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Research report

Validation of the Dutch Eating Behavior Questionnaire (DEBQ) in a sample of Spanish women ☆

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ABSTRACT

The Dutch Eating Behavior Questionnaire (DEBQ) was developed to measure eating styles that may contribute to or attenuate the development of overweight. It comprises three scales that measure emotional, external and restrained eating. The main goal of this study is to evaluate the internal structure of the Spanish version of the DEBQ using updated psychometric techniques in a sample of women. A sample of 647 Spanish females answered the questionnaire. Both exploratory structural equation modeling and confirmatory factor analysis were used to evaluate the factor structure of the DEBQ. Reliabilities were estimated with Cronbach's alpha. The relations between the subscales of the DEBQ and age, BMI, and scores on the Eating Attitude Test-26 (EAT) and the Restrained Scale-Revised (RS) were computed with Pearson correlations. Results showed that the internal structure was similar to the theoretical proposal, although items associated with boredom and idleness presented cross-loading problems. The reliability estimates were satisfactory. The *Emotional* and *External Eating* factors correlated with the BMI, and *External Eating* was negatively correlated with age. The *Restraint* factor of the DEBQ showed significant relationships with scales of the EAT-26 and RS. The dimensional validity of the DEBQ is reproduced in a Spanish sample, and the DEBQ seems to be an effective instrument for research in Spanish females. Minor modifications to the DEBQ are recommended.

Introduction

Susceptibility to weight gain and overweight can be understood at various levels ranging from genetic, physiological and metabolic to behavioral and psychological (Blundell et al., 2005). At the behavioral and psychological levels of food intake, there are three main psychological theories about the etiology of overeating: psychosomatic theory, externality theory and restraint theory (van Strien, Frijters, Bergers, & Defares, 1986). Each of these theories focuses on one type of eating behavior.

Psychosomatic theory focuses on emotional eating, that is, eating in response to emotional arousal states, such as anger, fear or anxiety. Emotional eating is the atypical response to distress (Gold & Chrousos, 2002; Greeno & Wing, 1994; van Strien et al., 2013). Emotional arousal is normally associated with an elevated activity of the hypothalamic-pituitary axis (HPA axis), with physiological reactions that are biologically designed to prepare the individual for a fight or flight reaction, thereby suppressing hunger. Because under-eating and weight loss are the typical and evolutionary adaptive responses to distress, it has been suggested that the unnatural response of emotional eating is acquired, perhaps as a result of adverse (parenting) experiences early in life (Bruch, 1973; Snoek, Engels, Janssens, & van Strien, 2007; Topham et al., 2011; van Strien & Bazelier, 2007), in interaction with genetic vulnerability (van Strien, Snoek, van der Zwaluw, & Engels, 2010).

In a similar way to psychosomatic theory, externality theory posits that the eating behavior of overweight individuals is relatively unresponsive to internal physiological signals, such as gastric motility. In contrast to the emphasis placed on internal emotional factors in psychosomatic theory, however, externality theory focuses on the external environment as a determinant of eating behavior. External eaters eat in response to environmental food cues, such as the sight and smell of food, and they are, therefore, characterized as stimulus bound (Schachter, 1971). A further contrast with emotional eating is that external eating has been considered an evolutionary adaptive response (Rodin, 1981) that

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has been related to Neel (1962) thrifty genotype concept. This concept suggests that evolution has favored genetic adaptations that allow humans to survive during periods of food shortages, including adaptations that allow them to overeat in times of food surplus (whenever external food cues are present in the environment) and rapidly develop fat on their bodies. External eating may, therefore, be a general characteristic and not specific to overweight people (van Strien, Herman, & Verheijden, 2009). Although external eating often co-occurs with emotional eating, it refers to an independent construct (Ouwens, van Strien, & van Leeuwe, 2009; Slochower, 1983; van Strien, Schippers, & Cox, 1995).

