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### Screening for Binge Eating Disorder in people with obesity

Mirjam C.M. Wever<sup>a</sup>, Alexandra E. Dingemans<sup>b</sup>, Tiny Geerets<sup>c</sup>, Unna N. Danner<sup>a,\*</sup>

<sup>a</sup> Altrecht Eating Disorders Rintveld, Wenshoek 4, Zeist, 3705 WE, The Netherlands

<sup>b</sup> Rivierduinen Eating Disorders Ursula, P.O.-Box 405, Leiden, 2300 AK, The Netherlands

<sup>c</sup> Geerets & Kuypers, Psychologists Practice for Eating Disorders, Goeman Borgesiuslaan 77, Utrecht, 3515 ET, The Netherlands

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#### ABSTRACT

The Risk factors for Binge Eating Disorder in Overweight (REO) questionnaire is a screening tool for nutritionists to discriminate between individuals with obesity with and without Binge Eating Disorder (BED). The first study tested the discriminative ability of the REO and identified an optimal cut-off value. In the second study this cut-off value was used to identify individuals with and without BED from a sample of individuals with obesity visiting a nutritionist and compared clinical and personality characteristics with a group of individuals officially diagnosed with BED. Results showed that the REO has a sensitivity of 95.1%, specificity of 81.5%, a good internal consistency of  $\alpha = .96$ , and an exploratory factor analysis showed four underlying factors of the REO that explained a total variance of 63.7%. Characteristics of individuals with BED symptoms identified by the REO and those officially diagnosed with BED were comparable and differed from individuals with obesity without BED symptoms. By screening individuals with obesity with the REO those presenting with BED symptoms are more easily identified, and can be referred to psychological treatment facilities for further assessment and appropriate treatment.

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#### Introduction

Binge Eating Disorder (BED) is a psychiatric disorder that is common amongst individuals with obesity. It is characterised by recurrent binge eating episodes defined as eating an unusually large amount of food someone else would not eat in the same period of time and in a similar setting, while experiencing loss of control [1]. The estimated prevalence rate of BED among individuals with obesity seeking weight-reduction treatment is between 13–27% [2]. In general, individuals with obesity and BED tend to seek help for weight loss and not for binge eating [3]. Detection of BED is often difficult due to shame and unawareness [4], and the complaints individuals report to nutritionists and general practitioners (GPs) are very similar in those suffering from obesity with and without BED. The difficulty in discriminating people with obesity with and without an eating disorder (BED as well as BN) is in the discrimination between normal and pathological eating behaviours. However, individuals whose BED is untreated tend to gain substantial weight

with body mass indexes (BMI) in the severe (morbid) obese range, causing serious health problems [5]. In order to shorten the time between onset and treatment, and to prevent aggravation of BED, it is of great importance to identify individuals with obesity and BED in an early stage of disease [5]. Therefore, a short screening tool for primary care is of great importance.

To date, the most frequently used screening tools for binge eating are: the Binge Eating Scale (BES; [6]), the Bulimic Investigation Test Edinburgh (BITE; [7]), the Binge Eating Disorder Test sub factor of the Bulimia Test-Revised (BEDT; [8]), and the Eating Disorder Diagnostic Scale (EDDS; [9]). Prior studies conclude that the BEDT and BES are particular screening tools that merit consideration for use [10,8], based on their high sensitivity and specificity to determine BED psychopathology in a sample with obesity. The BEDT has a sensitivity and specificity of both 100%, and a Cronbach's  $\alpha$  of .96 [8]. However, the BEDT tool has not been extensively studied and the sample size was rather small in the study of Vander Wal et al. [8]. Furthermore, the tool might benefit from a more thorough psychometric validation in future research [8]. In comparison, the BES has a sensitivity of 81.8% and a specificity of 97.8% for a cut-off value of 17, with a Cronbach's  $\alpha$  of .88 [10]. However, Duarte et al. [10] tested the BES in a general population with a mean BMI of 22.9 (SD = 3.79), with 7.2% of the sample that was overweight (BMI < 18.5) only 24.9% of the sample having overweight or obe-

\* Corresponding author at: Altrecht Eating Disorders Rintveld, Altrecht Mental Health Institute, Wenshoek 4, 3705 WE, Zeist, The Netherlands.

E-mail addresses: [m.c.m.wever@fsw.leidenuniv.nl](mailto:m.c.m.wever@fsw.leidenuniv.nl) (M.C.M. Wever), [a.dingemans@rivierduinen.nl](mailto:a.dingemans@rivierduinen.nl) (A.E. Dingemans), [geerets@geerets-kuypers.nl](mailto:geerets@geerets-kuypers.nl) (T. Geerets), [u.danner@altrecht.nl](mailto:u.danner@altrecht.nl) (U.N. Danner).

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sity ( $BMI \geq 25$ ) [10]. In a study of Ricca et al. [11], in which they determined the discriminative ability of the BES in an overweight sample with and without BED, they showed that the BES had a sensitivity of 84.8% and a specificity of 74.6% for a cut-off value of 17, and a sensitivity of 60.6% and a specificity of 95.2% for a cut-off value of 27, which is considerably lower than in the study of Duarte et al. [10,11]. A remarkable limitation of both of these tools was that they were validated in samples that included almost only female participants with BED [10,8]. Stice et al. [12] examined the screening ability of the EDSS for BED as compared to the Eating Disorder Examination (EDE; [13,14]) and found that, despite its high specificity of 96%, the sensitivity of the tool was rather low with 77% and the Cronbach's  $\alpha$  was .89 [12]. A limitation of the study of Stice et al. [12] was the inclusion of only female participants in their sample. In their study about the properties of the BITE screening tool for BED, Ricca et al. [11] show that despite its rather high sensitivity of 91%, the specificity of this tool was the lowest of all the abovementioned screening tools for BED, namely 51.4%, and the Cronbach's  $\alpha$  was lacking in this study [11]. The low specificity of the BITE is probably caused by the fact that the tool was not specifically designed to screen for BED, which hampers specific detection [15].

