



The Emotional Eating Scale adapted for children and adolescents: Factorial invariance across adolescent males and females



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ABSTRACT

Objective: The purpose of the present study was to assess factorial invariance of the Emotional Eating Scale (EES) across a sample of adolescent males and females.

Method: Two-hundred-twenty-six middle school students (mean age = 13.19 years; SD = 1.00) completed the EES adapted for children and adolescents and a brief demographic survey. Approximately 40% of the sample were males. An item-level multi-group confirmatory factor analysis was performed specifying a bi-factor model that mapped onto the EES' four scores.

Results: We found that the EES was partially invariant across sex in the current study's sample. The instrument appeared to measure the same constructs in both groups, except for the two items: worried and bored.

Conclusions: Our findings suggest that overall the EES items measure their intended constructs in both male and female adolescents, but caution should be used when interpreting scores that include the worried and bored items. These two item may have be measuring their constructs differently in adolescent females and males.

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1. Introduction

Emotional eating refers to the overconsumption of food in response to negative affect (Faith, Allison, & Geliebter, 1997; Konttinen, Silventoinen, Sarlio-Lähteenkorva, Männistö, & Haukka, 2010; Laugero, Falcon, & Tucker, 2011). Individuals who engage in emotional eating use food to temporarily alleviate distress while disregarding internal satiation cues (Bruch, 1973; Kaplan & Kaplan, 1957). Consequently, emotional eating is associated with higher rates of overweight/obesity (Braet & Van Strien, 1997; Péneau, Ménard, Méjean, Bellisle, & Hercberg, 2013; Shapiro et al., 2007) and predictive of poorer weight loss outcomes, eating disorder pathology, and quality of life 2 years post-bariatric surgery (White, Kalarchian, Masheb, Marcus, & Grilo, 2010).

Traditionally, studies of disrupted eating have focused solely on female populations (Ambwani, Slane, Thomas, Hopwood, & Grilo, 2014; Ganley, 1989). The increasing inclusion of males in this area of research has revealed males can also exhibit emotional eating, although notable sex differences have been documented (Camilleri et al., 2014; Konttinen, Mannistö, Sarlio-Lahteenkorva, Silventoinen, & Haukka, 2010; Larsen, Van Strien, Eisinga, & Engels, 2006; Péneau et al., 2013). For example, two large cross-sectional studies found depression

moderated the relationship between emotional eating and intake of energy-dense foods only among adult women (Camilleri et al., 2014; Péneau et al., 2013). Larsen et al. (2006) found that alexithymia (i.e., difficulty identifying and describing feelings) was associated with greater frequency of emotional eating in adult males but not adult females (Larsen et al., 2006).

Although relatively fewer studies have investigated emotional eating in youth, those that have reported sex differences in this population (Nguyen-Rodriguez, Unger, & Spruijt-Metz, 2009; Perpiñá, Cebolla, Botella, Lurbe, & Torró, 2011; Tanofsky-Kraff et al., 2007). In a sample of American middle school students, Nguyen-Rodriguez et al. (2009) found perceived stress, worries, and tension/anxiety were associated with emotional eating among girls, but only confused mood was associated with emotional eating in boys. Similarly, among a sample of American children and adolescents, Tanofsky-Kraff et al. (2007) reported girls demonstrated a greater propensity to eat in response to depressive symptoms and feeling unsettled compared to boys (Tanofsky-Kraff et al., 2007).

To date, none of the studies investigating sex differences in emotional eating have investigated factorial invariance in their emotional eating measures across adolescent males and females. Instead, they have assumed that the instruments measure the same constructs, the same way, for both males and females. Consequently, they only examined differences in means or correlations. Factorial invariance examines the degree to which an instrument measures the same constructs across two or more groups (Vandenberg & Lance, 2000). Establishing factorial

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invariance is essential before making cross-group comparisons. Without it, it is impossible to know if any score differences that exists are there due to group differences in the latent constructs the instrument was designed to measure or due differences in constructs irrelevant to the instrument (e.g., item interpretation; Cheung & Rensvold, 2002; Little, 1997; French & Finch, 2006). Beaujean and Sheng (2014) liken the situation of comparing mean differences without first establishing invariance to comparing average temperatures at two different geographic locations with thermometers that use different scales. While mean differences could be due to different temperatures, they could also be the result of the scales having different origins (e.g., Fahrenheit vs. Rankine), different units (e.g., Kelvin vs. Rankine), or both (e.g., Fahrenheit vs. Kelvin).

