

Original

Validation of a questionnaire on emotional eating for use in cases of obesity; the Emotional Eater Questionnaire (EEQ)

M. Garaulet¹, M. Canteras¹, E. Morales¹, G. López-Guimera², D. Sánchez-Carracedo² and M. D. Corbalán-Tutau¹

¹Department of Physiology. Faculty of Biology. University of Murcia. Murcia. Spain. ²Dept. of Clinical and Health Psychology. Faculty of Psychology. Universitat Autònoma de Barcelona. Barcelona. Spain.

Abstract

Introduction: Emotions have a powerful effect on our choice of food and eating habits. It has been found that in some people there is relationship between eating, emotions and the increased energy intake. This relationship should be measurable to better understand how food is used to deal with certain mood states and how these emotions affect the effectiveness of weight loss programs.

Objective: To develop and analyze the psychometric characteristics of a questionnaire on emotional eating for obesity easy to apply in clinical practice.

Subjects and methods: A ten-item questionnaire called Emotional-Eater-Questionnaire (EEQ) was developed and administered to a total of 354 subjects (body mass index, 31 ± 5), aged 39 ± 12 , who were subjected to a weight-reduction program. The questionnaire was specifically designed for obesity. Analysis of the internal structure, internal consistency, test-retest reliability and convergent validity with Mindful-Eater-Questionnaire (MEQ) were conducted.

Results: After principal components analysis, the questionnaire was classified in three different dimensions that explained 60% of the total variance: Disinhibition, Type-of-food and Guilt. Internal consistency showed that Cronbach's alpha was 0.773 for the "Disinhibition" subscale, 0.656 for the "Type of food" subscale and 0.612 for the "Guilt" subscale. The test-retest stability was $r = 0.70$. The data showed that the percentage of agreement between the EEQ and the MEQ was around 70% with a Kappa index of 0.40; $P < 0.0001$.

Conclusion: We have presented a new questionnaire, which classifies individuals as a function of the relation between food intake and emotions. Such information will permit personalised treatments to be designed by drawing up early strategies from the very beginning of treatment programmes.

(*Nutr Hosp.* 2012;27:645-651)

DOI:10.3305/nh.2012.27.2.5659

Key words: *Emotional-Eater. Obesity. Questionnaire. Validity.*

Correspondence: Marta Garaulet.
Department of Physiology. Faculty of Biology.
University of Murcia.
Campus de Espinardo, s/n.
30100. Murcia. Spain.
E-mail: garaulet@um.es

Recibido: 10-XII-2011.
Aceptado: 15-XII-2011.

VALIDACIÓN DE UN CUESTIONARIO DE COMEDORES EMOCIONALES PARA USO EN CASOS DE OBESIDAD; CUESTIONARIO DE COMEDOR EMOCIONAL (CCE)

Resumen

Introducción: Las emociones tienen un poderoso efecto sobre la elección de alimentos y los hábitos alimentarios. Existe una relación entre comer, emociones y el aumento del aporte calórico. Esta relación debería ser medible para comprender mejor cómo utilizamos los alimentos en determinados estados de ánimo y cómo las emociones afectan a la eficacia de los programas de pérdida de peso.

Objetivo: Desarrollar y analizar las características psicométricas de un cuestionario para identificar la ingesta emocional en la obesidad de fácil aplicación en la práctica clínica.

Material y métodos: Se ha desarrollado y administrado un cuestionario de diez ítems llamado Cuestionario-de-Comedor-Emocional (CCE) a un total de 354 sujetos (Índice de Masa Corporal: 31 ± 5), (Edad: 39 ± 12 años), pertenecientes a un programa de reducción de peso. Se llevó a cabo un análisis de la estructura interna del cuestionario, de la consistencia interna, la fiabilidad test-retest y la validez convergente con el Mindful-Eater-Questionnaire (MEQ).

Resultados: El análisis de componentes principales del cuestionario encontró tres dimensiones diferentes que explicaban el 60% de la varianza: desinhibición, tipo de alimento y culpa. La consistencia interna mostró que el alfa de Cronbach fue de 0,773 para la subescala "Desinhibición", 0,656 para "Tipo de alimentos" y 0,612 para "culpa". La estabilidad test-retest fue de $r = 0,70$. Los datos mostraron que el porcentaje de acuerdo entre el CCE y MEQ era del 70% con un índice Kappa de 0,40, $P < 0,0001$.

