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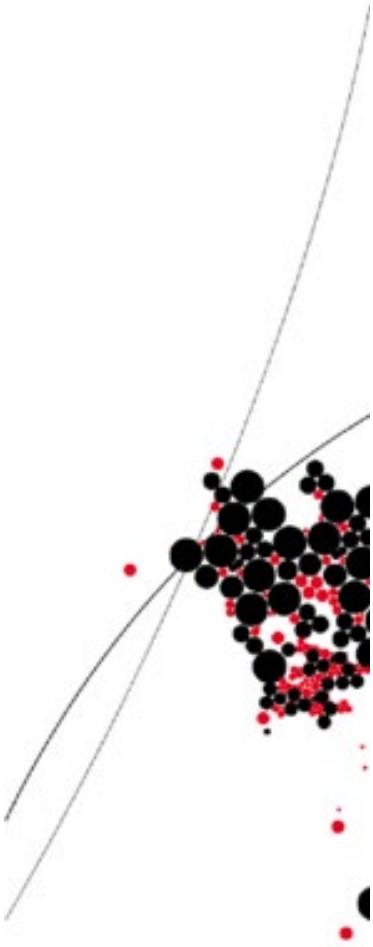

A Tailored Emotion Regulation Approach for Emotional Eaters: An Exploration

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Abstract

Emotional eating is a complex problem fostering obesity and resulting from maladaptive emotion regulation. Until now, attempts to decrease emotional eating with traditional behavioral weight loss interventions have shown little effect as they fail to target the specific needs of emotional eaters. To spark advancements in the development of interventions targeting emotional eating, the current study explored a tailored approach with the aim to positively influence affect (positive and negative) and emotion regulation. Subsequently, this study explored the usefulness of an initial concept for: (1) screening emotional eaters on different emotion regulation needs, and (2) three tailored exercises (i.e., bodyscan, opposite action, and positive reframing exercise).

An embedded mixed-method design was used to evaluate the effects of a two-week online quasi-experiment with three groups. In total, 80 participant with self-proclaimed emotional eating difficulties finished baseline measurements. The study sample was predominantly female (95%), with ages ranging from 18 till 66 (M_{age}=38, *SD*=14.25). Thirty-three participants finished mid-intervention measurements and 15 participants finished post-intervention measurements across the three groups.

In regard to the screening, results showed good internal consistency and promising face validity for two of the three DERS-SF subscales (i.e., awareness and strategies) within a sample of emotional eaters. Regarding the tailored exercises, the quantitative results of two of the three tailored exercises (i.e., bodyscan and positive reframing exercise) were in line with the study expectations and showed a small increase in positive affect and a small decrease in negative affect and overall emotion dysregulation. Although the quantitative results did not reach significance, the qualitative answers of participants have highlighted components of both tailored exercises which were deemed as useful by participants and may have contributed to effects. Overall, the results of the current study provided promising starting points for the further development of screening methods and tailored interventions for emotional eaters.

Recommendations for future studies, include: conducting an additional validation study, controlling for emotional eating scores, improving retention rates, and employing research methods like full factorial designs and ecological momentary assessments to optimize the bodyscan and positive reframing exercise respectively.

Introduction

In 2019, half the Dutch population (50.1%) of 18 years and older were overweight (BMI > 25) and 14.7% were obese (BMI > 30) (CBS, 2019). Early research by Ganley (1989) states that many of overweight and obese individuals (60% or more) struggle with emotional eating behavior; the tendency to overeat in response to negative emotions, like anxiety or irritability (Van Strien et al., 2007, p. 106). Emotional eating can occur regardless of satiation or hunger sensations and thereby can increase an individual's caloric intake and foster obesity (Reinelt, Petermann, Bauer & Bauer, 2020). In turn, obesity increases the risk for other chronic conditions such as arthritis, cancer, diabetes, heart disease, high cholesterol, and hypertension (Malnick & Knobler, 2006). Therefore, there seems to be a need for interventions effectively targeting emotional eating.

Until now, traditional behavioral weight loss interventions have demonstrated only little efficacy in reducing emotional eating (Niemeier et al.; Butryn et al.; Delahanty et al. as cited in Frayn & Knäuper, 2017). This is likely because these interventions hardly give attention to the specific needs of emotional eaters (Harvey-Berino et al., 2010; Manzoni, Pagini, Corti, Molinari & Cestelnuovo, 2011; Hutchesson et al., 2015), like using food for emotion regulation (Frayn & Knäuper, 2017). Emotion regulation is broadly defined as the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensity and duration, in order to accomplish a personal goal (Thompson, 1994). When exploring the concept of emotion regulation, in the context of emotional eating, the act of overeating is commonly assumed to be a maladaptive emotion regulation strategy in itself (e.g., people overeat to regulate negative affect). However, new findings reveal that not the experience of negative affect, but rather a maladaptive regulation of the negative affect is responsible for the overeating (Evers, Stok, & de Ridder, 2010). Accordingly, a longitudinal study among adolescents (Shriver et al., 2019) found that a lack of emotion regulation abilities could be associated with more emotional eating and subsequently could predict obesity. In turn, Eastabrook, Flynn and Hollenstein (2014) stated that emotion regulation abilities depend on an individual's level of emotional awareness. In other words, compared to adolescents with higher emotional awareness, an adolescent with lower emotional awareness is likely to experience greater difficulty in determining and employing effective regulation strategies. Thus, it could be helpful to screen emotional eaters on their level of emotional awareness or emotion regulation

abilities when tailoring future interventions.

In their pursuit to develop a smartphone coach application as a tailored intervention for emotional eaters, Dol, Bode, Velthuijsen, Van Strien and Van Gemert-Pijnen (2020) identified three needs of emotional eaters in the context of experiencing food cravings: (1) a need for insight in how to recognize and differentiate bodily signals associated with either emotions or food cravings, (2) a need for action plans that inspire alternative behavior, when self-control difficulties are experienced during food cravings, and (3) a need for emotion regulation strategies that help to effectively regulate emotions like agitation, stress and anger. However, it has yet to be determined how these specific needs are going to be translated into other aspects of the smartphone coach application, like the screening and tailored exercises. Therefore, the current study added to the research of Dol et al. (2020) by exploring the usefulness of an initial concept for both the screening and the tailored exercises within the context of the proposed smartphone coach application.

For the screening of emotional eaters, the current study explored to what extent the three identified needs may relate to: (1) an individual's level of emotional awareness, and (2) an individual's emotion regulation ability. Subsequently, the measurement instrument, either measuring an individual's emotional awareness or emotion regulation ability, was selected for screening emotional eaters in context of a smartphone coach application. Then, to develop a concept for the tailored exercises, three exercises were selected from the current body of literature based on the degree to which they seemed to accommodate the three needs of emotional eaters identified by Dol et al. (2020). After elaboration on the development of both concepts, the current study explored the usefulness of the screening by evaluating the reliability (i.e., internal consistency) and face validity as well as the effectiveness of the tailored exercises by conducting an embedded mixed-method study to evaluate the effects of a two-week online quasi-experiment.

Screening emotional eaters on individual levels of emotional awareness

As previously indicated, emotional awareness precedes the employment of effective emotion regulation strategies (Gottman et al.; Mayer et al.; Izard et al. as cited in Eastabrook et al., 2014; Subic-Wrana et al., 2014), and maladaptive emotion regulation in turn is associated with emotional eating (Shriver et al., 2019; Evers, Stok & de Ridder, 2010; Vandewalle, Moens & Braet as cited in Reinelt et al., 2020). Therefore, it seems worthwhile to explore if the needs of

emotional eaters, identified by Dol et al. (2020), refer to certain levels of emotional awareness. Subsequently, it can be determined if screening emotional eaters on these levels of emotional awareness can be proposed in the context of a smartphone coach application.

Broadly defined, emotional awareness is the ability to be consciously aware of one's feelings. According to the Levels of Emotional Awareness (LEA) Theory (Lane & Schwartz as cited in Subic-Wrana et al., 2014), conscious emotional awareness is achieved through a normative cognitive-emotional development from: expressing emotions as bodily sensation (level 1), to expressing emotions as action tendencies or general positive or negative arousal (level 2), to consciously expressing one emotion at one time (level 3), then consciously expressing multiply emotions at one time (level 4), and finally to being consciously aware of different emotions in oneself and others (level 5). Between these different levels of emotional awareness, a distinction can be made between implicit levels of emotional awareness, in which affective arousal is expressed as bodily sensations (level 1) or action tendencies (level 2), and explicit levels of emotional awareness (level 3-5), in which emotions are expressed consciously and verbally (Lane et al. as cited by Subic-Wrana et al., 2014).

When placing the needs of emotional eaters in the context of the LEA Theory, the needs can be linked to the different levels of implicit and explicit emotional awareness. First, one group of participants in the study of Dol et al. (2020) referred to a need for insights into bodily sensations associated with either their emotions or food cravings. Subsequently, this need relates to the first level of implicit emotional awareness as emotions are expressed as bodily sensations. Secondly, a group of participants expressed the need for action plans to help with their action urges or self-control difficulties when experiencing food cravings. This need refers to the second implicit level of emotional awareness in which emotional arousal is expressed as action tendencies. Lastly, one group expressed the need for emotion regulation strategies to help with regulating specific emotions, like anger. This need can be linked to the higher levels of emotional awareness (level 3-5) as participants explicitly referred to difficulties with regulating specific emotions.

Thus, as the needs of emotional eaters can refer to different levels of emotional awareness, screening emotional eaters on their individual level of emotional awareness could be a potential pathway in the context of a smartphone coach application. The instrument used to differentiate between individual levels of emotional awareness, is the Levels of Emotional

Awareness Scale (LEAS) (Lane, Quinlan, Schwartz, Walker & Zeilin, as cited in Subic-Wrana et al., 2014). The LEAS is a performance test based on the LEA Theory, and consists of 20 emotion-provoking vignettes. Per vignette, subjects are asked to write about how they themselves, and the other person involved, would feel in the vignette. Scores are then comprised by linking affect-related words to the specific levels of emotional awareness. Although, the reliability and construct validity of the LEAS has been proven (Lane, Sechrest, Riedel, Weldon & Kaszniak, as cited in Subic-Wrana et al., 2014), the short version of the LEAS (10-vignettes) can still take up to one and a half hours to complete (Maroti et al. as cited in Maroti, Lilliengren, & Bileviciute-Ljungar, 2018) and at least 15-20 minutes to rate the answers. Although computerized versions have been developed to score the LEAS (Barchard et al. as cited in Maroti et al., 2018), there is still a need for an easy, reliable and valid way to measure emotional awareness. As instruments used in clinical trials should be practical, short, and easy to answer and administer (Doward, Meads & Thorsen, 2004), the LEAS was considered too time consuming and burdensome for both participants and researchers to use as a screening instrument in the current study. Thus, other screening possibilities need to be explored.