In contrast to both the psychosomatic and externality theories, restraint theory attributes overeating to dieting (Herman & Polivy, 1975). This paradox is based on the concept of natural weight, a range of body weight that is homeostatically preserved by the individual. Attempts to lower body weight by the conscious restriction of food intake initiates physiological defenses, such as lowering the metabolic rate (Goldsmith et al., 2010; Major, Doucet, Trayhurn, Astrup, & Tremblay, 2007) and the arousal of persistent hunger. When self-control is undermined by disinhibitors, such as alcohol, anxiety, depression, or even the consumption of high-calorie foods, the cognitive resolve to diet may easily be abandoned (Herman & Polivy, 2004). Counter regulation may then occur, resulting in excessive food intake (Polivy & Herman, 1985). Thus, intense dieting may ultimately result in overeating patterns (that is, emotional or external eating), since both arousal and external stimuli disrupt the cognitive restraint normally exercised by dieters faced with persistent hunger (Herman, van Strien, & Polivy, 2008).

The Dutch Eating Behavior Questionnaire (DEBQ; van Strien et al., 1986) was developed to measure these three eating styles. It comprises 33 items responded to on a Likert-type scale ranging from 1 = *seldom* to 5 = *very often*. The *Emotional Eating* scale contains 13 items (e.g., "Do you have the desire to eat when you are irritated?"), the *External Eating* scale has 10 items (e.g., "Do you eat more than usual when you see others eating?"), and the *Restraint* scale contains 10 items (e.g., "Do you deliberately eat less in order to not become heavier?"). Only Item 21 ("Do you find it hard to resist eating delicious foods?") is a reverse-keyed item. Summarized item wordings and the distribution of items in the scales can be seen in Table 2. The DEBQ has been translated into several languages, e.g., English (Van Strien et., 1986), French (Lluch et al., 1996), and Turkish (Bozan, Bas, & Asci, 2011). The English version of the DEBQ (Wardle, 1987) and the adaptations of this version incorporate two modifications to the Dutch original: (a) the item response *seldom* was renamed *rarely*, and (b) Item 21 was reformulated so that a reverse scoring of this item was no longer necessary. The three scales of the DEBQ, in the original and translated versions, have been found to have good psychometric properties, such as adequate internal structure, satisfactory reliability and predictive validity (Bozan et al., 2011; Lluch et al., 1996; van Strien & van de Laar, 2008; van Strien et al., 1986; Wardle, 1987).

Although the DEBQ is a widely-used questionnaire in research on eating behavior, few studies have evaluated its internal structure. Almost all of them have done so with outdated psychometric approaches, such as orthogonal rotations, principal components analysis and the Kaiser–Guttmen rule for determining the number of factors (for a review, see Barrada, van Strien, & Cebolla, submitted for publication). A recent and noteworthy exception is the study by Barrada et al. (submitted for publication). Several factorial models were tested with a Dutch sample (n = 2173). The findings showed that: (a) the most appropriate analytical technique for analyzing the data was exploratory structural equation modeling (ESEM; Asparouhov & Muthén, 2009), rather than confirmatory factor analysis (CFA), as Item 3 ("Do you have a desire to eat when you have nothing to do?") loaded simultaneously on the *Emotional* and *External Eating* factors, and the uniquenesses of some items had to be allowed to correlate; (b) Item 21 (as previously noted, a reverse item in the Dutch version) presented very low loadings in any factor; and (c) the theoretical structure of the DEBQ could be recovered with satisfactory fit indices (RMSEA = .066, CFI = .966, TLI = .973).