From experiences in clinical practice and from studies describing factors that contribute to the development and maintenance of BED, it becomes apparent that it is important to incorporate factors into a screening tool for BED that discriminates between those with obesity with and without BED [16–18]. Important factors that appear to be more related to BED than to obesity are (1) preoccupation with weight and appearance, (2) presence of binge eating/disturbed eating pattern, (3) emotional eating, and (4) previous dieting attempts, (5) disturbances in psychosocial functioning, (6) existence of depressive symptoms, (7) diminished self-control, and (8) impulsivity [17]. Individuals with BED are more preoccupied with weight and appearance [19,20], they consume more calories and have more meals per day [21], experience a greater desire to eat after stressful situations [22] and they have a higher number of previous dieting attempts with more weight cycling and instable weight [23] than individuals with obesity without BED. Furthermore, disturbed psychosocial functioning appears to contribute to the maintenance of BED. Two prior studies showed greater disturbance of psychosocial functioning in individuals with obesity with BED than in those without BED [24,25]. Furthermore, close to 61% of the individuals with BED have comorbid mood disorders, which is substantially more than in people with obesity without BED [16], and accumulated evidence indicates that higher levels of depression are also associated to more severe BED psychopathology [26,16]. Therefore, the level of depression is additionally thought to contribute to the development and maintenance of BED. Individuals with BED suffer additionally from diminished self-control, that might contribute to binge eating, despite the negative long-term consequences [18]. A characteristic that is related to self-control, and is also commonly represented in individuals with BED is a strong tendency to behave impulsively [18]. This is defined as the inclination (1) to choose small, immediately available rewards over larger, delayed rewards, and/or (2) to respond rapidly without forethought and/or attention to consequences [27] in comparison to individuals with obesity without BED. To fulfil the need for a tool to screen for BED in a population seeking help for weight loss in primary care facilities, the Risk factor for Binge Eating Disorder in Overweight (REO) questionnaire was developed incorporating all eight factors that appeared to be relevant in discriminating between individuals with obesity with and without BED. The aim of the present study is to investigate the discriminative ability of the REO and consists of study 1 and study 2.

## Study 1

The purpose of study 1 was to test the discriminative ability of the REO, by examining whether the REO could accurately discriminate between individuals with obesity with BED and without BED. We aimed to identify an optimal cut-off value and the corresponding positive predictive value (PPV), negative predictive value (NPV), overall correct classification, sensitivity, and specificity. In addition, both groups were compared on relevant demographic, clinical, and personality characteristics to identify differences between them. Prior to the analyses of study 1, an exploratory factor analysis (EFA) was conducted to determine the factorability of the REO based on the REO data of all participants in study 1 and study 2 (see study 2 for a detailed description of the EFA).

## Method

### Participants

A total of 30 individuals with obesity and BED according to the Eating Disorder Examination (EDE; [13,14]) and 38 individuals with obesity but without BED participated in the first study. The participants were recruited at nutritionist practices throughout The Netherlands, including a private psychologist practice, specialised in the assessment and treatment of eating disorders, located in Utrecht. Participants were assessed with the EDE [13,14] by trained individuals in order to determine whether they suffered from BED psychopathology or from obesity without BED, and BED diagnoses were ascertained by experts in the field of eating disorders. In total, one participant was excluded due to a lack of information about the diagnosis, and 18 participants were excluded because they did not complete one or more questionnaires ( $n = 11$  obese without BED,  $n = 7$  obese with BED). The final sample consisted of 27 (6 males) participants with obesity without BED and 23 (4 males) participants with obesity with BED.

Participants were approached by nutritionists and psychologists and asked to participate in the study. Inclusion criteria were a  $BMI \geq 30 \text{ kg/m}^2$  and age  $\geq 18$  years. At the start of the study age, gender, and self-reported height and weight were collected and participants were asked to fill in the REO as well as three questionnaires about eating pathology (EDE-Q [28]), severity of depressive symptoms (Beck Depression Inventory Short Form; BDI-SF [29]), and self-control (Self-Control Scale; SCS [30]). All participants were thoroughly informed about the research procedure and gave written informed consent. Ethical approval for this study was obtained by the Medical Ethical Committee of the University Medical Centre Utrecht (protocol number: 09-434/C).

### Measures

*The Risk factors for Binge Eating Disorder in Overweight (REO).* [17] (see Supplement 1) is a screening tool that includes factors known to discriminate between individuals with obesity with and without BED, namely preoccupation with weight and appearance, previous dieting attempts, presence of binge eating and/or disturbed eating pattern, disturbance of psychosocial functioning, emotional eating behaviour, existence of depressive symptoms, diminished self-control and impulsivity. The items of the REO were partly inspired by items from various, already existing, questionnaires measuring similar concepts, like the Beck's Depression Inventory (BDI; [31]), EDE-Q [28], BES [6], SCS [30], and the EDSS [9]. Although partly inspired by these questionnaires, the questions were differently phrased and response categories were adapted towards the usability of the REO as a screening tool with a cut-off value based on its total score. The REO consists of 30 items and includes a 5-point Likert scale ranging from 1 (never) to 5 (almost always). The total score is the sum of all items (range 30–150). The internal con-

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