Screening emotional eaters on emotion regulation difficulties

An alternative to screening emotional eaters on their level of emotional awareness, could be to screen them on their emotion regulation abilities. As emotional awareness precedes the employment of effective emotion regulation strategies (Gottman et al.; Mayer et al.; Izard et al. as cited in Eastabrook et al., 2014; Subic-Wrana et al., 2014), screening individuals on their emotion regulation abilities could indirectly indicate to the level of emotional awareness an individual is capable of. Thus, it is worthwhile to explore if the needs of emotional eaters, identified by Dol et al. (2020), may relate to an individual's emotion regulation abilities and subsequently determine if screening emotional eaters on these abilities (or subsequent difficulties) could be proposed in the context of a smartphone coach application.

The most commonly used instrument to measure difficulties in emotion regulation (i.e., emotion dysregulation) is the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). The DERS consists of 36 items distributed across six subscales measuring: (1) difficulties with accepting negative emotions or responding negatively to them (nonacceptance subscale), (2) difficulties with concentrating on and achieving a task when experiencing negative emotions (goals subscale), (3) difficulties with understanding and knowing the specific emotion one is

experiencing (clarity subscale), (4) difficulties with being aware of or attending to one's own emotional responses (awareness subscale), (5) difficulties with controlling impulsive behavior when experiencing negative emotions (impulse subscale), and (6) an individual's belief that there are limited options to effectively regulate one's emotions once upset (strategies subscale).

When placing the three needs of emotional eaters in the context of the DERS subscales, the needs seem to relate best to three of the six subscales. First, the need for insight in bodily sensations to be able to recognize sensations associated with either emotions or food cravings (Dol et al., 2020), seems to reflect difficulties with being aware of or paying attention to emotional responses. Subsequently, it was expected that this need relates to items of the awareness subscale (*i.e., "I pay attention to how I feel."; "I care about what I am feeling."*; *"When I'm upset, I acknowledge my emotions."*). Secondly, the need for action plans that inspire alternative behavior when self-control difficulties are experienced, seems to reflect difficulties with inhibiting impulsive behavioral responses. Therefore, it was expected that this need relates to items of the impulse subscale (*i.e., "When I'm upset, I become out of control."; "When I'm upset, I have difficulty controlling my behaviors."; "When I'm upset, I lose control over my behaviors.")*. Finally, the need for emotion regulation strategies in order to effectively regulate negative emotions (e.g., agitation, stress, and anger) relates to difficulties with effectively regulating one's emotions once upset. It was expected that this need relates to items of the strategies subscale (*i.e., "When I'm upset, I believe that I'll end up feeling very depressed."; "When I'm upset, I believe that there is nothing I can do to make myself feel better."; "When I'm upset, it takes me a long time to feel better."*). Thus, as three of the six subscales of the DERS (i.e., awareness, impulse, and strategies) seem to reflect the three identified needs of emotional eaters, it is worthwhile to explore if the DERS can be used as an instrument to screen emotional eaters in the context of a smartphone coach application.

The DERS, as a measurement instrument, has shown high internal consistency, reliability, and construct validity in various samples, including: undergraduates, adolescents, and both clinical outpatients and inpatients (Gratz & Roemer; Gratz & Tull; Neumann et al.; Osborne et al.; Fowler et al. as cited in Skutch, Wang, Buqo, Haynos & Papa, 2019). Furthermore, it is an ideal measure to use in studies that require multiple assessment points or in treatment outcome research, as it has been found to be sensitive to change over time (Wilks, Korslund, Harned & Linehan, 2016). DERS scores have been found to change in response to various treatments

targeting emotion regulation, like emotion regulation group therapy (Gratz, Tull & Levy, 2013; Gratz, Bardeen, Levy, Dixon-Gordon & Tull, 2015) and dialectical behavior therapy (Ben-Porath, Federici, Wisniewski & Warren, 2014). However, a briefer version is favored as it reduces participant burden and potentially increases the validity as the response quality increases due to shorter data collection time (Galesic & Bosnjak as cited in Skutch et al., 2019)

Currently, three brief versions of the Difficulties in Emotion Regulation Scale exist: the DERS-16 (Bjureberg et al. 2016), DERS-SF (Kaufman et al. 2015), and DERS-18 (Victor & Klonsky, 2016). All three versions have demonstrated excellent reliability and validity comparable to the original DERS (Bjureberg et al. 2016; Kaufman et al. 2015; Victor and Klonsky 2016). Skutch et al. (2019) compared the three brief versions and did not identify one of them as superior to the others. However, the retention of all subscales of the original DERS is suggested, which is the case in two of the versions (i.e., DERS-SF and DERS-18). As the DERS-SF has been used longer and cited more often, the current study explored the usefulness of the DERS-SF, in particular three of its six subscales (i.e., awareness, impulse, and strategies), in regard to screening emotional eaters in the context of a smartphone coach application.

Tailored exercises

As previously indicated, three exercises were selected from the current body of literature to develop concepts for three tailored exercises that could potentially be included in the proposed coach application of Dol et al. (2020) as they seem to tailor to the needs of emotional eaters. The following paragraphs elaborate on the exercises that were used in the current study.

Firstly, to tailor to the first need (i.e., the need for insight in bodily sensations), an observational exercise described in the study protocol of Brevers et al. (2017) can be used. The observational exercise is aimed at promoting intuitive eating (i.e., attuned or mindful eating) in obese patients, by encouraging them to become aware of hunger and inner body sensations that might emerge from their emotions (Bacon & Aphramor; Bombak as cited in Brevers et al., 2017). Participants are asked to indicate (before eating): (1) the intensity of hunger (on a 10-point scale), (2) activated or deactivated bodily regions (13 in total), and (3) the most relevant affect state. Particularly step two, could be of interest in the current study as it is focused on being aware of sensations in different regions of the body. As the current study focused initially on exploring the effect of the tailored exercises regardless of the context (e.g., food cravings or eating), the first step of the observational exercise was excluded. Furthermore, according to the

previously described Levels of Emotional Awareness Theory, individuals who refer to bodily sensations when expressing their emotions (level 1) have difficulties with explicitly stating the emotion that they are feeling (level 3). This difficulty was kept in mind if step three was added to the observational exercise within the current study.

Secondly, to tailor to the second need of emotional eaters (i.e., the need for action plans that inspire alternative behavior, when self-control difficulties are experienced), a skills exercise from the dialectical behavioral therapy (DBT) called "Opposite Action" (OA) can be used. This exercise is focused on helping individuals with identifying action urges that are associated with their emotions (e.g., anxiety motivates people to avoid the situation) and subsequently invites them to act the opposite (e.g., approach the situation) (Ben-Porath et al., 2014). Findings of Ben-Porath et al. (2014) suggested that repeated practice of the OA skill yields improvements in regard to impulsivity. A pilot study of Rizvi, Dimeff, Skutch, Carroll and Linehan (2011) showed similar results. Over the course of a two-week trial among individuals with Borderline Personality Disorder and Substance Use Disorder, repeated practice with an OA exercise resulted in a significant decrease in both emotional intensity and urges to use drugs after each session. During each session participants were asked to indicate: (1) the emotion that they were experiencing, (2) the action urge, and (3) an opposite action from a list of emotion-specific options. In the current study the use of an opposite action exercise similar to the exercise developed by Rizvi et al. (2011) was proposed.

Lastly, to tailor to the third need of emotional eaters (i.e., the need for emotion regulation strategies to effectively regulate emotions like agitation, stress, & anger), a cognitive reappraisal exercise can be used. Cognitive reappraisal can be defined as reinterpreting the meaning of emotional stimuli and with that changing the emotional response (Ray et al. as cited in Ranney, Bruehlman-Senecal & Ayduk, 2016). Findings in both laboratory and naturalistic settings, show that cognitive reappraisal yields improvements in self-reported emotional states, such as anger (Ray, Wilhelm & Gross, 2008), disgust (Gallo, McCulloch & Gollwitzer, 2012), anxiety (DiBartolo, Frost, Dixon & Almodovar, 2001; Zhang, Guo, Zhang & Luo, 2013) and perceived stress (Denny & Ochsner, 2014). When comparing three different cognitive reappraisal techniques (a. positive reframing, b. self-distancing, and c. temporal distancing) regarding their effect on well-being, all three techniques yielded similar effects (Ranney et al., 2016). Where the positive reframing technique required individuals to find the positive aspects in the negative or

stressful event, the self-distancing technique required individuals to visualize themselves in the negative or stressful situation from a third-person perspective and the temporal distancing technique required individuals to look back at the negative or stressful event one, five and ten years from now. The latter two techniques (i.e., self-distancing and temporal distancing) can be seen as more difficult as they require a greater perspective shift than the positive reframing technique (Ranney et al., 2016). Thus, in the current study the use of the positive reframing exercise was proposed.

This study

An embedded mixed-method study, with a quantitative core component and a qualitative supplementary component, was conducted to evaluate the effects of a two-week online quasi-experiment exploring: (1) the usefulness of the proposed screening, and (2) the effectiveness of the three tailored exercises on affect (positive & negative) and emotion dysregulation. No research has yet been done to examine which specific DERS-SF subscales could be useful to screen emotional eaters on emotion regulation needs. To answer this gap in current literature, this research aimed to explore the usefulness of three of the six subscales of the DERS-SF (i.e., awareness, impulse, and strategies) to screen emotional eaters on emotion regulation difficulties. The usefulness was determined by exploring the reliability (i.e., internal consistency) and face validity. The following research questions were answered:

Research question 1: "To what extent are the DERS-SF subscales (awareness, impulse, & strategies) able to detect reliable and valid differences in emotion regulation difficulties among emotional eaters?"

Research question 1a: "To what extent do the DERS-SF and its individual subscales show good internal consistency within a sample of emotional eaters?"

Research question 1b: "Which DERS-SF subscale do emotional eaters rank as best reflecting their emotion regulation difficulties, and to what extent are there significant differences between emotional eaters?"

Secondly, traditional behavioral weight loss interventions seem to be only little effective in reducing emotional eating. This was supported by literature that suggests that these interventions hardly tailor to the specific needs of emotional eaters. Because of this reasoning, this study evaluated the usefulness of three tailored exercises. The usefulness was determined by exploring

if the tailored exercises increase positive affect, decrease negative affect, and decrease emotion dysregulation. Furthermore, the opinions of emotional eaters about the tailored exercises were explored to gain a more comprehensive understanding of how the exercises could contribute to found effects The following research questions were answered:

Research question 2: “To what extent and in what way do opinions of emotional eaters about three tailored exercises, contribute to a more comprehensive understanding of the hypothesized changes in affect and emotion dysregulation after a two-week online training protocol?”

Research question 2a: What is the effect of the three tailored exercises on positive affect, negative affect and emotion dysregulation?

Research question 2b: To what extent and in what way do emotional eaters consider the three tailored exercises as helpful?