Some limitations of Barrada et al.'s study (submitted for publication) should be noted. First, the tested version was the Dutch one, which is not equivalent to the English version or those derived from it. Second, many new parameters were incorporated into the factor model by inspecting the modification indices, which raises concerns about capitalization on chance (MacCallum, Roznowski, & Necowitz, 1992). Third, the final solution was based on ESEM. As noted by Sánchez-Carracedo et al. (2012), the ESEM has limitations of usability (up until now, this technique is only available with M*plus* – Muthén & Muthén, 1998–2012), it has less historical background, and, thus, less use and research, and some analytical options are not available with it. As Morin, Marsh, and Nagengast (2013) noted, "ESEM should generally be preferred to ICM-CFA when the factors are appropriately identified by ESEM, the goodness of fit is meaningfully better than for ICM-CFA, and factor correlations are meaningfully smaller than for ICM-CFA" (p. 430; where ICM-CFA refers to the independent cluster model CFA, CFAs where items are allowed to correlate in a single factor, the common practice). Thus, from the reverse point of view, under some circumstances CFA models should be preferred.

There are two main goals of this study. The first is to replicate and extend the analysis from Barrada et al. (submitted for publication), in order to evaluate (a) the internal structure of the DEBQ in a version without reverse items and with a new sample and (b) the adequacy of a CFA solution, rather than an ESEM solution. The second goal is to evaluate the psychometric properties of the Spanish version of the DEBQ in a sample of women. Factor analysis, reliabilities and convergent and divergent correlations will be evaluated.

Method

Participants and procedure

A total of 943 participants were recruited from the University of Valencia and Jaume I University in Castelló (Spain). Researchers went to the classes to explain the objectives of the study. Students who voluntary accepted to participate, with no economic or academic incentives, were asked to sign an informed consent. All the participants filled out the DEBQ in class time using a pencil-and-paper format. The recruitment included grade, post-graduates, and specific courses for senior students. BMI was calculated using self-reported height and weight values provided by participants.

Our sample comprised only 135 men (14.3% of the total). We decided to discard men from the analysis given that (a) men and women differ in relevant variables with respect to eating behavior, so keeping both sexes in a conjoint analysis would imply a using mixture of the different populations, and (b) the male sample was not big enough to perform the desired analysis splitting by sex (for instance, 135 men for 33 items would imply to have only 4.09 participants per item for the factor analysis in the male sample). Thus, we used only the data from the females. Moreover, to reduce the high variability in the characteristics of the initial sample of females, we decided to analyze only data from females with ages between 18 and 65 years (both included), a BMI of between 18.50 and 40, and three or fewer missing items on the DEBQ (less than 10% missing). After removing the participants who did not satisfy these requeriments, the final sample comprised 647 women. The main descriptives of the sample were: (a) age, M = 25.55, SD = 8.27; (b) BMI, M = 22.12, SD = 2.96; and (c) missing items, M = 0.11, SD = 0.40.

Of this reduced sample, 150 participants also answered the Eating Attitudes Test (EAT-26; Garner, Olmsted, Bohr, & Garfinkel, 1982) and the Revised Restraint Scale (RS; Herman & Polivy, 1980). Of these women, 142 and 124 had no missing items on the EAT-26 and RS, respectively.

Instruments

Dutch Eating Behavior Questionnaire (DEBQ; van Strien et al., 1986). The English version of the DEBQ (Van Strien et al., 2002) was translated into Spanish by the authors. We took great care to use a standard version of Spanish language so it could be also well understandable for Latin-American people, so that it could be used successfully in the study of Latin American populations. This initial version was revised by a bilingual psychologist from the USA (backward translation). The discrepancies between the two translations were resolved by a professional English translator and the author of the original Dutch version. Therefore, the Spanish version, like the English version, has no reverse-scored item.

Eating Attitudes Test-26 (EAT-26; Garner et al., 1982). This 26-item questionnaire measures the frequency of the individual's behavior or attitudes about eating disorders. Items are responded to on a 6-point Likert scale ranging from *Always* to *Never*. Although the internal structure of the EAT-26 is not completely clear (e.g., Koslowsky et al., 1992; Ocker, Lam, Jensen, & Zhang, 2007), four different scores are usually computed: a score for the total scale and three scores for the different subscales: *Diet* (13 items; e.g., "I am terrified about being overweight"), *Bulimia and Food Preoccupation* (6 items; e.g., "I find myself preoccupied with food"), and *Oral Control* (7 items; e.g., "I avoid eating when I am hungry"). For the present study, the Spanish translation was used (Rivas, Bersabé, Jiménez, & Berrocal, 2010). The Cronbach's alphas for the present sample were .91 for the total scale, .90 for the *Diet* scale, .84 for the *Bulimic and Preoccupation about Food* scale, and .59 for the *Oral Control* scale.

