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Development and preliminary validation of the Salzburg Stress Eating Scale

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ABSTRACT

Stress-related eating has long been a focus of study in several disciplines. Currently available psychometric scales conflate stress-related eating with emotional eating despite that not all stress states can be subsumed under some form of specific emotion. Moreover, existing measures primarily assess increased food intake in response to emotions and stress, thus ignoring evidence of decreased food intake in response to stress. Therefore, we drew from established stress concepts to develop the first genuine stress-related eating scale (Salzburg Stress Eating Scale [SSES]) in both German and English versions. In the SSES higher scores indicate eating more when stressed and lower scores indicate eating less when stressed. In study 1 ($n = 340$), the German SSES was found to have a one-factor structure ($\alpha = 0.89$). SSES scores were weakly or moderately correlated with other eating-related constructs (e.g., emotional eating, body mass index [BMI]), and weakly correlated or uncorrelated with non-eating-related constructs (e.g., impulsivity, perceived stress); in addition, women had higher scores than men. Perceived stress moderated the association between stress eating and BMI, such that higher SSES scores were significantly related to higher BMI in individuals with high perceived stress, but not in individuals with low perceived stress. In studies 2 ($n = 790$) and 3 ($n = 331$), factor structure, internal consistency, and associations with sex and BMI were replicated for both German and English versions of the SSES. Hence, the SSES represents a psychometrically sound tool for the measurement of stress-related eating.

1. Introduction

Although the effects of stress on eating have been well documented, the mechanisms remain poorly understood (Greeno & Wing, 1994; Robbins & Fray, 1980; Tomiyama, Finch, & Cummings, 2015). Animal research-based 'main effect' models assuming a uniform eating-inhibitory effect of stress have fallen short of explaining the complexity and variability of stress' effects on human appetite. Depending on individual differences (e.g., Oliver, Wardle, & Gibson, 2000) or situational factors (e.g., Sproesser, Schupp, & Renner, 2014), experiencing stress can lead to decreased food intake, unchanged food intake, or increased food intake. In fact, it has been estimated that stress eaters are almost equally divided between those who perceive themselves as eating more than usual when stressed and those who perceive themselves as eating less than usual when stressed (Gibson, 2006; Oliver & Wardle, 1999). Thus, these individual differences need to be taken into account in research on stress-related eating in humans, particularly when it comes to its psychometric assessment.

While there are several measures for the assessment of emotional eating (cf. Bongers & Jansen, 2016), psychometrically sound self-report questionnaires for the measurement of 'pure' stress eating are lacking. States of distress can overlap with states associated with negative emotions, but there are also non-overlapping states. For example, one might feel stressed (due to time pressure, inability to control important outcomes, task overload, etc.) without endorsing specific emotions, such as anxiety, anger, or sadness. Some of the existing questionnaires for the assessment of emotional eating, such as the *Dutch Eating Behavior Questionnaire* or the *Emotional Appetite Questionnaire*, do probe for eating in response to stressful situations, but items are intermingled with items that include emotional situations (Geliebter & Aversa, 2003; Nolan, Halperin, & Geliebter, 2010; van Strien, Frijters, Bergers, & Defares, 1986). Furthermore, although some studies ask participants about their food intake in response to

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stress (e.g., with response categories ranging from *much less than usual* to *much more than usual*), these studies employed only one or a few questions (e.g., Sproesser et al., 2014; Oliver & Wardle, 1999; Epel et al., 2004; Stone & Brownell, 1994), which limits validity and replicability.

Therefore, the aim of the current studies was to develop a new self-report measure for the assessment of genuine stress eating—the *Salzburg Stress Eating Scale* (SSES)—and to evaluate its psychometric properties and correlates. In accordance with prior studies (e.g., Nolan et al., 2010; Sproesser et al., 2014), response categories of this measure were designed to enable participants to indicate whether they typically eat less, just as much, or more than usual when feeling stressed. High scores on the scale indicate a tendency to eat more when stressed, and low scores indicate a tendency to eat less when stressed. In contrast to other self-report questionnaires, however, the scale includes only items that specifically refer to stress without confounding with other affective states (e.g., sadness, boredom, or anger).

In a first study, it was expected that the scale would demonstrate a one-factor structure and high internal consistency (i.e., factorial validity) because all items refer solely to stress eating. Based on previous findings (Oliver & Wardle, 1999), it was hypothesized that women would score higher than men. As an indication of convergent validity, it was expected that the scale would show small to moderate correlations with other eating-related measures (emotional eating, eating disorder symptomatology, perceived self-regulatory success in weight regulation). As an indication of discriminant validity, it was expected that the scale would show small or no correlations with relevant measures that are not directly related to eating (impulsivity, perceived stress, depressiveness). As chronic life stress seems to be associated with a greater preference for energy-dense foods and weight gain (Torres & Nowson, 2007), whether scores on the scale were related to body mass index (BMI) as a function of perceived stress was examined. Specifically, higher SSES scores were expected to be related to higher BMI in participants who reported high levels of stress, but to be unrelated to BMI in participants who reported low levels of stress. Such an interactive effect would represent an additional, preliminary indication of validity, as the tendency to eat more when stressed should not result in higher body weight in an individual who does not experience chronic stress. Finally, two additional studies were aimed at replicating factor structure, internal consistency, and relationships with sex and BMI for the German and English versions of the SSES.