Method

Design

This study used an embedded mixed-method design to evaluate the effects of a two-week online quasi-experiment with three groups. Quantitative data was collected to explore: (1) the reliability (i.e., internal consistency) and face validity of the proposed screening with the DERS-SF subscales (i.e., awareness, impulse, and strategies), and (2) the effects of three tailored exercises on affect (negative and positive) and emotion dysregulation. To supplement the latter, qualitative data was collected simultaneously in order to gain a more comprehensive understanding of the effects.

Participants in the current study were assigned to one of three groups based on their scores on the three DERS-SF subscales (i.e., awareness, impulse and strategies) at baseline (T0). Participants who scored high on the awareness subscale (score $\geq$ 9) were assigned to a group with participants that received the bodyscan exercise. Participants who scored low on the awareness subscale (score < 9) AND high on the impulse subscale (score $\geq$ 9) were assigned to a group with participants that received the opposite action exercise. Lastly, participants who scored low on both the awareness AND impulse subscales (scores < 9) AND high on the strategies subscale (score $\geq$ 9), OR scored low on all subscales (all scores < 9) were assigned to a group with participants that received the positive reframing exercise. The group receiving the bodyscan exercise was called group A. The group that received the opposite action exercise was called group B and the group that received the positive reframing exercise was called group C.

Measurements were conducted at baseline (T0), mid-intervention (T1), and post-intervention (T2). A schematic overview of the design is provided in figure 1.

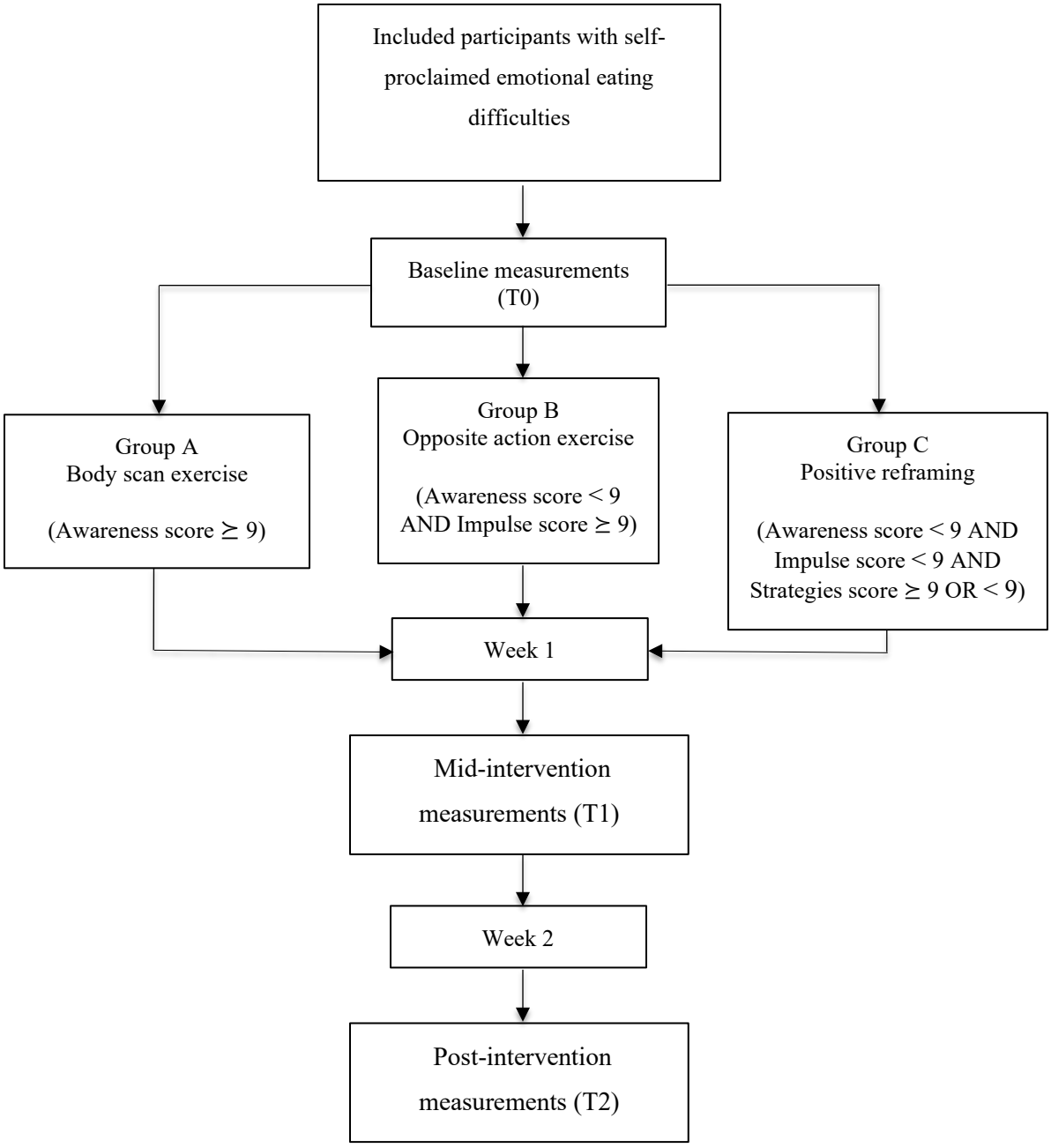


Figure 1. Schematic overview of study design

Procedure

This study was approved by the BMS Ethics Committee of the University of Twente (file number: 200091).

Before participation, participants were informed about the research aim and asked if they wanted to take part in the current study. If so, an informed consent was signed (appendix A). Then, after filling out the demographic questions (appendix B), the short form of the Positive and Negative Affect Schedule (PANAS-SF), the Emotional Eating subscale of the Dutch Eating Behavior Questionnaire (DEBQ-E), and the short form of the Difficulties with Emotion Regulation Scale (DERS-SF) were completed. Furthermore, participants were asked to rank-order the three DERS subscales, based on which subscale best reflected their emotion regulation difficulties (ranging from 1 "most apparent" to 3 "least apparent"). Based on their scores on the awareness, impulse and strategies subscale of the DERS-SF, participants were assigned one of the three tailored exercises. Participants were asked to practice (+/- 15 minutes) every other day with the assigned exercise for two weeks.

After one week, participants were asked to fill out the mid-intervention questionnaires (PANAS-SF and DERS-SF). After the two-week intervention period, participants were asked to fill out the PANAS-SF and DERS-SF again and also to answer five open questions about their experience with the assigned exercise (i.e., "Which aspects of the exercises did you find useful?", "Which aspect of the exercise did you not find useful?", "Which (new) insights or skills did u acquire by practicing with the exercise?", "How would you adapt the exercise so it would be able to help you better?" and "Is there anything else you would like to share with us?"). A schematic overview of the used questionnaires at different measurement times is provided in table 1.

Table 1. *Overview of used questionnaires at different measurement times*

T0 (pre-intervention)	**T1 (mid-intervention)**	**T2 (post-intervention)**
Informed consent	-	-
Demographic questions	-	-
PANAS-SF	PANAS-SF	PANAS-SF
DEBQ-E	-	-
DERS-SF	DERS-SF	DERS-SF
Rank-order question	-	-
-	-	Subjective questions about experience

Interventions

The current study included three interventions (i.e., tailored exercises) targeted at improving emotion regulation skills. The first tailored exercise, called the *bodyscan exercise* (appendix C), required participants to indicate per bodily region (13 in total) whether it felt pleasant (including neutral) or unpleasant based on a topographical self-report method (Nummenmaa, Glerean, Hari, & Hietanen, 2013). Subsequently, participants were challenged to think about what could be causing the pleasant/unpleasant sensations in their body, with answer options ranging from: (1) bodily/physiological processes (e.g., hunger, thirst, muscle soreness, disease symptoms), (2) an emotion, or (3) other. A text entry box was provided for each answer option to give participants room to answer the question more freely.

The second intervention, called *opposite action exercise* (appendix D), required participants to describe a situation on which they wanted to reflect. Next, participants were asked to describe their behavior in that particular situation. Then, participants were challenged to think about: (1) the emotion that could have motivated their behavior, and (2) an opposite action that could help regulate the emotion. Lastly, participants were encouraged to apply the opposite action in practice and observe changes in their emotional experience. The exercise was accompanied by an example list of emotions, emotion-specific action urges and opposite actions to help participants during the exercise. The list was drafted using the DBT Skills Training

Manual (Emotion Regulation Handout 11) of Linehan (2015) and the Emotions Motivate Actions Information Handout of Psychology Tools (2020). The latter was also used to design a short introductory exercise, which participants could opt to do before the opposite action exercise, to practice with linking action urges to specific emotions.

The third intervention, called *positive reframing* (appendix E), required participants to describe an unpleasant event on which they wanted to reflect. Furthermore, participants were asked to describe their thoughts and feelings evoked by the unpleasant event. After that, participants were challenged to: (1) think of other possible explanation(s) for what happened, (2) find positive aspects in the unpleasant event, (3) find things they could learn from the unpleasant event, and (4) describe how this event might be helpful for them.

Materials

Demographics

The demographic data contained questions about participant's gender, marital status, living situation, highest level of education, employment status, age, length, weight, and number of consultations with dietitians.

Body mass index

Body mass index (BMI) was calculated by dividing body weight (in kilogram) by height (in meters) squared.

$$BMI = (\text{weight(kg)})/(\text{height(m)2})$$

Emotional eating behavior

Emotional eating behavior was assessed using the Emotional Eating scale of the Dutch Eating Behavior Questionnaire (DEBQ-E) (Van Strien, Frijters, Bergers & Defares, 1986), added as appendix F. The scale contains 13 items about emotional eating with four items about dealing with eating in response to diffuse emotion and nine items about dealing with eating in response to clearly labeled emotions. Each item was rated on a 5-point Likert scale ranging from 1 "never" to 5 "very often. Scores on the DEBQ-E were comprised by dividing the sum of the items scored by the total number of items (Van Strien et al., 1986). The emotional eating scale

showed good internal consistency in both the original validation (α = .94) and in the current study (α = .86).

Positive and negative affect

Positive and negative affect were measured using the International Positive and Negative Affect Schedule Short Form (I-PANAS-SF), see appendix G (Thomson, 2007). It is a 10-item questionnaire that consists of five positive and five negative emotions. Each emotion was rated on a five-point Likert scale ranging from 1 "very slightly" to 5 "very much". The positive emotions are: alert, inspired, determined, attentive, and active. The negative emotions are: upset, hostile, ashamed, nervous, and afraid. The Dutch translations of these emotions were derived from a Dutch version (Peeters, Ponds, & Vermeeren, 1996) of the original 20-item PANAS (Watson, Clark & Tellegen, 1988). Previous research showed that the I-PANAS-SF had acceptable psychometric properties (Thompson, 2007). Similarly, the Dutch version of the PANAS showed sufficient validity and reliability (Peeters et al., 1996). In the current study, the internal consistency of the positive affect scale was α = .77 at T0 (n=80), α = .68 at T1 (n=26), and α = .62 at T2 (n=15). For the negative affect scale, the internal consistency was α = .63 at T0 (n=80), α = .69 at T1 (n=26), and α = .82 at T2 (n=15).