Restrained Scale-Revised (RS; Herman & Polivy, 1980). The RS assesses attitudes toward body weight, frequency of dieting and weight fluctuation. It has 10 items and comprises two subscales, *Concern about Diet* (6 items; e.g., "How often do you diet?") and *Weight Fluctuations* (four items; e.g., "What is the maximum amount of weight (in kilos) you have lost in 1 month?"). Response options and scoring vary according to the item. For the present study, a Spanish translation was used (Silva & Urzúa-Morales, 2010). The Cronbach's alphas for the present sample were .79 for the *Concern about Diet* scale, and .78 for the *Weight Fluctuation* scale.

Statistical analysis and expected results

Three steps were taken consecutively to validate the Spanish version of the DEBQ.

Internal structure

The starting point was the final ESEM model chosen in Barrada et al. (submitted for publication). In that model (a) all the items are allowed to load in all the factors; (b) the uniquenesses of Items 3, 8, 10 and 28, belonging to the content category of diffuse emotions (not clearly labeled emotions), were allowed to correlate with each other; and (c) the uniquenesses of the pairs of Items 2 and 6, Items 4 and 19, and Items 26 and 29 were also allowed to correlate. After removing some problematic items (see Results section below), a CFA model with the same correlated uniquenesses was tested. The analyses were performed with M*plus* 7 (Muthén & Muthén, 2012). None of the default values of the program was changed. Variables were treated as categorical in the analysis (Estimator = WLSMV). As indications of model fit, we consider whether the comparative fit index (CFI) and Tucker–Lewis index (TLI) have values greater than .95, and whether the root mean square error of approximation (RMSEA) is less than .06 (Hu & Bentler, 1999). We expected to basically replicate the results from Barrada et al. (submitted for publication), and given the low cross-loading values previously found (when problematic items are not considered), we expected that a CFA model would provide a fit that was not worse than the ESEM model.

Reliability

Reliabilities of the DEBQ were estimated with Cronbach's alpha. Only participants without missing values on the evaluated questionnaire were included in these computations. Analyses were carried out with SPSS. Given that the three eating styles are quite narrow constructs, and considering previous studies of the DEBQ, we expected high reliabilities.

Relation with other variables

The relation between the subscales of the DEBQ and age, BMI, the subscales of the EAT and RS, and the total score on the EAT were computed with Pearson correlations. Subscale scores were computed only if there were no missing values for that questionnaire. For missing values, we applied pair-wise deletion. SPSS was used for the calculations.

Results

Results of model fit can be seen in Table 1. The ESEM model with all 33 items (M1) produced satisfactory fit indices (although with a RMSE slightly over .06), with values very similar to an equivalent model tested in Barrada et al. (submitted for publication): RMSEA = .061, CFI = .967, and TLI = .959. Item loadings for this model are shown in Table 2. Loadings were high in value in the theoretical factor where the item corresponded (M = .75, range [.54,.95]); Items 3 and 28 were not considered for these descriptives), with minor cross-loadings (considering their absolute values, M = .05, range [.00,.18]). There were two exceptions that deserve attention. First, Item 3 ("Do you have a desire to eat when you have nothing to do?") loaded .24 in its corresponding factor and presented a higher loading in what should be a secondary factor. Item 28 ("Do you have a desire to eat when you are bored or restless?") also presented a cross-loading problem, with two loadings of almost the equal size. Inter-factor correlations showed a

Table 1
Goodness of fit indices for the different models.