Conclusión: Hemos presentado un nuevo cuestionario, que clasifica a los individuos en función de la relación entre la ingesta de alimentos y las emociones. Esta información permitirá el diseño de tratamientos personalizados desde el inicio para la obesidad.

(*Nutr Hosp.* 2012;27:645-651)

DOI:10.3305/nh.2012.27.2.5659

Palabras clave: *Comedor emocional. Obesidad. Cuestionario. Validación.*

Introduction

Obesity is a heterogeneous syndrome with an increasing prevalence in many countries.^{1,2} It is considered the result of a variety of interactions between genetic, social, economic, endocrine, metabolic and psychopathological factors.³ Association between obesity and psychopathology is a controversial issue. However, there is substantial evidence that obesity increase the risk of depression,⁴ and moderate evidence about positive association between obesity and anxiety disorders.⁵

Emotional eating has been defined as “eating as a response to a range of negative emotions, such as anxiety, depression, anger and loneliness”.⁶ It is well known that our emotions have a powerful effect on our choice of food and eating habits,⁶⁻¹² as we seek emotional well being.¹³ Until now, seeking relief in food has been considered a strategy to alleviate anxiety, sadness and other negative emotions, in many cases as a result of following a long term diet or other problems that occur in our daily lives.¹⁴⁻¹⁶

Several studies support the idea that there is relationship between eating, emotions and the increased energy intake.¹⁷⁻¹⁸ This relationship should be measurable to better understand how food is used to deal with certain mood states and how these emotions affect the effectiveness of weight loss programs.

The exact process by which emotions affect eating behavior emerges as one of the central unanswered questions in the field of emotional eating.¹⁹ It has been found empirical support that the influence of emotions on eating behavior is stronger in obese people than in non-obese and in dieters than in non-dieters.²⁰ It also has been suggested that emotion itself may not be responsible for overeating but rather the way in which the emotion is dealt with.²¹

One of the most commonly used psychological tools for studying eating behaviour is the *Three Factor Eating Questionnaire*²² (TFEQ), which explores three dimensions of eating behaviour: restraint (cognitive restraint of eating), disinhibition and hunger. However, this questionnaire is very long (51 items) and its usefulness for obese women is unclear since the correlation between the subscales of restraint and disinhibition and the values of weight and basal Body Mass Index (BMI) is weak.²³ In contrast, the *Mindful Eating Questionnaire* (MEQ),²⁴ which describes a non-judgemental awareness of physical and emotional sensations associated with eating, has been proposed as a helpful weight loss tool. Moreover, the mean MEQ summary score has previously been associated with obesity. Other questionnaires, such as The *Eating and Appraisal Due to Emotions and Stress* (EADES) Questionnaire, the *Dutch Eating Behaviour Questionnaire* (DEBQ) and the *Emotional Eating Scale* (EES) are also useful to assess emotions and other non-traditional factors that contribute to overweight and obesity.²⁵⁻²⁷ However, some of these questionnaires are designed to assess eating disorders, are not specific for obesity, or are too long or complicated to be applied in the clinical practice of obesity by the nutritionist.

Table I
Characteristics of the population studied

<i>Anthropometric characteristics</i>	<i>Total sample n = 354</i>
Age	39 ± 12
Weight (kg)	83.7 ± 16.3
BMI (kg/m ²)	31.6 ± 5.4
Fat percentage (%)	37.8 ± 6.2
Hip (cm)	113.6 ± 10.1
Waist (cm)	102.1 ± 13.8
Waist/Hip ratio	0.89 ± 0.08

Data are presented as mean ± SD.
BMI: Body Mass Index.

For these reasons the aim of this study was to develop and evaluate, in a Mediterranean Population of South-east Spain, a questionnaire on emotional eating in obesity easy to be applied in the nutritional practice.

Methods

Participants

The anthropometric characteristics of the study population are shown in table I.