Emotion regulation difficulties

Emotion regulation difficulties were measured using the Difficulties in Emotion Regulation Scale Short Form (DERS-SF) (Kaufman et al., 2015), see appendix H. This scale contains 18 items and measures emotion regulation difficulties (i.e., emotion dysregulation) across six dimensions: non-acceptance, goals, clarity, awareness, impulse, and strategies. Items were rated on a five-point Likert scale ranging from 1 "almost never" to 5 "almost always". The DERS-SF showed excellent psychometric properties in its original validation. Cronbach's alpha coefficients for all six DERS-SF subscales ranged from .79 to .91 (Kaufman et al., 2015).

Participants

Using convenience sampling 80 participants with self-proclaimed emotional eating difficulties have been recruited. Participants were recruited through sending out an invitation for participation (appendix I): (1) to clients of two dietician practices with trajectories for people with overweight or obesity (CLEZ and DieetZorg), (2) to clients of a polyclinic for dietetics (Nij Smellinghe); (3) to participants from the study of Dol et al. (2020), who indicated to be willing to participate in follow-up research; (4) through an online newsletter from the Dutch Patient Association for Eating Disorders (WEET), and (5) on various social media outlets (i.e., a private Facebook group "Emotie eten"; an online forum for people with eating difficulties "Proud2Bme"; story mentioning's on the Instagram Pages of six Dutch eating coaches). Only on a voluntary basis and after signing an online informed consent (appendix A) an individual could participate. The following inclusion criteria were used: 1) age of 18 years or older; 2) experience of emotional eating difficulties; 3) sufficient knowledge of the Dutch language.

Table 2 shows the demographic characteristics of the study sample divided in the group that only received the body scan exercise (group A, n=41), the group that only received the opposite action exercise (group B, n=5), the group that only received the positive reframing exercise (group C, n=34), and total (n=80). The study sample was predominantly female (95.0%), with ages ranging from 18 till 66 (M_{age}=38, *SD*=14.25). In contrast to group A and C, participants in group B reported a higher mean age of 50 years. Most participants were employed, either part-time (37.5%) or fulltime (22.5%), followed by 17.5 percent of the sample being a student. In line with other studies (Kemp, Bui & Grier, 2013; Annesi, Mareno & McEwen, 2016; Barrada, Van Strien & Cebolla, 2016), the majority of the sample (68.8%) reported having received higher levels of education. Lastly, almost half of the participants in the current sample were obese (48.8%), followed by 21.3% with overweight and 30.0% of participants with a normal weight. Surprisingly, 43.8% of the sample have never had a consultation with a dietician before.

Table 2. *Demographic characteristics per group*

Characteristics	**Group A, n= 41 (51.3%)**	**Group B, n= 5 (6.3%)**	**Group C, n= 34 (42.5%)**	**Total, n= 80 (100%)**
Mean age (range)	37 (18 - 63)	50 (26 - 61)	38 (19 - 66)	38 (18 - 66)
Gender				
Woman	39 (95.1%)	5 (100.0%)	32 (94.1%)	76 (95.0%)
Men	1 (2.4%)	0	1 (2.9%)	2 (2.5%)
Other	1 (2.4%)	0	1 (2.9%)	2 (1.3%)
Marital status				
Single	23 (56.1%)	2 (40.0%)	23 (67.6%)	48 (60.0%)
Married	15 (36.6%)	3 (60.0%)	8 (23.5%)	26 (32.5%)
Widowed/divorced	3 (7.3%)	0	3 (8.8%)	6 (7.5%)
Living situation				
With partner/spouse (+ child(ren))	22 (53.7%)	5 (100.0%)	15 (44.1%)	42 (52.5%)
Alone (+ child(ren))	12 (29.3%)	0	9 (26.5%)	21 (26.3%)
Other	7 (17.1%)	0	10 (29.4%)	17 (21.3%)
Highest level of education				
1-3*	1 (2.4%)	0	0	1 (1.3%)
4-6*	11 (26.8%)	2 (40.0%)	10 (29.4%)	23 (28.8%)
7-8*	29 (70.7%)	3 (60.0%)	23 (67.6%)	55 (68.8%)
Employment status				
Part time (<35 hr/week)	13 (31.7%)	1 (20.0%)	16 (47.1%)	30 (37.5%)
Full time (≥35 hr/week)	12 (29.3%)	1 (20.0%)	5 (14.7%)	18 (22.5%)
Student	5 (12.2%)	1 (20.0%)	8 (23.5%)	14 (17.5%)
Unemployed	4 (9.8%)	1 (20.0%)	0	5 (6.3%)
Other	7 (17.1%)	1 (20.0%)	5 (14.7%)	13 (16.3%)

BMI				
<25	11 (26.8%)	2 (40.0%)	11 (32.4%)	24 (30.0%)
25-30	6 (14.6%)	2 (40.0%)	9 (26.5%)	17 (21.3%)
>30	24 (58.5%)	1 (20.0%)	14 (41.2%)	39 (48.8%)
Number of consultations with dietician				
None	13 (31.7%)	3 (60.0%)	19 (55.9%)	35 (43.8%)
1-10	14 (34.1%)	1 (20.0%)	7 (20.6%)	22 (27.5%)
>10	14 (34.1%)	1 (20.0%)	8 (23.5%)	23 (28.7%)

Note. *1-3: lower education; 4-6: intermediate education; 7-8: higher education

1. Geen opleiding, 2. Basisonderwijs, 3. Lager beroepsonderwijs, 4. MAVO, (M)ULO, 3-jarige HBS, VMBO, 5. Middelbaar beroepsonderwijs, 6. 5-jarige HBS, HAVO, MMS, atheneum, gymnasium, 7. Hoger beroepsonderwijs, 8. Wetenschappelijk onderwijs

Analysis

Research question 1: "To what extent are the DERS-SF subscales (awareness, impulse, & strategies) able to detect reliable and valid differences in emotion regulation difficulties among emotional eaters?"

This first research question was answered through its subquestions (1a & 1b). See below.

Research question 1a: "To what extent do the DERS-SF and its individual subscales show good internal consistency within a sample of emotional eaters?"

To explore the internal-consistency of the DERS-SF and its subscales for a sample of emotional eaters, the Cronbach's alpha and Guttman's Lambda-2 were calculated at baseline (T0), mid-intervention (T1) and post-intervention (T2).

Research question 1b: "Which DERS-SF subscale do emotional eaters rank as best reflecting their emotion regulation difficulties, and to what extent are there significant differences between emotional eaters?"

This research question explored the face validity of the DERS-SF when being used for screening emotional eaters on differences in emotion regulation difficulties. The face validity of the screening was considered high if participants' subscale scores, determining the allocation across the three intervention groups, were in accordance with their highest ranked subscale choice. Subsequently, it was assumed that: (1) group A (receiving the bodyscan exercise) was more likely to select the awareness subscale as best reflecting their emotion regulation difficulties and less likely to select the other two subscales; (2) group B (receiving the opposite action exercise) was most likely to select the impulse, and (3) group C (receiving the positive reframing exercise) was most likely to select the strategies subscale compared to the other two subscales. To study these expectations, the current study explored if there was a significant difference in the distribution of highest ranked subscale choices between the three intervention groups. Thereafter, a chi-square test of homogeneity was computed with the following hypotheses:

H0: "*The distribution of most relevant subscale choice is the same across the three intervention groups."*

H1: *"The distribution of most relevant subscale choice is different across the three intervention groups."*

If H0 can be rejected (α <.05), the standardized residuals were examined to explore underlying patterns in the distribution of subscale choices across the three intervention groups.

Research question 2: "To what extent and in what way do opinions of emotional eaters about the three tailored exercises, contribute to a more comprehensive understanding of changes in affect and emotion dysregulation after a two-week online training protocol?"
This second research question was answered through one quantitative (2a) and one qualitative (2b) subquestion. See below.

Research question 2a: "What is the effect of the three tailored exercises on positive affect, negative affect and emotion dysregulation?"
To explore the effect of the three tailored exercises on emotion dysregulation, measured with the DERS-SF, total and subscale were calculated at baseline (T0), mid-intervention (T1), and post-intervention (T2) per intervention group. Subsequently, the scores were compared between T0, T1 and T2 using a paired t-test. In case of small intervention groups and not normally distributed data, a Wilcoxon signed-rank test was used instead of a paired t-test. As the three interventions were tailored to specific needs of emotional eaters, in line with three of six emotion regulation difficulties (i.e., awareness, impulse, and strategies), specific assumptions were made. First, it was expected that total emotion dysregulation scores would significantly decrease in all three intervention groups. Furthermore, for group A it was expected that awareness subscales scores would significantly decrease, for group B the impulse subscale scores, and for group C the strategies subscale scores.

To explore the effect of the three tailored exercises on positive affect, measured by the I-PANAS-SF, summed positive affect scores were calculated at baseline (T0), mid-intervention (T1), and post-intervention (T2) for each intervention group. The summed positive affect scores were calculated by adding all five positive emotion scores from all participants in the respective intervention group and dividing this score by five and the number of participants in the group. Subsequently, a paired t-test was used to compare the scores between T0, T1, and T2. In the same manner the effect on negative affect was explored. As the three interventions target specific