Models		χ^{2a}	*df*	RMSEA	CFI	TLI
M1	ESEM – Three factors	1442.130	423	.061	.967	.959
M2	ESEM – Three factors (without items 3 and 28)	1363.927	371	.064	.967	.959
M3	CFA – Three factors (without items 3 and 28)	1139.885	427	.051	.977	.974

Notes: ESEM = exploratory structural equation modeling; CFA = confirmatory factor analysis; Three factors = *Emotional Eating*, *External Eating*, and *Restraint*; *df* = degrees of freedom; RMSEA = root mean square error of approximation; TLI = Tucker–Lewis index; CFI = comparative fit index.

[a] All *p*-values for the Chi-square test were <.001. χ^2 values cannot be directly compared, as model estimator is WLSMV.

Table 2
Factor loadings and inter-factor correlations for ESEM (M1) and CFA (M3) models.

	Loadings					
	ESEM			CFA		
Item wording[a]	Emot	Exter	Restr	Emot	Exter	Restr
01. Desire to eat when irritated…	**.76**	.02	−.01	**.77**		
02. Eat more than usual when tasty…	.04	**.65**	.04		**.70**	
03. *Desire to eat when nothing to do…	.24	**.46**	.10	*		
04. Eat less than usual when gained weight…	−.09	−.01	**.82**			**.76**
05. Desire to eat when you feel depressed…	**.77**	−.03	−.01	**.74**		
06. Eat more than normal when food is good…	−.02	**.69**	−.01		**.68**	
07. Reject food or drinks because worry about weight…	.04	−.02	**.88**			**.89**
08. Eating when you feel lonely…	**.64**	.17	.05	**.77**		
09. Desire to eat when delicious…	−.10	**.80**	−.08		**.68**	
10. Desire to eat when somebody lets you down…	**.86**	−.02	−.01	**.85**		
11. Eat less during meal times…	.07	.05	**.80**			**.84**
12. Eat it immediately when delicious…	.04	**.54**	−.18		**.51**	
13. Desire to eat when angry…	**.87**	.01	−.03	**.86**		
14. Watch what you eat…	.04	−.05	**.68**			**.68**
15. Desire to eat something delicious…	.01	**.54**	.01		**.56**	
16. Desire to eat when unpleasant…	**.82**	.02	−.01	**.83**		
17. Eat foods that are slimming…	.14	−.10	**.68**			**.72**
18. Desire to eat when others eating…	.04	**.65**	−.08		**.67**	
19. Eating less after eating too much…	.01	.01	**.75**			**.75**
20. Desire to eat when anxious…	**.74**	.00	.06	**.76**		
21. Difficult to resist delicious food...	−.03	**.75**	−.07		**.70**	
22. Eat less deliberately...	−.02	.06	**.91**			**.91**
23. Desire to eat when things go against you...	**.95**	−.05	.00	**.92**		
24. Desire to buy food when bar...	.01	**.68**	−.06		**.68**	
25. Desire to eat when upset...	**.92**	.02	.00	**.93**		
26. Not to eat because watching your weight...	−.01	.10	**.85**			**.87**
27. Eat more than usual when others eating...	.03	**.58**	.11		**.68**	
28. *Desire to eat when bored…	**.42**	**.35**	.04	*		
29. Try not to eat in evening because watching weight…	.15	−.01	**.63**			**.72**
30. Desire to eat when frightened…	**.75**	.00	−.04	**.73**		
31. Take into account weight when eat…	−.02	.09	**.85**			**.86**
32. Desire to eat when disappointed…	**.90**	.01	−.07	**.88**		
33. Eating when preparing meal…	−.11	**.60**	.06		**.52**	

	Inter-factor correlations					
	ESEM			CFA		
	Emot	Exter	Restr	Emot	Exter	Restr
Emot						
Exter	.52			.51		
Restr	.34	.17		.37	.17	

Notes: CFA = confirmatory factor analysis; ESEM = exploratory structural equation modeling; Emot = *Emotional Eating*; Exter = *External Eating*; Restr = *Restraint*. Items with an asterisk indicate problematic items in the ESEM model, not included in the CFA model. Shaded cells indicate the factor where the item theoretically belongs. Loadings in bold indicate loadings over .30.
[a]Exact item wording cannot be shown due to copyright restrictions.

medium–high relation between *Emotional* and *External Eating* (r = .52), a medium–low relation between *Emotional Eating* and *Restraint* (r = .34), and a negligible relation between *External Eating* and *Restraint* (r = .17).