The initial sample was composed of 354 overweight or obese subjects (84% women) aged 39 ± 12 years; BMI 31,6 ± 5,4 kg/m². All the subjects were voluntarily attending a nutrition clinic in south-eastern Spain for dietetic and behavioural treatment to lose weight based on the principle of the Mediterranean diet and behavioural and cognitive techniques (Método Garaulet®) as described previously.²⁸ Exclusion criteria were: Aged under 14 or above 75 years and BMI ≤ 25 kg/m². Also excluded were patients diagnosed as bulimic, prone to binge eating or undergoing treatment with anxiolytic or antidepressive drugs. A test-retest study was conducted in 122 participants. These participants completed the Emotional Eater Questionnaire (EEQ) twice, with an average interval period of 3.5 (SD:1.1) months. The same number of subjects completed the MEQ questionnaire.

Procedures

Administration of the questionnaires took place during the period from January 2011 to May 2011. Each questionnaire was completed anonymously during group therapy in weight loss treatment, under the supervision of a nutritionist. The questions were carefully explained by the nutritionist to ensure complete understanding and to avoid any questions remaining unanswered.

The written informed consent was obtained before subjects were accepted and was performed in accordance with the Helsinki Declaration of Human Studies and approved by the Ethical Committee of the University of Murcia.

Table IIa
Emotional Eater Questionnaire (EEQ) Garaulet

1. Do the weight scales have a great power over you? Can they change your mood?			
<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Generally	<input type="checkbox"/> Always
2. Do you crave specific foods?			
<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Generally	<input type="checkbox"/> Always
3. Is it difficult for you to stop eating sweet things, especially chocolate?			
<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Generally	<input type="checkbox"/> Always
4. Do you have problems controlling the amount of certain types of food you eat?			
<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Generally	<input type="checkbox"/> Always
5. Do you eat when you are stressed, angry or bored?			
<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Generally	<input type="checkbox"/> Always
6. Do you eat more of your favourite food and with less control when you are alone?			
<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Generally	<input type="checkbox"/> Always
7. Do you feel guilty when eat "forbidden" foods, like sweets or snacks?			
<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Generally	<input type="checkbox"/> Always
8. Do you feel less control over your diet when you are tired after work at night?			
<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Generally	<input type="checkbox"/> Always
9. When you overeat while on a diet, do you give up and start eating without control, particularly food that you think is fattening?			
<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Generally	<input type="checkbox"/> Always
10. How often do you feel that food controls you, rather than you controlling food?			
<input type="checkbox"/> Never	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Generally	<input type="checkbox"/> Always

Scores: Value "0" = Never; Value "1" = Sometimes; Value "2" = Generally; Value "3" = Always.

For the clinical Practice:

Score between 0-5: You are a *non-emotional eater*. Your emotions have little or nothing to do in your eating behavior. You are a person with great stability with respect to your feeding behaviour. You eat when you feel hungry, regardless of external factors or emotions.

Score between 6-10: You are a *low emotional eater*. It is rare that you solve your problems with food. However, you feel that certain foods affect your will.

Score between 11-20: You are an *emotional eater*. Your responses indicate that to some extent your emotions influence your diet. Feelings and mood in some moments of your life determine how much and how you eat.

Score between 21-30: You are a *very emotional eater*. If you're not careful, food will control your life. Your feelings and emotions constantly rotate around your food.

Instruments

A ten-item questionnaire was developed to assess to what extent emotions affect eating behaviour. This questionnaire was called the Emotional Eater Questionnaire (EEQ). All the questions had four possible replies: 1) Never, 2) Sometimes; 3) Generally and 4) Always. Each reply was given a score of 1 to 4, the lower the score, the healthier the behaviour. For the clinical practice subjects

were classified in four groups attending to the score obtained. Score between 0-5: non-emotional eater. Score between 6-10: low emotional eater. Score between 11-20: emotional eater. Score between 21-30: very emotional eater. See table IIa in English and table IIb in Spanish.