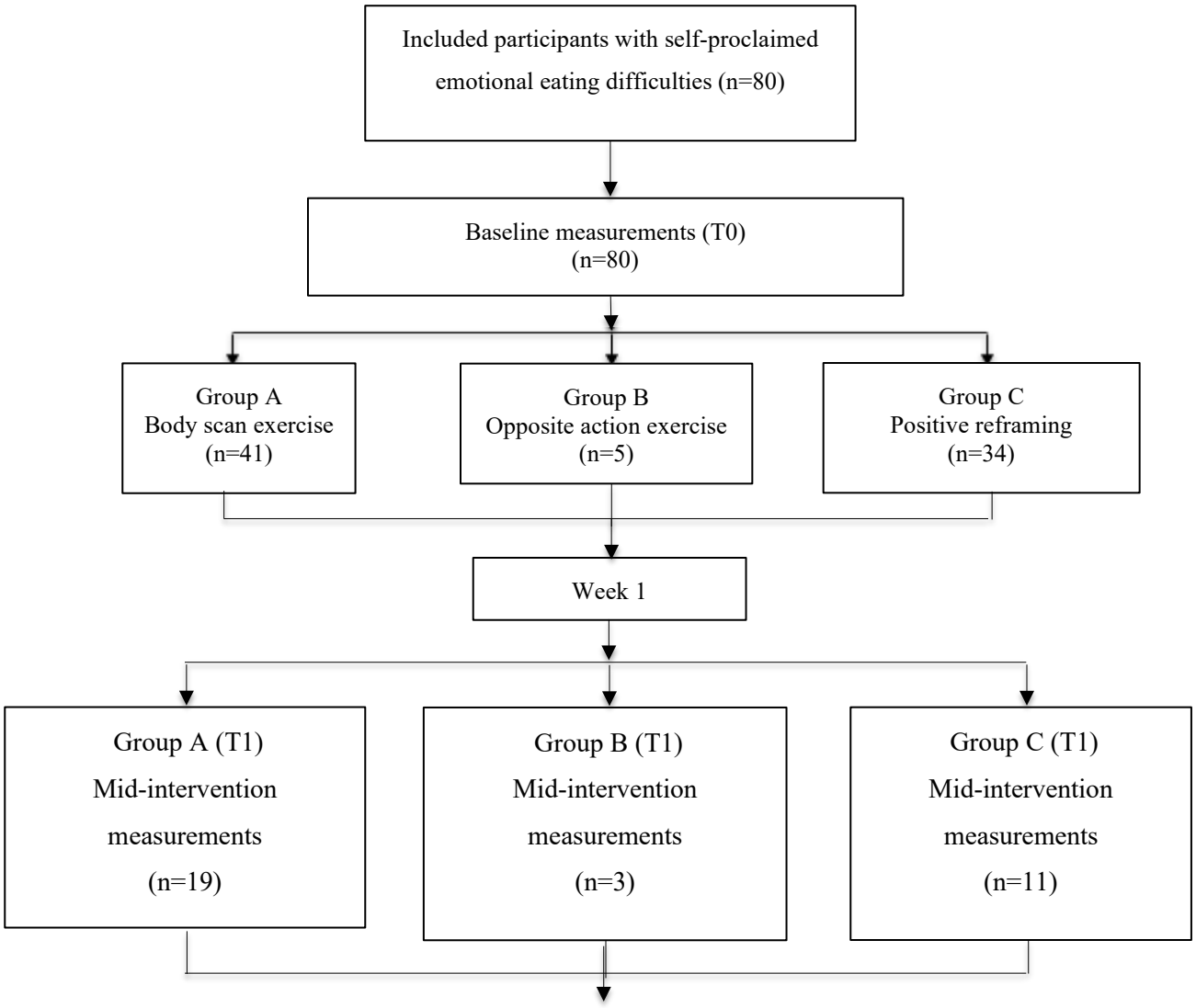
emotion regulation difficulties, it was expected that improved emotion regulation would in turn improve affect states. Therefore, it was expected that positive affect scores would increase, and negative affect scores would decrease, in all three intervention groups.

Research question 2b: "To what extent and in what way do emotional eaters consider the three tailored exercise as helpful?"

The textual answers to the five open questions (i.e., "Which aspects of the exercises did you find useful?", "Which aspect of the exercise did you not find useful?", "Which (new) insights or skills did u acquire by practicing with the exercise?", "How would you adapt the exercise so it would be able to help you better?" and "Is there anything else you would like to share with us?") were collected from an SPSS file and imported into a Microsoft Office Word document, sorted per intervention group. Thematic coding was used to facilitate the analysis of the textual data. All meaningful fragments, consisting of either a sentence, a part of a sentence or a combination of sentences, were first coded by the author (L. Schwartz) into overarching themes by analyzing the underlying meaning of the fragments. An iterative process facilitated the adjustment and fine-tuning of the final fifteen coding schemes. The final coding schemes were peer-reviewed by a PhD student (A. Dol) who has relevant experience with research on emotional eating and emotion regulation difficulties. For all coding schemes, an acceptable inter-rater reliability (range .75 to 1.00) was reached after the first round of coding.

Results

The flow of participants in the current study is shown in figure 2. After one week (mid-intervention) 47 of the 80 participants had dropped out, resulting in drop-out rates varying from 40% (group B) to 53.7% (group A), and 67.6% (group C). After two weeks (post-intervention), the total drop-out was 65 participants, increasing drop-out rates to 60.0% (group B), 80.5% (group A), and 85.3% (group C). In total 15 participants completed post-intervention measurements (19.0%). One-way ANOVA calculations determined no significant baseline differences between the completers and the drop-out groups on any socio-demographic characteristics (i.e., gender, age, BMI, marital status, employment status, living situation, education level and number of consultations with dieticians) and questionnaires (i.e., emotional eating, emotion dysregulation, positive affect and negative affect), see table 3.



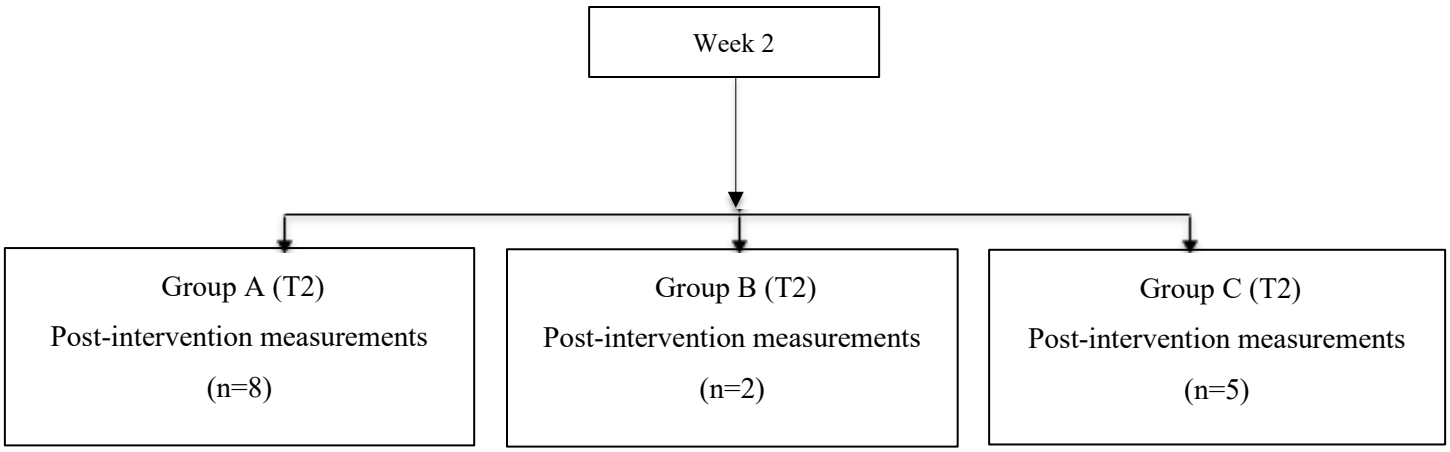


Figure 2. Flow of participants

Table 3. *Baseline differences between completers and drop-out groups at T1 and T2*

Variable	**Total (SD)**	**Completers (SD)**	**Drop-out (SD)**	**F-value**	**p-value**
Situation at T1					
Emotional eating	45.25 (8.37)	46.82 (7.28)	44.15 (8.98)	1.994	.162
Emotion dysregulation	48.95 (12.28)	49.15 (12.28)	48.81 (12.53)	.015	.903
Positive affect	15.84 (3.35)	16.42 (3.40)	15.43 (3.29)	1.739	.191
Negative affect	13.24 (2.97)	13.33 (2.81)	13.17 (3.10)	.058	.811
Situation at T2					
Emotional eating	45.25 (8.37)	48.27 (8.22)	44.55 (8.32)	2.439	.122
Emotion dysregulation	48.95 (12.28)	48.67 (12.88)	49.02 (12.24)	.010	.922
Positive affect	15.84 (3.35)	16.67 (4.10)	15.65 (3.16)	1.132	.291
Negative affect	13.24 (2.97)	13.07 (2.91)	13.28 (3.00)	.060	.807

*significant at a .05 significance level

Regarding the comparison of the three intervention groups, ANOVA calculations showed no significant baseline differences between the three intervention groups on socio-demographic variables. However, there were significant baseline differences on emotional eating ($F(2,77) = 5.516$, $p = .006$), emotion dysregulation ($F(2,77) = 4.150$, $p = .019$), positive affect ($F(2,77) = 6.745$, $p = .002$), and negative affect ($F(2,77) = 4.150$, $p = .019$) between the intervention groups, see table 4.

Table 4. *Baseline differences between intervention groups*

Variable	**Group A (SD)**	**Group B (SD)**	**Group C (SD)**	**F-value**	**p-value**
Emotional eating	47.49 (7.87)	49.80 (5.97)	41.88 (8.21)	5.516	.006*
Emotional dysregulation	56.07 (10.44)	53.00 (8.22)	39.76 (8.25)	28.16	<.005*
Positive affect	14.59 (3.26)	17.40 (2.88)	17.12 (3.00)	6.745	.002*
Negative affect	13.83 (2.64)	15.20 (1.79)	12.24 (3.19)	4.150	.019*

*significant at a .05 significance level

Tuckey post hoc calculations revealed that group A did not significantly differ from group B on any of the baseline questionnaires (emotional eating, $p = .812$; emotion dysregulation, $p = .772$; positive affect, $p = .146$; and negative affect, $p = .571$), see table 5. In contrast, group A did significantly differ from group C on all baseline questionnaires, with significantly higher positive affect scores ($p = .002$) and significantly lower emotional eating ($p = .009$), emotion dysregulation ($p < .005$) and negative affect ($p = .048$) scores. Subsequently, as the allocation of participants across the three intervention groups was based on screening for emotion dysregulation differences at baseline, the lack of a significant difference between group A and B can explain the low number of participants in group B (n=5), compared to group A (n=41) and C (n=34).

Table 5. *Post hoc calculations of baseline differences between intervention groups*

Variable	Group A-B (SE)	p	Group A-C (SE)	p	Group B-C (SE)	p
Emo. eating	-2.31 (3.76)	.812	5.61 (1.84)	.009*	7.92 (3.80)	.100
Emo. dysreg.	3.07 (4.48)	.772	16.31 (2.19)	<.005*	13.24 (4.53)	.012*
Pos. affect	-2.81 (1.48)	.146	-2.53 (.73)	.002*	.28 (1.50)	.981
Neg. affect	-1.37 (1.35)	.571	1.59 (.66)	.048*	2.96 (1.37)	.084

*significant at a .05 significance level

Research question 1a: "To what extend do the DERS-SF and its individual subscales show good internal consistency within a sample of emotional eaters?"

Table 6 reports the reliability coefficients of the DERS-SF and its six three-item subscales. The Cronbach's alpha coefficients for the DERS-SF total scale were .89 at baseline (T0), .88 at mid-intervention (T1), and .90 at post-intervention (T2). These results were comparable with previous research among adolescent (α = .91) and college (α = .89) samples (Kaufman et al., 2015).