The Emotional Eating Scale (EES) was developed by Arnow, Kenardy, and Agras (1995) as a self-report measure to assess the extent to which adults eat in response to specific emotions. The psychometric properties of the EES for adults have been extensively documented (Arnow et al., 1995; Goldbacher et al., 2012; Schneider et al., 2012). The EES was recently adapted for use in children and adolescents ages 8–17 years and a three-factor structure (urge to eat in response to anxiety/anger/frustration, depressive symptoms, and feeling unsettled) and total scale score have been proposed in the empirical literature (Tanofsky-Kraff et al., 2007; Vannucci et al., 2012). To date, no studies have investigated factorial invariance of the EES across male and female adolescents. Consequently, the objective of the present study was to assess factorial invariance of the EES for children and adolescents across a sample of adolescent males and females. We hypothesized that the EES adapted for children and adolescents would demonstrate partial invariance across sex in our sample.

2. Method

2.1. Participants

Participants in this cross-sectional study were a sample of 226 middle school students from a suburban area in the southern United States. Approximately 40% of the sample were males. The mean age of the sample was 13.19 years ($SD = 1.00$; range = 12–15 years). Fifty-eight percent of the sample self-identified as Caucasian, 13.7% as Latino, 8.4% as Asian, 7.1% as Black, and 12.8% as Other. The majority of participants' parents had attended at least some college or vocational school (68.1%). With regard to BMI, 10.2% of the sample were underweight, 57.1% fell within the normal range, 17.3% were overweight, and 14.6% were obese (Missing data = 0.8%). Table 1 contains demographic information for the sample.

2.2. Measures

2.2.1. Emotional eating

The Emotional Eating Scale (EES) is a measure of how indicative a person is to eat in response to negative affect. Tanofsky-Kraff et al. (2007) adapted the adult version of the EES for individuals 8 to 17 years old by re-wording many of the item stems to make them more relevant to children and adolescents. The scale requires respondents to self-report on their urge to eat in response to 25 specific negative emotions using a 5-point Likert-type response scale (0 = no desire, 5 = very strong desire to eat). We did not use the items “shaky” and “worn out” in our analysis because data from the original validation study indicated neither of these items measured any of the common factors (Tanofsky-Kraff et al., 2007). There are four scores available on the adapted EES: a total score and 3 subscale scores (depression, anger/anxiety/frustration, and feeling unsettled). The internal consistency reliability (Tanofsky-Kraff et al., 2007) and construct validity (Vannucci et al., 2012) of the EES adapted for children and adolescents have been supported in the empirical literature.

Table 1
Sample demographics and EES descriptives ($N = 226$).

Characteristics	N	Percentage/range
Mean age in years	13.19	12–15
(SD)	(1.00)	
Female	140	61.9
Male	86	38.1
Race/ethnicity		
Caucasian	131	58.00
Latino	31	13.7
Black	16	7.1
Asian	19	8.4
Other	29	12.8
Parent education		
College degree or higher	69	30.5
Vocational school or some college	85	37.6
High school diploma or GED	18	8.0
Some high school or less	54	23.9
Body Mass Index (BMI)		
Underweight	23	10.2
Normal weight	129	57.1
Overweight	39	17.3
Obese	33	14.6
Missing	2	0.8
EES total	27.87	0–92
(SD)	(17.92)	
EES depression	10.74	0–28
(SD)	(6.48)	
EES anger/anxiety/frustration	12.68	0–48
(SD)	(9.95)	
EES feeling unsettled	4.56	0–19
(SD)	(3.46)	

2.2.2. Demographic information

Participants completed a demographic questionnaire that included information about their sex, age, race/ethnicity, and parental highest educational attainment.

2.2.3. Body Mass Index

Body Mass Index (BMI) was objectively measured and calculated as weight in kilograms divided by height in meters squared.

2.3. Procedures

Participants were middle school students from a public school in the southern United States. An advertisement explaining the general objective and procedures of the study was sent home to students and parents. This advertisement also indicated that students who participated in the study would be entered into a drawing to earn one of five \$10 gift cards. Written informed assent and parental consent were obtained from each participant. Participants completed the EES and demographic form in their health class. A trained research assistant weighed participants and measured their height in a separate room after the questionnaires were completed. Data collection procedures took approximately 20 min per child. The university's Institutional Review Board (IRB) approved the study procedures before data collection began.

2.4. Statistical analyses

The data analysis involved two components. First, we had to decide whether to treat the EES items as categorical or continuous variables. Second, we had to assess if the instrument was invariant. For all analyses, we used R (R Development Core Team, 2014). For the latent variable models, we used the psych (Revelle, 2015) and lavaan (Rosseel, 2012) packages.

2.4.1. Analyzing item-level data

Before testing for invariance, we inspected the data to see if we should use a model for categorical data or one for continuous data.

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