The Mindful Eating Questionnaire (MEQ) (24) describes a nonjudgmental awareness of physical and emotional sensations associated with eating. It was validated with adults (range 18 to 80 years), mostly

Table IIb
Cuestionario de Comedor Emocional Garaulet (CCE)

1. ¿La báscula tiene un gran poder sobre ti? ¿Es capaz de cambiar tu estado de humor?			
<input type="checkbox"/> Nunca	<input type="checkbox"/> A veces	<input type="checkbox"/> Generalmente	<input type="checkbox"/> Siempre
2. ¿Tienes antojos por ciertos alimentos específicos?			
<input type="checkbox"/> Nunca	<input type="checkbox"/> A veces	<input type="checkbox"/> Generalmente	<input type="checkbox"/> Siempre
3. ¿Te cuesta parar de comer alimentos dulces, especialmente chocolate?			
<input type="checkbox"/> Nunca	<input type="checkbox"/> A veces	<input type="checkbox"/> Generalmente	<input type="checkbox"/> Siempre
4. ¿Tienes problemas para controlar las cantidades de ciertos alimentos?			
<input type="checkbox"/> Nunca	<input type="checkbox"/> A veces	<input type="checkbox"/> Generalmente	<input type="checkbox"/> Siempre
5. ¿Comes cuando estás estresado, enfadado o aburrido?			
<input type="checkbox"/> Nunca	<input type="checkbox"/> A veces	<input type="checkbox"/> Generalmente	<input type="checkbox"/> Siempre
6. ¿Comes más de tus alimentos favoritos, y con más descontrol, cuando estás solo?			
<input type="checkbox"/> Nunca	<input type="checkbox"/> A veces	<input type="checkbox"/> Generalmente	<input type="checkbox"/> Siempre
7. ¿Te sientes culpable cuando tomas alimentos “prohibidos”, es decir, aquellos que crees que no deberías, como los dulces o snacks?			
<input type="checkbox"/> Nunca	<input type="checkbox"/> A veces	<input type="checkbox"/> Generalmente	<input type="checkbox"/> Siempre
8. Por la noche, cuando llegas cansado de trabajar ¿es cuando más descontrol sientes en tu alimentación?			
<input type="checkbox"/> Nunca	<input type="checkbox"/> A veces	<input type="checkbox"/> Generalmente	<input type="checkbox"/> Siempre
9. Estás a dieta, y por alguna razón comes más de la cuenta, entonces piensas que no vale la pena y ¿comes de forma descontrolada aquellos alimentos que piensas que más te van a engordar?			
<input type="checkbox"/> Nunca	<input type="checkbox"/> A veces	<input type="checkbox"/> Generalmente	<input type="checkbox"/> Siempre
10. ¿Cuántas veces sientes que la comida te controla a ti en vez de tú a ella?			
<input type="checkbox"/> Nunca	<input type="checkbox"/> A veces	<input type="checkbox"/> Generalmente	<input type="checkbox"/> Siempre

Valores: Valor “0” = Nunca; Valor “1” = A veces; Valor “2” = Generalmente; Valor “3” = Siempre.

Para la práctica clínica:

Puntuación entre 0-5: Eres un *Comedor No Emocional*. Tus emociones influyen poco o nada en tu comportamiento alimentario. Ya puedes decir que eres una persona con gran estabilidad en lo que se refiere al comportamiento alimentario, y que seguramente comes cuando fisiológicamente sientes apetito, sin tener en cuenta los factores externos ni tus emociones.

Puntuación entre 6-10: Eres un *Comedor Poco Emocional*. Sigues siendo una persona poco emotiva respecto a tu alimentación. Es raro que soluciones tus problemas o tus nervios con la comida. Sin embargo, ya sientes que ciertos alimentos influyen sobre tu voluntad y que la comida, es algo más que comida.

Puntuación entre 11-20: Eres un *Comedor Emocional*. Tus respuestas indican que en cierta medida tus emociones influyen en tu alimentación. Los sentimientos y el estado de ánimo en algunos momentos de tu vida determinan cuánto y cómo comes. Aún así, aunque eres un comedor emocional, todavía la comida no controla tus acciones sino que sigues siendo tú quien domina tu alimentación.

Puntuación entre 21-30: Está claro que eres un *Comedor Muy Emocional*. Si no te cuidas, la comida llegará a controlar tu vida. Tus sentimientos y emociones girarán constantemente alrededor de tu alimentación y, si no pones los medios, puedes llegar a sufrir algún tipo de desorden en el comportamiento alimentario que te puede llevar a enfermedades como la anorexia y la bulimia.

women (81%), some of them enrolled in different weight loss programs. It has 28 items scored one to four, where four indicated higher mindfulness. Exploratory factor analysis found a solution of following factors: disinhibition (8 items; ex., “When I

eat at “all you can eat” buffets, I tend to overeat”), awareness (7 items; ex., “I notice when there are subtle flavors in the foods I eat”), external cues (6 items; ex., “I recognize when food advertisements make me want to eat”), emotional response (4 items; ex., “When I’m