Cronbach's alpha coefficient for all DERS-SF subscales, exceeded .70 and ranged from .71 to .89 at baseline (n=80). Similarly, at T1 (n=26) all DERS-SF subscales, except one (i.e., impulse, α = .49), exceeded .70 and ranged from .74 to .89. Further examinations of the problematic impulse subscale showed only a small, but not satisfactory, increase in the alpha coefficient (α = .52) if one of the items (i.e., item 17) would be deleted. At T2 (n=15) all Cronbach's alpha coefficients, except one (i.e., non-acceptance, α = .69), exceeded .70 and ranged from .75 to .98. Calculations of Guttman's lambda-2 coefficients for the DERS-SF total scale and its subscales yielded similar results, see table 6.

In sum, even though the sample size decreased from 80 to 15 during the two-week training protocol, the DERS-SF and all its subscales maintained acceptable to good internal consistency within the current sample of self-proclaimed emotional eaters, except for the impulse subscale at mid-intervention.

Table 6. *Reliability coefficients of the DERS-SF and subscales at T0 (n=80), T1 (n=26), and T2 (n=15)*

	T0		T1		T2	
	α	λ_2	α	λ_2	α	λ_2
Strategies	.71	.72	.74	.75	.75	.75
Non-acceptance	.76	.77	.74	.74	.69	.72
Impulse	.83	.84	**.49**	**.51**	.89	.89
Goals	.81	.81	.79	.81	.88	.88
Awareness	.78	.77	.79	.80	.80	.81
Clarity	.89	.89	.89	.89	.98	.98
Total DERS-SF	.89	.90	.88	.90	.90	.92

Research question 1b: "Which DERS-SF subscale do emotional eaters rank as best reflecting their emotion regulation difficulties, and to what extent are there significant differences between emotional eaters?"

Table 7 shows for each DERS-SF subscale how many participants across the three intervention groups have ranked the subsequent subscale as best reflecting their emotion regulation difficulties. For group A it was assumed that participants would be more likely to select the awareness scale. In line with this assumption, initial explorations of the results revealed that 31 of the 41 participants in group A indeed chose the awareness subscale as best reflecting their difficulties, compared to seven participants who chose the impulse subscale and three who chose the strategies subscale. For group B it was assumed that participants would be more likely to select the impulse subscale. However, two of the three participants in group B (missing=2) chose the strategies subscale and one chose the awareness subscale as best reflecting their emotion regulation difficulties. Contrary to what was assumed, none of the participants in group B chose the impulse subscale. Lastly, for group C it was assumed that participants would be more likely to select the strategies subscale as best reflecting their difficulties with emotion regulation. However, 15 of the 28 participants in group C (missing=6) chose the awareness subscale, compared to eight participants who chose the strategies subscale and five who chose the impulse subscale.

To explore the distribution of subscale choices across the three intervention groups more thoroughly and determine if the distribution differed significantly, a chi-square test for homogeneity was computed. The chi-square test for homogeneity ($X^2 = 9.941$, df=4, n=74, p=.041) revealed that the null hypothesis could be rejected, which would mean that there was evidence to assume that the distribution of selected subscale choices significantly differed across the three intervention groups. However, as the expected cell frequency condition was not met in this initial chi-square test, see table 7, this conclusion could be inaccurate (DeVeaux, Velleman & Bock, 2016).

Table 7. *Most relevant subscale choices from participants across the three intervention groups (N=74)*

	Awareness	Impulse	Strategies	Total
Group A				
Count	31	7	3	41
Expected count	27.1	6.6	7.2	41.0
% within group	75.6%	17.1%	7.3%	100.0%
Standardized res.	0.7	0.0	-1.6	
Group B				
Count	1	0	2	3
Expected count	2.0*	0.5*	0.5*	3.0
% within group	33.3%	0.0%	66.7%	100.0%
Standardized res.	-0.7	-0.7	2.0	
Group C				
Count	15	5	8	28
Expected count	19.9	4.9*	5.3	30.0
% within group	53.6%	17.9%	28.6%	100.0%
Standardized res.	-0.6	0.1	1.2	

Total				
	Count	49	12	13	74
	Expected count	49.0	12.0	13.0	74.0
	% within group	66.2%	16.2%	17.6%	100.0%

*4 cells (44.4%) have expected count less than 5. The minimum expected count is 0.49

To decrease the number of cells with expected cell frequencies below five, a second chi-square test for homogeneity was performed excluding group B. This resulted in only one expected cell value below five. Although the expected cell frequency condition was also not satisfied in the second chi-square test, the value is close to five (4.65), see table 8. In contrast to the first chi-square test for homogeneity, the second test ($X^2 = 5.108$, df=2, n=71, p=.078) revealed that the null hypothesis cannot be rejected. This would mean that the distribution of subscale choice is distributed the same in group A and C.

Although no significant difference could be detected in the distribution of subscale choices between group A and C by the second chi-square test, it is noteworthy to report that the standardized residuals do indicate that the group A seemed slightly more likely to choose the awareness subscale (c=0.6) and less likely to choose the strategies subscale (c=-1.3), and accordingly group C seemed slightly more likely to choose the strategies subscale (c=1.6) and less likely to choose the awareness subscale (c=-0.7). Thus, although not significant, the direction of the standardized residuals for group A and C seem to be in line with study expectations.

Table 8. *Most relevant subscale choices from participants in group A and C (N=71)*

		Awareness	Impulse	Strategies	Total
Group A					
	Count	31	7	3	41
	Expected count	27.7	6.9	6.4	41.0
	% within group	75.6%	17.1%	7.3%	100.0%
	Standardized res.	0**.6**	0.0	**-1.3**	

Group C					
	Count	17	5	8	30
	Expected count	20.3	5.1	4.6*	30.0
	% within group	56.7%	16.7%	26.7%	100.0%
	Standardized res.	**-0.7**	0.0	**1.6**	
Total					
	Count	48	12	11	71
	Expected count	48.0	12.0	11.0	71.0
	% within group	67.6%	16.9%	15.5%	100.0%

*1 cell (16.7%) has an expected count less than 5. The minimum expected count is 4.65.

Research question 2a: "What is the effect of the three tailored exercises on positive affect, negative affect and emotion regulation difficulties?"

First, for the group who practiced with the opposite action exercise (group B) only two remaining participants filled in the post-intervention questionnaires. Due to an unexpectedly small sample size from the beginning and throughout the two-week training protocol (T0=5, T1=2, T2=2), no quantitative results about the effect of the opposite action exercise on positive affect, negative affect and emotion regulation difficulties were reported here.

Then, for the group that practiced with the bodyscan exercise (group A) the scores for positive affect and three of the six DERS-SF subscales (i.e., awareness, impulse and strategies) were not distributed normally (respectively Shapiro-Wilk test: T0=.034, T0<.001 and T2=.029, T=.008 and T1=.033). Subsequently, the nonparametric alternative for a paired t-test, the Wilcoxon signed-rank test, was used for all calculations. In line with this studies expectation, the results showed a small increase in positive affect (T0=14.59, T1=14.71, T2=15.75) and a small decrease in negative affect (T0=13.83, T1=13.79, T2=13.63), see table 9. Furthermore, emotion dysregulation scores (DERS-SF total) also decreased over the two-week training protocol (T0=56.07, T1=55.50, T2=54.63). However, none of these results reached significance. In regard to the DERS-SF subscale scores, it was expected that the bodyscan exercise would decrease the scores on the awareness subscale. Although no significant differences were found on any of the DERS-SF subscale scores, the awareness subscale was the only subscale producing a nearly significant result between T0 and T1 (p=.07) in line with the expected direction, see table 9.

Table 9. *Wilcoxon signed rank test group A between T0 (n=41) - T1 (n=14), and T0 - T2 (n=8)*

Variable	**T0 (SD)**	**T1 (SD)**	**Z**	**p**	**T2 (SD)**	**Z**	**p**
Positive affect	14.59 (3.26)	14.71 (3.15)	-.135	.892	15.75 (2.05)	-.954	.340
Negative affect	13.83 (2.64)	13.79 (3.19)	-1.464	.143	13.63 (3.11)	-.282	.778
DERS-SF (total)	56.07 (10.44)	55.50 (9.55)	-1.418	.156	54.63 (13.10)	-.350	.726
Awareness	10.73 (1.67)	10.43 (2.50)	-1.813	**.070**	10.75 (2.31)	-1.633	.102
Clarity	9.37 (3.21)	9.71 (3.07)	-1.284	.199	10.50 (3.70)	-.539	.590
Goals	10.61 (2.91)	11.00 (2.25)	-.225	.822	9.63 (3.11)	-.333	.730
Impulse	7.41 (3.03)	6.57 (2.47)	-.791	.429	6.63 (2.88)	-.345	.730
Non-acceptance	9.54 (3.13)	9.36 (3.37)	-1.028	.304	9.00 (3.34)	-.544	.586
Strategies	8.39 (2.37)	8.43 (2.14)	-.810	.418	8.13 (2.75)	-.690	.490

*significant at a .05 significance level

In the group that practiced with the positive reframing exercise (group C) the scores for positive affect and five of the six DERS-SF subscales (i.e., awareness, clarity, impulse, non-acceptance and strategies) were not distributed normally (respectively Shapiro-Wilk test: T2=.03, T0=.018, T0=.007 and T1=.001, T0=.01 and T1=.034 and T2=.042, T0=.011 and T0=.017). Subsequently, the nonparametric alternative for a paired t-test, the Wilcoxon signed-rank test, was used to analyze all data. The results for group C were also in line with this studies expectation and showed a small increase in positive affect (T0=17.12, T1=18.40, T2=18.60) and a small decrease in negative affect (T0=12.24, T1=11.00, T2=10.40), see table 10. For emotion dysregulation scores (DERS-SF total) also decreased over the two-week training protocol after a small increase at mid-intervention (T0=39.76, T1=40.40, T2=36.00). However, similar to the results for group A, none of these results reached significance. In regard to the DERS-SF subscale scores, it was expected that the positive reframing exercise would significantly decrease the scores on the strategies subscale. However, no significant differences were found for any of the subscale scores between T0, T1 and T2 indicating the expected effect, see table 10.

Table 10. *Wilcoxon signed rank test group C between T0 (n=34) - T1 (n=10), and T0 - T2 (n=5)*

Variable	T0 (SD)	T1 (SD)	Z	p	T2 (SD)	Z	p
Positive affect	17.12 (3.00)	18.40 (2.01)	-.426	.670	18.60 (3.21)	-1.511	.131
Negative affect	12.24 (319)	11.00 (2.54)	-1.086	.277	10.40 (4.34)	-.677	.498
DERS-SF (total)	39.76 (8.25)	40.40 (11.60)	-.153	.878	36.00 (9.51)	-.542	.588
Awareness	5.88 (1.53)	5.50 (1.72)	-.408	.683	5.80 (1.79)	-1.342	.180
Clarity	6.03 (2.18)	5.70 (3.23)	-.284	.776	3.80 (1.30)	-1.473	.141
Goals	9.65 (2.82)	9.90 (3.51)	-.307	.759	9.20 (4.32)	-.184	.854
Impulse	5.00 (1.52)	5.00 (2.05)	-1.150	.250	4.00 (1.41)	<.001	1.00
Non-acceptance	7.29 (2.52)	8.10 (2.81)	-.425	.671	8.00 (2.45)	<.001	1.00
Strategies	5.91 (1.88)	6.20 (2.44)	-.499	.618	5.20 (1.10)	-.816	.414

*significant at a .05 significance level

Research question 2b: "To what extent and in what way do emotional eaters consider the three tailored exercise as helpful?"