Given the problems in allocating Items 3 and 28 to a specific subscale for computing a score, we tested a model after removing these items. Fit indices for this model (M2) were basically unchanged with respect to indices for M1. Inspection of the loadings (not provided; available under request) revealed that cross-loadings were a minimal problem for the DEBQ after deleting the problematic items, as the mean loading (in absolute value) in a secondary factor was equal to .05, with a maximum of .16.

As cross-loadings were not a relevant concern for this version of the DEBQ, and given the advantages of the CFA over the ESEM, we tested a CFA model for the remaining 31 items (M3). As a lower number of parameters had to be estimated, degrees of freedom increased. The fit indices of M3 were better than those of M2. Inter-factor correlations were almost unchanged when compared with M1 and M2 (maximum change = .03). Therefore, following Morin et al.'s (2013) advice, we consider this to be the preferred model. Item loadings basically mimicked the results from Barrada et al. (submitted for publication): for *Emotional Eating*, M = .82 (range [.73,.93]); for *External Eating*, M = .64 (range [.51,.70]); and for *Restraint*, M = .80 (range [.68,.91]).

As found in previous studies, and as could be expected given the mean loadings and number of items, Cronbach's alphas were high for the three subscales: for *Emotional Eating* (without Items 3 and 28), the alpha was .94; for *External Eating*, .84; and for *Restraint*, .93.

The correlations of the three subscales of the DEBQ with some relevant demographic variables and additional questionnaires are shown in Table 3. The only eating style associated with age is *External Eating*, with a low negative trend (r = −.16). Both *Emotional Eating* (r = .23) and *Restraint* (r = .29) increase as BMI goes up. The eating style most closely related to the dimensions measured by the EAT-26 is *Restraint* (r = .79 for the overall EAT score), although *Emotional Eating* shared a relevant amount of variance with *Bulimia*

Table 3
Correlations between the three eating styles measured with the DEBQ and demographic variables and EAT-26 and RS scores.

	Emot	Exter	Restr
Age[a]	.058	*−.159*	−.004
BMI[a]	*.233*	.013	*.295*
EAT Diet[b]	*.352*	.129	*.813*
EAT Bulimia and Food Preoccupation[b]	*.460*	*.177*	*.547*
EAT Oral Control[b]	.150	−.149	*.494*
EAT-26[b]	*.397*	.102	*.788*
RS Concern about Diet[c]	*.478*	*.309*	*.717*
RS Weight Fluctuation[c]	*.437*	*.358*	*.568*

Notes: Emot = *Emotional Eating* (without Items 3 and 28); Exter = *External Eating*; Restr = *Restraint*. EAT = Eating Attitudes Test. RS = Restraint Scale. Italicized values indicate statistically significant correlations.
[a] $n = 593$.
[b] $n = 125$.
[c] $n = 109$.

and Food Preoccupation ($r = .46$), probably because both of them share emotional content. Finally, also for the RS subscales, the eating style that presented the highest correlations was *Restraint* ($rs = .72$ and $.57$), as could be expected given the similarity of the tapped constructs. Correlations with *Oral Control* should be interpreted with caution, given the low reliability of this scale. Importantly, the highest values, over .70, were between *Restraint* and the *Diet* subscale of the EAT-26 and the *Concern about Diet* of the RS, indicating good convergent validity.

Conclusions

This study had two aims. The first was to replicate and extend the Barrada et al. (submitted for publication) study about the internal structure of the DEBQ with a new sample. The second was to validate the Spanish version of the DEBQ.