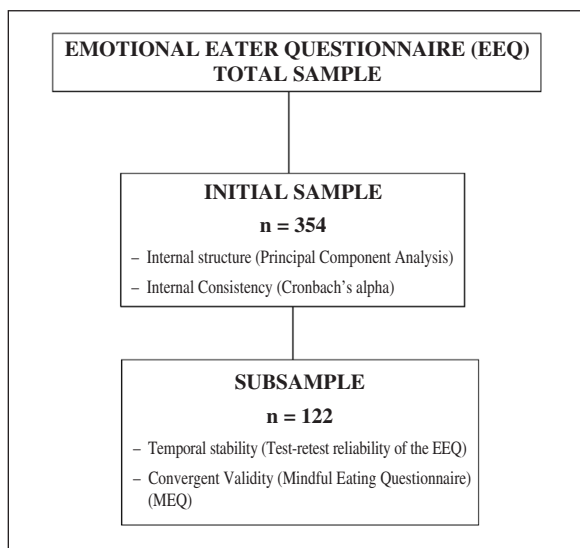


Fig. 1.—The different steps followed for validation of the EEQ.

sad I eat to feel better”), and distraction (3 items; ex., “My thoughts tend to wander while I am eating”). The internal consistency (Cronbach’s alfa) were 0.83, 0.74, 0.70, 0.71 and 0.64 respectively. The total mean MEQ score was 2.92 ± 0.37 , with Chronbach’s alfa of 0.64.

Statistical analysis

Figure 1 represents the different steps followed for the validation. The psychometric assessment was conducted in two distinct phases. First, we studied the *internal structure* of the scale. The replies to the questionnaires were analysed by *principal components analysis* to determine whether the different variables could be grouped in a lower number of factors. A rotation of maximum variance

method (varimax) was used. The number of factors to be extracted from the rotated pattern matrix was determined by factor eigenvalues above 1.0.^{29,30} Items were to be used if their primary factor loading was at least (0.40).^{29,30}

Internal consistency of the questionnaire was assessed by means of Cronbach’s alpha reliability index. Second, temporal stability and convergent validity were analyzed in a subsample. To determine *temporal stability*, test-retest reliability was estimated by means of Pearson’s correlation coefficient. *Convergent validity* between the EEQ and the previously validated MEQ was assessed by means of Kappa’s Index concordance. We considered as satisfactory reliability indicators Cronbach’s alpha and test-retest correlations higher than 0.7.³¹ All the analyses were carried out with SPSS for Windows (version 15.0).

Result

Validity and reliability of EEQ

Internal structure of the EEQ

Table III shows the results of the principal components analysis after giving the questionnaire to the patients of the total sample (n = 354).

Varimax rotation identified three factors that explained 60% of the total variance. The first (which explained 25% of the variance) included questions related with disinhibition, like “Do you feel less control over your diet when you are tired after work at night?” or “Do you eat more of your favourite food and with less control when you are alone?”. The second factor (explaining 18.5% of the variance) included questions related with the type of food for which patients find it most difficult to exercise control; for example, “Do

Table III
Factorial analysis of the Emotional Eater Questionnaire (EEQ)

	Loading of the variables by factor		
	F1	F2	F3
Do you feel less control over your diet when you are tired after work at night?	0.759		
Do you eat more of your favourite food and with less control when you are alone??	0.664		
Do you eat when you are stressed, angry or bored?	0.649		
When you overeat while on a diet, do you give up and start eating without control, particularly food that you think is fattening?	0.610		
How often do you feel that food controls you, rather than you controlling food?	0.559		
Do you have problems controlling the amount of certain types of food you eat?	0.554		
Is it difficult for you to stop eating sweet things, especially chocolate?		0.827	
Do you crave specific foods?		0.815	
Do the weight scales have a great power over you? Can they change your mood?			0.846
Do you feel guilty when eat “forbidden” foods, like sweets or snacks?			0.774
% Total variance	25.6	18.5	16.3

Three factors explained 60.4 % of the total variance. Factors with a % of total variability < 5% are not shown. Factors loading less than 0.25 were not recorded.

you crave specific foods?”. Finally, the factor that least explained the variance (16%) included questions related with patients’ emotions and their relation with the weighing scales and the sense of guilt that eating “forbidden” foods (e.g. sweets or snacks) produces.