To answer this research question, the participants' answers to five open questions at post-intervention were coded per intervention group. The following questions were asked at post-intervention: (1) "Which aspects of the exercise did you find useful?" (2) "Which aspects of the exercise did you find not useful?" (3) "What (new) insights or skills have you acquired by practicing with the exercise?" (4) "How would you adapt the exercise so it could help you (even) better?", and (5) "Is there anything else that you would like to share?"

Bodyscan exercise

The following paragraphs elaborate on the qualitative results regarding the bodyscan exercise.

Useful aspects bodyscan

Table 11.1. shows the coding scheme for the answers of participants in group A for the first open question *"Which aspects of the [bodyscan] exercise did you find useful?"*.

Six of the eight remaining participants in the group who practiced with the bodyscan exercise (group A) found it useful that the exercise would help them pay attention to their physical sensations (*"Thinking about what you feel and where, instead of just going on." (res. 5)*. In line with this, five of the eight participants mentioned the exercise helped them to explore the causes of their physical experiences. One participant mentioned this in a more general sense (*"Consider [...] the possible causes of discomfort in your body." (res. 3))*, whereas others were more specific. Namely, three participants found it particularly helpful that the exercise asked them to determine if a sensation was either a physical or emotional response (*"[...] and especially to see if the green or red part is related to something physical or emotion(s)." (res.4))*. Furthermore, one participant found the provided list of emotions helpful. Lastly, one participant mentioned that everything was useful, in contrast to one other participant who had no idea how the exercise had benefited them.

Table 11.1. *Coding scheme useful aspects bodyscan exercise*

Code	Variations
Paying attention to physical sensations (n=6)	
Exploring the causes of physical sensations	- In general (n=1) - Physical vs. emotional response (n=3) - List of emotions (n=1)
Everything (n= 1)	
No idea (n=1)	
Irrelevant (n=2)	

Note. The number of fragments per code or variation is represented by 'n'.

Not useful aspects bodyscan

Table 11.2. shows the coding scheme for the answers of participants in group A for the second open question *"Which aspects of the [bodyscan] exercise did you not find useful?"*

Five of the remaining eight participants provided feedback about aspects of the bodyscan exercise they found less useful. Two of the five participants' answers were related to a lack of

additional support. One participant specifically mentioned that they were unable to write down their physical sensations and identify its causes: *"That I had to write down what I felt and what might have caused it. Frankly, I have no clue what the reason is and it irritated me that I had to write this down over and over again." (res. 1)* Thus, additional help would have been required to help them: (1) identify what they felt, and (2) what might have caused it. The other participant mentioned the need for more examples (*"It would be good to provide an example under "other". (res. 8))*. Furthermore, one participant mentioned that they would have liked to try more exercises, which refers to a lack of variation in the exercise provided. Another participant would have liked to have had the opportunity to practice daily and thus experienced a lack in practice opportunities. Lastly, one participant mentioned: *"That it [the bodyscan exercise] can take too long, which causes me to lose my attention and concentration" (res. 6)*, which refers to the duration of the bodyscan exercise that could be improved.

Table 11.2. *Coding scheme not useful aspects bodyscan exercise*

Code
Lack of additional support (n=2)
Lack of variation (n=1)
Lack in practice opportunity (n=1)
Duration (n=1)

Note. The number of fragments per code or variation is represented by 'n'.

Insights and skills from bodyscan exercise

Table 11.3. shows the coding scheme for the answers of participants in group A for the third open question *"Which (new) insights or skills did you acquire by practicing with the [bodyscan] exercise?"*.

Three of the eight participants mentioned that with the exercise they were able to take a step back, and incorporate relaxation into their day ("*This exercise has forced me to take a step back once in a while.*" (res. 4) "*Let myself relax for a bit*." (res. 6) *"Take a break or relax sooner"* (res. 3)). Furthermore, five of the eight participants mentioned that they learned to

observe themselves *("[...] and look at myself" (res.4))*, their physical sensations *("That you feel things sometimes if you pay attention to it." (res.5))*, or their emotions *("Pay more attention to my emotions and to which different emotions there are." (res. 2)).* Other participants got insights into what might cause their physical discomfort. The answers of two participants were related to poor self-care *("[Taking a step back] this is something that I regularly fail to do because of workload or busyness in the family. My chronic back and muscle complaints are probably related to this." (res. 4))* and one to the impact of negative emotions: *"That negative emotions also can lead to a lot of uncomfortable bodily sensations." (res. 8).* Lastly, one participant mentioned that they had gained no new insights or skills from practicing with the bodyscan exercise.

Table 11.3. *Coding scheme new insights and skills learned through bodyscan exercise*

Code	Variation
Relaxation (n=3)	
Observation	- Themselves (in general) (n=1)
	- Physical sensations (n=2)
	- Emotions (n=2)
Causes physical discomfort	- Poor self-care (n=2)
	- Impact negative emotions (n=1)
None (n=1)	

Note. The number of fragments per code or variation is represented by 'n'.

Suggested adaptations bodyscan exercise

Table 11.4. shows the coding scheme for the answers of participants in group A for the fourth open question *"How would you adapt the [bodyscan] exercise, so that it can help you (even) better?".*

Four of the eight remaining participants' answers were related to additional support. One of the five participants answered: *"I have no idea. I have no clue how this exercise can help me anyway. (res. 1)"* This answer can be related to a lack of information about the exercise in regard

to how it works and in turn might be helpful for the participant. Thus, additional information should be provided about the exercise itself. Furthermore, two of the five participants mentioned a need for tips in regard to dealing with their emotions. One participant mentioned this more generally: *"Perhaps I would like to get some more tips on how to deal with certain feelings." (res. 2).* Whereas, another participant specifically mentioned the need for help with dealing with positive or negative feelings: *"[...] what helps with holding on to positive feelings or to release negative feelings in a healthy way." (res. 3).* Lastly, one of the four participants suggested adding a guided bodyscan.

Three of the eight remaining participants' answers were related to supplementing existing parts of the bodyscan exercise, like adding more emotions to the list of emotions, providing examples under "other causes", adding a picture of the back body and adding a motivational step to help elaborate on the motivation of participants to do something (*"Maybe an extra step: motivation to do something." (res. 3)*). Other suggested adaptations were related to the schedule, order and duration of the bodyscan exercise. Where one participant suggested adapting the schedule of the exercise to a set time point each day (*"Daily, at a fixed time, for example 21:00 o'clock." (res. 5)*), another participant suggested the opposite: *"I have done the exercise when I was resting, [or] had time for it. But in hindsight it would also have been useful to do this at any time in between, even at a hectic or emotional moment, in order to gain insight into how I physically react to my emotional state at that particular moment." (res. 4).* Thus, the latter participant suggests collecting real time data at varying time points. In regard to the order of the exercise, one participant suggested to also reverse the exercise (*"So reverse the exercise, as it were." (res. 4)*). Thus, this would mean that instead of first identifying physical sensations and finding emotions that might have caused it, they suggest first to identify the emotional state and then recognize the physical sensation that comes with it. Lastly, regarding the duration, one participant suggested to make sure that the exercise does not take too long. They suggested keeping it at 25-30 minutes maximum.

Table 11.4. *Coding scheme suggested adaptations bodyscan exercise*

Code	Variation
Additional support	- Additional information (n=1) - Tips: how to deal with emotions (n=3) - Guided bodyscan (n=1)
Supplementing existing parts	- Supplement list of emotions (n=1) - Provide example under "other causes" (n=1) - Add a picture of the back body (n=1) - Motivational step (n=1)
Exercise schedule	- Varying time points (n=1) - Fixed time point (n=1)
Reverse order (n=1)	
Duration (n=1)	

Note. The number of fragments per code or variation is represented by 'n'.

Additional remarks regarding bodyscan exercise

In addition to the four open questions, one additional question was added to provide participants with the freedom to share any additional feedback, which might not relate to the other questions previously asked.

Table 11.5. shows the coding scheme for the answers of participants in group A for this last open question: *"Is there anything else that you would like to share with us?"*

Four of the eight remaining participants shared additional feedback. One participant shared: "*I thought it was pretty vague that I had to indicate whether I thought a body part felt good or not. My stomach never feels good, but what does it matter?" (res. 1)* This answer could reflect a need for additional information about: (1) emotions and their physical effects, and/or (2) the goal of the exercise (i.e., increase emotional awareness through identifying physical sensations). However, it could also be that the use of the terms "good" and "not good" was too

vague. Thus, it should be explored how these terms can be clarified or if an alternative should be used. That same participant mentioned experiencing increased physical tension during the bodyscan exercise: *"It is always like this and the more I focus on my body the more it starts to feel tense." (res. 1).* Therefore, it could be helpful to provide a relaxation exercise in combination with the bodyscan exercise to potentially decrease the physical tension experienced because one is focusing on it during the exercise. Lastly, one participant emphasized the importance of human contact: *"It's also nice to just talk about the difficulty you experience. I don't have any family or friends to turn to. Mindfulness alone is not enough." (res. 6).* Thus, there seems to be a need for human interaction and therefore it should be explored how human interaction can be enabled within the bodyscan exercise or final coach application.

Table 11.5. *Coding scheme for other comments bodyscan exercise*

Code
Additional information (n=1)
Increased physical tension (n=1)
Importance of human contact (n=1)
Irrelevant (n=3)

Note. The number of fragments per code or variation is represented by 'n'.

Opposite action exercise

In the group who practiced with the opposite action exercise (group B) only two remaining participants filled in the post-intervention questionnaires. However, only one of those two participants answered the open questions partially (i.e., the first, third and fifth question respectively). Table 12 shows the coding scheme for the answers of this participant.

In regard to the first question the participant reported all aspects of the opposite action exercise as useful. Subsequently, in regard to the second questions about acquired insights or skills, the participant stated gaining insight about the interaction between behavior and emotions, as they mentioned: "B*ecome aware of your behavior and which emotion it comes from and what you can do differently. (res.1)"*. Lastly, the answer for the fifth open question about additional

remarks, was coded as irrelevant.

Table 12. *Coding scheme for opposite action exercise*

Question	Code
Question 1	All (n=1)
Question 3	Interaction behavior and emotions (n=1)
Question 5	Irrelevant (n=1)

Note. The number of fragments per code or variation is represented by 'n'.