Several key messages can be extracted from the factor analysis: (a) In general, the theoretical structure of the DEBQ was correctly recovered, both with ESEM and CFA; (b) Item 3 was found to be problematic, as in Barrada et al. (submitted for publication); (c) Item 28 also presented problems with cross-loadings, an unexpected result given the performance of this item in Barrada et al.; (d) Item 21, which is a reverse-score item in the Dutch version and presented negligible loadings in the three factor model in Barrada et al., presented no problems in this version, where it is no longer reversed. We will develop some of these points.

Our results raise doubts about the suitability of identifying food intake in response to boredom or idleness as an emotional eating process. The relationship between feeling bored and emotional eating has been reported in the literature, especially linked to psychopathology. For example, Walfish (2004) found that 45% of their sample of morbidly obese females attributed their overweight mainly to over-eating when feeling bored. Vanderlinden, Grave, Vandereycken, and Noorduin (2001) reported that 66% of a sample of women diagnosed with binge-eating disorder indicated that feeling bored was a frequent trigger for binges. Furthermore, other measures of emotional eating have included items on eating when feeling bored (Arnow, Kenardy, & Agras, 1995; Nolan, Halperin, & Geliebter, 2010; Rollins et al., 2011). Feeling bored has been linked to alexithymia, as people who frequently feel bored may have difficulties with emotion awareness, and they may also be more externally-oriented (Eastwood, Cavaliere, Fahlman, & Eastwood, 2007). Emotional eating has also been related to alexithymia and difficulties in identifying emotions (van Strien & Ouwens, 2007). Nonetheless, feeling bored is generally perceived as a negative feeling (Eastwood et al., 2007), as it is also associated with significant emotional distress. Thus, it would seem that eating when bored refers to an emotional process. Furthermore, "eating when having nothing to do" is closely related to "eating when feeling bored", which means that this item should also refer to an emotional eating process.

Given these results, our suggestion is to remove Item 3 from the DEBQ, as it has been found to be problematic both in the study by Barrada et al. (submitted for publication) and in the present study, and this result has been replicated with different samples from different cultures (Dutch and Spanish) and languages. Boredom can be defined as "the aversive experience of wanting, but being unable, to engage in satisfying activity" (Eastwood, Frischen, Fenske, & Smilek, 2012; abstract). Boredom suggests lack of focus on a task that could be emotionally negative and (perhaps) leads a person to external sensitivity to food cues. This would lead to the present pattern of cross-loadings.

It is not yet clear to us what to do with Item 28, given the inconsistent pattern of results from Barrada et al. (submitted for publication) and the present study. Differences between the two studies can be attributed to differences between the samples, languages or cultures, or to statistical instability. Moreover, this relation may be culturally dependent. Emotional cross-cultural studies have pointed out how there are differences in the conceptualization of boredom between cultures (Sundberg, Latkin, Farmer, & Saoud, 1991). For example, students from a Mediterranean country like Italy reported more frequently the word "boredom" compared to students from Netherlands when asked to list all emotion words they could think of in 5 min, and this did not occur with other negative emotions like sadness or anger (Van Goozen & Frijda, 1993).

Further research should be done to clarify these points. However, theoretical considerations aside, from a practical point of view it does not make much difference whether Items 3 and 28 are included or excluded when computing total scores on *Emotional Eating*, as the correlation of the scores computed in these two different ways, with and without these two items, is .99.

We have shown that the suggested version, without Items 3 and 28, can be satisfactorily modeled with an ESEM or a CFA. Given that the fit for the CFA was somewhat higher, that the ESEM showed no relevant problems with cross-loadings, and that there was no noticeable difference in the inter-factor correlations (Morin et al., 2012), we consider CFA to be the preferred technique. However, this would not be the case when modeling the intact version of the DEBQ.

The reliability estimates were satisfactory for the three versions for research purposes and, especially *Emotional Eating* and *Restraint*, for clinical use. The high correlation between the complete version of the DEBQ and the version when the problematic items are removed, as well as the high reliabilities, point to the possibility of creating short versions of the DEBQ. We are now working along these lines.