Cronbach’s alpha was 0.773 for the “Disinhibition” subscale, 0.656 for the “Type of food” subscale and 0.612 for the “Guilt” subscale.

Test-retest reliability and convergent validity

Lineal correlations demonstrated good agreement between the first and second administrations of the EEQ (*test-retest reliability*) ($r = 0.702$; $P < 0.0001$).

For *testing convergent validity* the EEQ was compared with MEQ. Data showed that the percentage of agreement between the EEQ and the MEQ was around 70% with a Kappa index of 0.40; $p < 0.0001$.

Discussion

The present work develops a compact questionnaire that is easy to administer in clinical practice. It is valid and reliable in evaluating the degree of emotion in relation with food intake in subjects considered overweight or obese.

An often forgotten aspect in treating obesity and one that is often overlooked by nutritionists is the emotional state of patients and the consequences of different behavioural patterns on weight loss and the effectiveness of treatment. From the results of this study and based on the grouping of the questions after principal components analysis, three important aspects can be identified for treating patients. The first factor, or F1, “Disinhibition” groups the questions that refer to discontrol in terms of eating. The second factor (F2) includes questions related with the “type of food” that patients eat most frequently in given situations. Lastly, the third factor (F3) refers to the “sense of guilt” felt by individuals when they look at the weighing scales or the consumption of forbidden foods.

“Disinhibition” (F1) corresponds to a tendency to lose control over one’s eating behaviour and ingest excessively large quantities of food substances in response to a variety of cues and circumstances.³² It has already been described how the inability to control food-related impulses and cravings is determined by the individual character of each person.³³ In this respect, application of the present questionnaire should help detect those patients who have the greatest need to develop self-control in the face of impulses since these are precisely the patients who will have greatest difficulty in achieving weight loss. The questionnaire should also help in the early detection of eating disorders since “fearing loss of control over eating” is one of the feelings that help to discriminate between eating disorder and healthy groups of women.³⁴

The construct of disinhibition, was recently found to have two factors: internal disinhibition (eating in

response to cognitive and emotional cues) and external disinhibition (eating in response to environmental cues).³⁵ In the current questionnaire, the first subscale basically refers to “internal disinhibition” since it considers emotional cues. Indeed, questions are related to disinhibition when “tired”, “alone”, “stressed, angry or bored” Previously, it has been demonstrated that early changes in internal disinhibition that occurred during a weight loss program predicted later weight loss success. This first subscale also shows the highest degree of reliability or *Internal consistency*

The second factor (F2) in our questionnaire explained 18.5% of the variance (table II) and contained questions like *Is it difficult for you to stop eating sweet things, especially chocolate?* And “*Do you crave specific foods?*” and mentions the “types of food” ingested in the above mentioned situations. Foods with a high calorie content, such as ice cream, biscuits and chocolate are closely related with decontrol³⁶ and are used to combat negative emotions^{37,38} since their consumption is associated with the production of endogenous opiates and serotonin,³⁹ both directly involved with the emotions.^{37,40}

Guilt and fear of the scales are variables in the third factor (F3) of the analysis, or third subscale. It has been described how food is converted into a conflict between guilt and pleasure in more emotional individuals.⁴¹ Our findings show this to be the least important factor since it only explains 16% of the variance. Moreover, this dimension presents a reliability index (Cronbach’s alpha) of 0.62, being only represented by two items. Even so, the dimension could be useful in clinical practice since it is related to the early prediction of binge eating disorders.⁴²

When the EEQ was compared with the previously validated Mindful Eater Questionnaire (MEQ), there was a high degree of agreement. For both questionnaires the subscales with the greatest weight in the principal components analysis was “Disinhibition”, although in the MEQ, this subscale mainly refers to “external disinhibition”, which in general is more weakly related with weight loss. In the EEQ, on the other hand, the relevant questions refer to emotional or cognitive situations (internal disinhibition). The main purpose of the EEQ is detect a propensity to obesity and to predict weight loss success in further studies and it was previously demonstrated that of the 5 subscales of the MEQ the largest difference between BMI categories was for the emotional response.²⁴ Another important difference between the EEQ and MEQ is that the latter considers critically important the study of environmental cues, which makes the questionnaire very specific and poorly applicable to people living in the Mediterranean region with its different environment from the North American environment. Lastly, the MEQ includes an important subscale “awareness” which confers further complexity to the questionnaire since our patients found these questions the most difficult to answer (data not shown).