2. Study 1

2.1. Methods

2.1.1. Participants and procedure

Participants were recruited via student mailing lists at universities in Germany and Austria and completed the questionnaires online via www.unipark.com. Questionnaire completion took approximately 20 min. Every question required a response in order to continue. Initially 382 individuals participated; 42 participants who cancelled before or during completion of the SSES were excluded from analysis, resulting in 340 participants who provided complete data on sociodemographic details and the SSES (sample sizes were slightly lower for other study variables due to missing data). Most participants were women (77%, $n = 261$), students (92%, $n = 312$), and had German citizenship (94%, $n = 321$). Mean ($\pm SD$) age was 23.8 ± 5.0 y (range: 18–53 y) and mean BMI was 22.5 ± 3.6 kg/m^2 (range: 14.5–39.2 kg/m^2). Twenty-two participants (6.5%) were underweight (BMI < 18.5 kg/m^2), 250 participants (74%) were healthy weight (BMI = 18.5–24.9 kg/m^2), 52 participants (15%) were overweight (BMI = 25.0–29.9 kg/m^2), and 16 participants (4.7%) were obese (BMI ≥ 30.0 kg/m^2).

2.1.2. Measures

Salzburg Stress Eating Scale (SSES). The SSES was developed by the authors based on six stress-related items of the *Mood Eating Scale* (MES, Jackson & Hawkins, 1980) and four items of the *Perceived Stress Scale* (PSS, Cohen, Kamarck, & Mermelstein, 1983). Published German-language versions of the MES (Abramson, 1996, 2001) and PSS (Büssing & Recchia, 2016; Büssing, Günther, Baumann, Frick, & Jacobs, 2013) were used. One item of the MES ("I snack a lot while studying for an exam.") was modified to "… preparing for a strenuous task …" to broaden the applicability to non-student populations. PSS items that are worded as questions ("How often have you … ?"), were reworded to statements ("When I feel …"). Finally, all items were modified such that each item described a stressful situation and the sentences ended in response categories, such that participants indicate if they usually eat much less, less, just as much, more, or much more (scored from 1 to 5) under the described stress circumstances (see Table 1 for all items in German and English). The original scales were available in both German and English, and a bilingual, native speaker verified that the modifications did not change the original content.

Dutch Eating Behavior Questionnaire (DEBQ). The emotional eating subscale of the DEBQ (Grunert, 1989; van Strien et al., 1986) was used to measure eating in response to specific emotional states. The scale consists of 10 items coded from 1 (*never*) to 5 (*very often*). Internal consistency was $\alpha = 0.90$ in the current study.

Eating Disorder Examination – Questionnaire (EDE-Q). The EDE-Q (Fairburn & Beglin, 1994; Hilbert, Tuschen-Caffier, Karwautz, Niederhofer, & Munsch, 2007) was used to measure eating-disorder psychopathology in the past 28 days. The scale consists of 22 items coded from 0 (*no days*/*not at all*) to 6 (*every day*/*markedly*). There are four subscales representing *eating restraint*, *eating concern*, *weight concern*, and *shape concern*. Only the total score was used in the current study. Internal consistency was $\alpha = 0.95$. Six additional items assess the number of days or times with overeating, loss of control eating, binge eating, and compensatory bulimic behaviors. Of these, the number of binge days was used in the current analyses.

Perceived Self-Regulatory Success in Dieting Scale (PSRS). The PSRS (Meule, Papies, & Kübler, 2012) was used to measure perceived self-regulatory success in weight regulation. The scale consists of three items coded from 1 (*not successful*/*not difficult*) to 7 (*very successful*/*very difficult*). Internal consistency was $\alpha = 0.64$ in the current study.

Barratt Impulsiveness Scale – short form (BIS-15). The BIS-15 (Meule, Vögele, & Kübler, 2011; Spinella, 2007) was used to measure trait impulsivity. The scale consists of 15 items coded from 1 (*rarely*/*never*) to 4 (*almost always*/*always*). Three subscales assess attentional, motor, and non-planning impulsivity. Their internal consistencies were $\alpha = 0.60$, $\alpha = 0.72$, and $\alpha = 0.81$, respectively, in the current study.

Perceived Stress Scale (PSS). A short version of the PSS (Büssing et al., 2013; Cohen & Williamson, 1988) was used to measure perceived stress in the past month. The scale consists of 10 items coded from 0 (*never*) to 4 (*very often*). Internal consistency was $\alpha = 0.85$ in the current study.

Center for Epidemiologic Studies Depression Scale (CES-D). A short version of the CES-D (Hautzinger, Bailer, Hofmeister, & Keller, 2012; Radloff, 1977) was used to measure depressive symptoms in the past week. The scale consists of 15 items coded from 0 (*rarely or none of the time*) to 3 (*most or all of the time*). Internal consistency was $\alpha = 0.89$ in the current study.