Regarding the outcomes of the correlational analysis, the results show that, as observed in previous research (Barrada et al., submitted for publication; Lluch et al., 1996; van Strien et al., 1986), the *Emotional* and *External* factors showed a medium–high overlap. The relationship between the two factors can be explained by Heatherton and Baumeister (1991) notion that negative emotions or stress cause individuals to increase their awareness of the immediate environment and decrease their awareness of the self. Thus, negative emotions may make people more sensitive to the immediate food environment (Newman, O'Connor, & Conner, 2008). The DEBQ factors correlated with the eating disorder scales, especially the *Restraint* factor, which correlated with dieting factors from the EAT-26 and RS. This result is in line with previous studies, where the DEBQ scores have been related to eating disorders such as anorexia nervosa (Kiezebrink, Campbell, Mann, & Blundell, 2009; Vervaet, van Heeringen, & Audenaert, 2004), bulimia nervosa or binge-eating disorder (van Strien, Engels, van

Leeuwe, & Snoek, 2005; Wardle, 1987). Regarding age, a positive relation was found with *External Eating*, as previously reported (van Strien et al., 2009). The relations between the BMI and the DEBQ scores paralleled previous results: (a) there was a positive relation with emotional eating (Konttinen, Männistö, Sarlio-Lähteenkorva, Silventoinen, & Haukkala, 2010; van Strien et al., 2009), supporting the idea of the direct relation between emotional eating and obesity; (b) there was a positive relation with restrained eating (van Strien et al., 2009), but (c) no relation was found with external eating (van Strien et al., 2009; see also the references in that article).

This study has some limitations that should be highlighted. The first is that we did not collect data on test–retest reliability, which means that an important source of psychometric quality could not be evaluated. Second, the data are cross-sectional, and, therefore, no firm conclusions about the direction of the obtained associations can be drawn. Third, given the low proportion of men in our initial sample, we only analyzed data from women. Fourth, as our sample was composed of university students, it was not representative of the population of Spanish women and age distribution presented a high positive asymmetry. Fifth, the anthropometric data were self-reported. Previous studies showed that self-reported height shows overestimation and weight shows underestimation in women compared to direct measurement (Engstrom, Paterson, Doherty, Trabulsi, & Speer, 2003), although studies have found a high correlation between self-reported body measures and real measures (McAdams, Van Dam, & Hu, 2007). We expect that the limitations in terms of sampling (distribution of age, only women, and years of education) of this study not to be especially problematic. Barrada et al. (submitted for publication) have shown that the Dutch version of the DEBQ is invariant with respect to sex, age, and education. Although we cannot assume those properties to hold in the Spanish version, so they should be tested, it is reasonable to expect similar outcomes given the correspondence between the studies in other results.

Several strengths must be noted. First, special attention has been paid to apply updated psychometric techniques to the analysis of the internal structure of the DEBQ. Second, our sample size is well beyond the size of previous studies about the psychometric properties of the instrument (e.g., Bozan et al., 2011; Lluch et al., 1996; Wardle, 1987). Third, the convergent validity of the subscales of the DEBQ was evaluated with respect to common questionnaires in the area of eating attitudes and behaviors. Fourth, although we cannot rule out that certain expressions in the items wording may be more typical for peninsular Spanish than for Latin American Spanish, our translation process was performed with the idea of providing a version suitable for all the Spanish speaking cultures and countries.

In conclusion, the dimensional validity of the DEBQ, already established in previous studies, is reproduced in a Spanish sample. Our careful analyses point to some minor problems with the questionnaire. Some of them had already been noted by Barrada et al. (submitted for publication). The problem with item 28 is specific to this study. The Spanish version of the DEBQ is an effective instrument for measuring eating behaviors of Spanish women. However, further research must be done to establish the structure of the DEBQ in different samples, and determine whether the present findings for the items on eating in response to feeling bored or idle can indeed be attributed to differences in culture.

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