The strengths of the present study are the following: 1) It was specifically designed for obesity; 2) Validation of the questionnaire was performed through prin-

cial component analysis, internal consistency, test-retest reliability and convergent validity with MEQ.

One limitation is that, although the overall reliability of the questionnaire is high, the “Guilt and fear of the scales” subscale presented a relatively low reliability index of around 0.60. Subsequent refinement of the test could include new questions to increase the reliability of these dimensions.

In summary, we have presented a new questionnaire which classifies obese individuals as a function of the relation between food intake and emotions in the clinical practice. Such information will permit personalised treatments to be designed by drawing up early strategies from the very beginning of treatment programmes.

Acknowledgements

This work was supported by the The Spanish Government of Science and Innovation (project BFU2011-24720).

References

- Ogden CL, Yanovski SZ, Carroll MD, Flegal KM. The epidemiology of obesity. *Gastroenterology* 2007; 132: 2087-102.
- Hedley AA, Ogden CL, Johnson CL, Carroll MD, Curtin LR, Flegal KM. Prevalence of overweight and obesity among US children, adolescents, and adults, 1999-2002. *JAMA* 2004; 291: 2847-50.
- Behn A, Ur E. The obesity epidemic and its cardiovascular consequences. *Curr Opin Cardiol* 2006; 21: 353-60.
- Florian SL, de Wit LM, Bouvy PF, Stijnen T, Cuijpers P, Penninx BWJH, Zitman FG. Overweight, Obesity, and Depression: A Systematic Review and Meta-analysis of Longitudinal Studies. *Arch Gen Psychiatry* 2010; 67 (3): 220-29.
- Garipey G, Nitka D, Schmitz N. The association between obesity and anxiety disorders in the population: a systematic review and meta-analysis. *Int J Obes* 2010; 34: 407-19.
- Faith MS, Allison DB, Geliebter A. Emotional eating and obesity: theoretical considerations and practical recommendations. In: Dalton's, Editor. Obesity and weight control: the health professional's guide to understanding and treatment. Gaithersburg, MD: Aspen, 1997, pp. 439-465.
- Cantin I, Dubé L. Attitudinal moderation of correlation between food liking and consumption. *Appetite* 1999; 32: 367-81.
- Paquet C, Arnaud-Mckenzie D, Kergoat MJ, Ferland G, Dubé L. Direct and indirect effects of everyday emotions on food intake of elderly patients in institutions. *J Gerontol A Biol Sci Med Sci* 2003; 58: 153-8.
- Macht M, Gerer J, Ellgring H. Emotions in overweight and normalweight women immediately after eating foods differing in energy. *Physiol Behav* 2003; 80: 367-74.
- Macht M, Simons G. Emotions and eating in everyday life. *Appetite* 2000; 35: 65-71.
- Macht M. Characteristics of eating in anger, fear, sadness and joy. *Appetite* 1999; 33: 129-39.
- Christensen L, Redig C. Effect of meal composition on mood. *Behav Neurosci* 1993; 107: 346-53.
- Wansink B, Cheney MM, Chan N. Exploring comfort food preferences across age and gender. *Physiol Behav* 2003; 79: 739-47.
- Polivy J, Zeitlin SB, Herman CP, Beal AL. Food restriction and binge eating: a study of former prisoners of war. *J Abnorm Psychol* 1994; 103: 409-11.
- Greeno CG, Wing RR. Stress-induced eating. *Psychol Bull* 1994; 115: 444-64.
- Oliver G, Wardle J. Perceived effects of stress on food choice. *Physiol Behav* 1999; 66: 511-55.
- Wardle J, Steptoe A, Oliver G, Lipsey Z. Stress, dietary restraint and food intake. *Journal of Psychosomatic Research* 2000; 48: 195-202.
- Oliver G, Wardle J, Gibson EL. Stress and food choice: a laboratory study. *Psychosomatic Medicine* 2000; 62: 853-865.
