists of 13 items and has been translated into a number of languages (Caci, Adan, et al., 2005; Randler, 2008). Scale reliability and convergent validity for the CSM is sound. Smith et al. (1989) reported a scale reliability coefficient of .87 and many studies have reported similar or better coefficients (Caci, Adan, et al., 2005; Di Milia & Bohle, 2009). Convergent validity between the CSM and another commonly used measure, the Morningness–Eveningness Questionnaire (Horne & Östberg, 1976) range between .80 and .90 (Randler, 2009).

Less agreement is found concerning the factor structure for the CSM. In part, this reflects the variety of factor-analytic methods employed and sample characteristics (see Di Milia & Bohle, 2009). One consistent finding however, is the presence of a *morning affect* (MA) factor across countries (Caci, Adan, et al., 2005). The MA factor describes a subset of items that make up the Morning factor of the CSM. Drawing on a sample of French university students Caci, Deschaux, Adan, and Natale (2009) identified a four-item MA scale with the factor loadings ranging from .47 to .85 but scale validity was not assessed. Using structural equation modelling this four-item model was replicated in a large Australian sample and found to apply to males and females (Di Milia & Bohle, 2009). The MA scale was also found to have good reliability (.82) and construct validity against self-reported sleepiness. These results provide some evidence that the MA scale has good measurement properties. However, this study had some weaknesses. One limitation is that it also relied on a student sample with a mean age of approximately 23 years. The second limitation is there were twice as many females as males and third, it used a self-report measure to assess construct validity.

The use of self-reported performance estimates to assess construct validity is a common practice in morningness–eveningness studies (Randler, 2009). However, there is a long standing concern in the social psychology literature regarding the extent to which respondents answer in a way that is considered socially desirable (Crowne & Marlowe, 1960; Edwards, 1957). This type of bias may be more likely under conditions of anonymity or when the task importance is high. For example, Paulhus (1984) reported that impression management (IM) was more common in situations when students believed their responses would be made public. In an employment interview setting, participants that engaged in self-promotion were considered better candidates against end of interview ratings (Swider, Barrick, Harris, & Stoverink, 2011) and automobile drivers tend to over emphasise their driving ability compared to the general population (Groeger & Brown, 1989). There appears to be only one study that has examined the possibility of bias in examining the link between morningness–eveningness and self-rated driving ability (Di Milia et al., 2008). The results showed that morning and evening types that scored high on self-deception did make more favourable ratings but these were not significant.

The present study has two main goals. The first is to provide additional evidence for the psychometric properties of the MA scale and to confirm its factor structure in a working sample in order to address some of the limitations discussed earlier. The study will also examine construct validity for the MA scale by using self-rated sleepiness scores. We are not aware of specific studies that have examined whether sleepiness ratings may be biased but there is no reason to expect that sleepiness ratings are free of bias. Rogers and Dinges (2003) have highlighted a number of studies that show self-report sleepiness ratings are not consistent with physiological indicators of sleep. It is possible to suggest high IM participants may rate themselves as less sleepy across the day. Thus the second goal of this study is to examine whether sleepiness estimates are biased to the extent that they are not a reliable indicator of construct validity. We do this by including a measure of IM in the study.

2. Method

2.1. Participants and measures

Approximately 350 surveys were distributed by the safety manager to employees at a nickel processing plant. Employees received a package that contained an information sheet describing the study, a consent form and the survey questions. Participation was voluntary, anonymous and confidential. Replies were received from 102 males and 89 females (response rate 53%). The mean age was 36.28 ± 12.94 years and participants worked a mean of 40.91 ± 12.81 h per week (including overtime). The majority of the participants (71%) worked during the day only and the balance worked a continuous rotating 12 h shift schedule.

The survey was divided into four sections. Participants first completed biographical and work details, followed by the CSM (Smith et al., 1989), the 20-item IM scale (Balanced Inventory of Desirable Responding (BIDR) Version 6, Paulhus, 1991) and the Karolinska Sleepiness Scale (KSS; Åkerstedt & Gillberg, 1990). A sample item from the IM scale is "I always obey laws, even if I'm unlikely to get caught" and a sample item from the MA scale is "How alert do you feel during the first half hour after having awakened in the morning?" The BIDR also includes a 'self-deception scale' which describes individuals that honestly believe in their positive self-reports. IM on the other hand is a deliberate attempt to be perceived favourably and Paulhus recommends controlling only for the IM scale.

The KSS requires participants to rate their level of sleepiness (1 = very alert; 9 = very sleepy) at 2-hourly intervals at times when they are normally awake on days off work. These ratings were made retrospective. Folkard, Spelten, Totterdell, Barton, and Smith (1995) used the KSS retrospectively and concurrently in a group of nurses and reported that retrospective ratings were sensitive to time of day and valid predictors of concurrent measures. The KSS has been validated against physiological indicators of sleep (Kaida et al., 2006).

The CSM and the four-item MA scale are computed by adding the item scores; higher scores suggest a morning orientation. Both scale scores were computed to allow their correlation to be determined. The IM scale employs a 7-point scale (1 = not true; 7 = very true). After reversing for negatively worded statements the scale score is computed by assigning one point for every rating of 6 and 7.

2.2. Data analyses

The IM scale was subjected to a principal components analysis (varimax rotation) to ensure the best items were used to create the scale score. The criterion to retain items was set at .40 (Nunnally & Bernstein, 1994) and as a result 14 items were retained. The Kaiser–Meyer–Olkin measure of sampling adequacy for these items (.79) indicated the sample was appropriate for factor analysis (Hair, Black, Babin, & Anderson, 2010) and the factor loadings ranged from .40 to .60.

Construct validity for the MA scale was assessed using the KSS. The 40th and 60th percentiles were used to categorise participants into low (evening type) and high (morning type) on the MA scale