- Macht M. How emotions affect eating: A five-way model. *Appetite* 2008; 50: 1-11.
- Cannetti L, Bachar E, Berry EM. Food and Emotion. *Behav Processes* 2002; 60: 157-164.
- Evers C, Stok FM, Ridder DTD. Feeding Your Feelings: Emotion Regulation Strategies and Emotional Eating. *Pers Soc Psychol Bull* 2010; 36 (6): 792-804.
- Stunkard AJ, Messick S. The Three-Factor Eating Questionnaire to measure dietary restraint, disinhibition and hunger. *J Psychosom Res* 1985; 29: 71-83.
- Foster GD, Wadden TA, Swain RM, Stunkard AJ, Platte P, Vogt RA. The eating inventory in obese women: clinical correlates and relationship to weight loss. *Int J Obes Relat Metab Disord* 1999; 23 (1): 106.
- Framson C, Kristal AR, Schenk JM, Littman AJ, Zeliadt S, Benitez D. Development and validation of the Mindful Eating Questionnaire. *J Am Diet Assoc* 2009; 109 (8): 1439-44.
- Ozier AD, Kendrick OW, Knol LL, Leeper JD, Perko M, Burnham J. The Eating and Appraisal Due to Emotions and Stress (EADES) Questionnaire: development and validation. *J Am Diet Assoc* 2007; 107 (4): 619-28.
- Van Strien T, Frijters JER, Bergers GPA, Defares PB. The Dutch Eating Behavior Questionnaire (DEBQ) for assessment of restrained, emotional, and external eating behavior. *Int J Eat Disord* 1986; 5: 295-315.
- Arnou B, Kenardy J, Agras WS. The Emotional Eating Scale: the development of a measure to assess coping with negative affect by eating. *Int J Eat Disord* 1995; 18 (1): 79-90.
- Corbalán MD, Morales EM, Canteras M, Espallardo A, Hernández T, Garaulet M. Effectiveness of cognitive-behavioral therapy based on the mediterranean diet for the treatment of obesity. *Nutrition* 2009; 25 (7-8): 861-9.
- Cattell RB. The scree test for the number of factors. *Multivariate Behavioral Research*. 1966; 1: 140-161.
- Costello AB, Osborne JW. Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation* 2005; 10: 1-9.
- Nunnally JC, Bernstein JJ. Psychometric theory, 3rd ed. New York, McGraw-Hill, Inc., 1994.
- Bellisle F. Assessing various aspects of the motivation to eat that can affect food intake and body weight control. *Encephale* 2009; 35 (2): 182-5.
- Elfhag K, Morey LC. Personality traits and eating behavior in the obese: poor self-control < in emotional and external eating but personality assets in restrained eating. *Eat Behav* 2008; 9: 285-293.
- Abraham SF, Von Lojewski A, Anderson G, Clarke S, Russell J. Feelings: what questions best discriminate women with and without eating disorders? *Eat Weight Disord* 2009; 14 (1): 6-10.
- Butryn ML, Thomas JG, Lowe MR. Reductions in internal disinhibition during weight loss predict better weight loss maintenance. *Obesity* 2009; 17 (5): 1101-3.
- Nguyen-Michel ST, Unger JB, Spruijt-Metz D. Dietary correlates of emotional eating in adolescence. *Appetite* 2007; 49: 494-499.
- Wurtman JJ. Depression and weight gain: the serotonin connection. *J Affect Disord* 1993; 29: 183-92.
- Benton D. Food and mood. In: Mattson MP, Editor. Diet-brain connections: impact on mood, aging and disease. Boston' Kluwer Academic Publishers; 2002, pp. 15-34.
- Patel KA, Schlundt DG. Impact of moods and social context on eating behaviour. *Appetite* 2001; 36: 111-118.
- Fantino M, Hosotte J, Apfelbaum M. An opioid antagonist, naltrexone, reduces preference for sucrose in humans. *Am J Physiol* 1986; 251: r91.
- Narchi I, Walrand S, Boirie Y, Rousset S. Emotions generated by food in elderly french people. *J Nutr Health Aging* 2008; 12: 626-33.
- Alböhn-Kühne C, Rief W. Shame, guilt and social anxiety in obesity with binge-eating disorder. *Psychother Psychosom Med Psychol* 2011; 61 (9-10): 412-7.