Positive reframing exercise

The following paragraphs elaborate on the qualitative results regarding the positive reframing exercise.

Useful aspects positive reframing exercise

Table 13.1. shows the coding scheme for the answers of participants who practiced with the positive reframing exercise (group C) for the first open question *"Which aspects of the [positive reframing] exercise did you find useful?"*

All five remaining participants in the group C found it useful that the exercise would help them to reflect either on what happened in specific situations (*"It is very useful to reflect on a certain negative event, if you write it down you can really see what is bothering you." (res. 2)*) or their feelings (*"You will think a little better, think more consciously about how you feel and why you feel that way. (res. 1)*). Furthermore, two of the five participants found the reframing an useful aspect of the exercise, as one of the participants mentioned: *"Practicing with reframing forces you to see positive aspects in negative things. I noticed that this was a pleasant thing to do and think that I will apply this more often when I experience setbacks.*" *(res. 2)*.

Table 13.1. *Coding scheme useful aspect positive reframing exercise*

Code	Variation
Reflection	- Situations (n=3) - Feelings (n=3)
Reframing (n=2)	

Note. The number of fragments per code or variation is represented by 'n'.

Not useful aspects positive reframing exercise

Table 13.2. shows the coding scheme for the answers of participants in group C for the second open question *"Which aspects of the [positive reframing] exercise did you not find useful?"*.

Three of the five remaining participants felt that the recurrence of practice moments was too close together, as one participant mentioned: *"It is not every day that you encounter an unpleasant event, at one point I found it difficult to think of a situation." (res. 2).* In line with this, one participant reported that the exercise was too extensive for some situations (*"For some situations it [the exercise] did not work, felt too extensive." (res. 4)*). Lastly, one participant stated that none of the aspects of the positive reframing exercise were not useful.

Table 13.2. *Coding scheme not useful aspect positive reframing exercise*

Code
Recurrence of practice moments (n=3)
Extensiveness (n=1)
None (n=1)

Note. The number of fragments per code or variation is represented by 'n'.

Insights and skills from positive reframing exercise

Table 13.3. shows the coding scheme for the answers of participants in group C for the third open question *"Which (new) insights or skills did you acquire by practicing with the [positive reframing] exercise?"*.

Three of the five remaining participants' answers reflected certain reflection skills. One participant got more insights into how they react in different situations (*"[I am] more aware of how I react in different situations" (res. 1)*), whereas another participant got more insights into how they think and how to challenge these thoughts ("*Paying attention to how you think and whether it can be different." (res. 5)*). Furthermore, one participant reported a certain willingness to await the reaction of the other person more often (*"By sometimes waiting a bit more to hear what someone else has to say about the situation. (res. 3)*).

Two of the five participants' answers referred to gained insights on how to tackle negative events. One participant specifically mentioned the skill to recognize positive aspects in negative situations. Another participant mentioned the skill to distance oneself from the situation (*"Take a step back from the situation for one moment [...] (res. 4)*) and reevaluate the situation (*[...] and review it (res. 4)*). One fragment was coded as irrelevant.

Table 13.3. *Coding scheme insights and skills positive reframing exercise*

Code	Variation
Reflection skills	- How do I react? (n=1) - How do I think? (n=1) - How does the other react? (n=1)
Tackling negative events	- Recognizing positive aspects (n=1) - Distancing yourself (n=1) - Reevaluate (n=1)
Irrelevant (n=1)	

Note. The number of fragments per code or variation is represented by 'n'.

Suggested adaptations positive reframing exercise

Table 13.4. shows the coding scheme for the answers of participants in group C for the fourth open question *"How would you adapt the [positive reframing] exercise, so that it can help you (even) better?"*.

Where one of the five remaining participants had no suggestions to adapt the positive reframing exercise as it was fine as it is (*"The exercise is fine like this." (res. 5)*), others did have some suggestions. For example, one participant experienced a lack of variation during the two-week training protocol and suggested a change in exercise once in a while (*"I would like to have a change in exercise, for example after the first week based on the results of the half-point evaluation, a different exercise." (res.1)*). Regarding the specific content of the exercise, another participant suggested providing examples that could help with answering the questions that prompt reflection (*"Give several examples for the question: "How did you feel about this?" Sometimes it is difficult to identify your feelings exactly, giving a few examples might help." (res. 2)*). Lastly, one fragment was coded as irrelevant.

Table 13.4. *Coding scheme suggested adaptations positive reframing exercise*

Code
Variation (n=1)
Providing examples (n=1)
None (n=1)
Irrelevant (n=1)

Note. The number of fragments per code or variation is represented by 'n'.

Additional remarks regarding positive reframing exercise

Table 13.5. shows the coding scheme for the answers of participants in group C for the last open question: *"Is there anything else that you would like to share with us?"*.

One of the five remaining participants left additional remarks in regards to the positive reframing exercise. One fragment included that participants would need an intermediate level of education to participate in the exercise (*"I don't know which target group [has] to be reached,*

but I do think that you should have at least an MBO-level if you want to be able to answer the questions." (res.1)). Another fragment referred to a loss of focus during the exercise, as the participant stated: *"Sometimes you have to think long about a question which causes your attention span to disappear." (res.1).* Lastly, one fragment suggested supplementing instructions at the beginning of the exercise: *"Perhaps you should mention at the outset that you should take your time and do the test and the exercises in a relaxed manner." (res. 1).*

Table 13.5. *Coding scheme additional remarks positive reframing exercise*

Code
Level of education (n=1)
Loss of focus (n=1)
Supplementing instructions (n=1)

Note. The number of fragments per code or variation is represented by 'n'.

Discussion

This study explored the usefulness of a concept for screening emotional eaters with three of the six subscales of the Difficulties in Emotion Regulation Scale Short Form (DERS-SF) (i.e., awareness, impulse, and strategies) and the effectiveness of three tailored exercises on affect (positive and negative) and emotion dysregulation.

Main findings for the proposed screening

The usefulness of the concept for screening emotional eaters with three of the six subscales of the DERS-SF (i.e., awareness, impulse, and strategies) was determined by exploring the reliability (i.e., internal consistency) and face validity of the DERS-SF and its subscales within a sample of emotional eaters. Regarding reliability, the results indicated acceptable to good internal consistency for all the DERS-SF subscales. Only at mid-intervention the impulse subscale showed problematic reliability. In contrast to previous research on the DERS-SF (Skutch et al., 2019), the awareness subscale did not have the lowest reliability scores within the current sample of emotional eaters.

In regard to validity, the face validity of the screening was considered high if participants' subscale scores, which determined the allocation across the three intervention groups, was in accordance with their most relevant subscale choice at baseline (i.e., the subscale which best reflected their emotion regulation difficulties at baseline). Subsequently, it was expected that the group that practiced with the bodyscan exercise (group A) would be more likely to choose the awareness subscale, the group that practiced with the opposite action exercise (group B) would choose the impulse subscale, and the group that practiced with the positive reframing exercise (group C) would choose the strategies subscale as most relevant to them. The results indicated that for two of the three intervention groups the most relevant subscale choice was in line with the study expectations, where group A indeed seemed more likely to choose the awareness subscale and group C the strategies subscale as most relevant to them. Although the results did not reach significance, the face validity of two of the three subscales (i.e., awareness and strategies subscale) used in the current study to screening emotional eaters seemed promising.

Taking the above into account, together with results indicating that only two of the three groups (i.e., group A and group C) significantly differed from each other on emotion regulation

difficulties at baseline, two of the three DERS-SF subscales (i.e., awareness and strategies) could be considered useful for screening and subsequently distinguish two groups of emotional eaters and their emotion regulation needs.

Recommendations for further research on the proposed screening

Firstly, as highlighted in the previous paragraph, the proposed screening in the current study was able to distinguish two groups of emotional eaters. However, it failed to distinguish a third group of emotional eaters (group B), characterized by experiencing difficulties with controlling impulsive behavior when negative emotions arise. This revealed questions about whether the screening with the impulse subscale, was able to capture this difficulty sufficiently within a sample of emotional eaters. Subsequently, although concerns about the burden for both participants and researchers have been described previously, it may be recommended to conduct a validation study between the Levels of Emotional Awareness Scale (LEAS) and the screening with the DERS-SF as proposed in the current study. This may help to explore whether or not these instruments measure a similar construct and further guide research on determining which instrument may best capture and distinguish between the different needs of emotional eaters.

Secondly, emotional eaters have previously been screened based on their differences in emotional eating scores (i.e., low or high emotional eaters). For example, Van Strien, Herman, Anschutz, Engels and De Weerth (2012) based inclusion of participants on cut-points for low (<1.82) and high (>3.25) emotional eating. On the contrary, one of the criteria for inclusion in the current study was based on the more general experience of emotional eating and there was no additional controlling for differences in emotional eating scores between the three intervention groups. This can be seen as an important limitation of the current study as it not only allows memory bias, but also jeopardizes the representativeness of the current study sample for the population of emotional eaters. The latter was also highlighted by additional explorations, see table 14, showing that the mean total and subscale scores of group C were comparable to the scores of normal and overweight controls in the study of Brockmeyer et al. (2014) without a lifetime diagnosis of any eating disorder (i.e., AN-R, anorexia nervosa-restricting type; AN-BP, anorexia nervosa-binge/purge type; BN, bulimia nervosa; BED, binge-eating disorder).

Table 14. *DERS-SF scores Group A and C compared to NWC* and OWC* in Brockmeyer et al. (2014)*

DERS(-SF) subscale	Group A	Group C	NWC*	OWC*
Total	56.07	39.76	34.84	34.30
Awareness	10.73	**5.88**	**6.89**	**7.76**
Clarity	9.37	6.03	5.70	5.17
Goals	10.61	9.63	6.79	5.69
Impulse	7.41	5.00	4.38	4.80
Nonacceptance	9.54	7.29	6.14	5.86
Strategies	8.39	**5.91**	**5.27**	**5.12**

Notes. DERS(-SF), Difficulties in Emotion Regulation Scale (Short Form); *NWC, normal-weight controls; *OC, overweight controls.

Thus, for future research it is recommended to control for differences in emotional eating scores to increase the representativeness of the study samples and determine if the screening with two of three DERS-SF subscales (e.g., awareness & strategies) stays promising within a representative sample of emotional eaters. Lastly, as significant differences in emotional eating scores were only explored between-groups, it would be interesting to explore within-group differences in emotional eating scores. Exploring within-group differences in emotional eating scores could provide valuable information about the need for further optimizing the screening of emotional eaters.

Main findings tailored exercises

The effectiveness of the three tailored exercises (i.e., bodyscan, opposite action and positive reframing exercise) was determined by measuring changes in affect (positive and negative) and emotion dysregulation. Thereafter, the opinions of emotional eaters were explored to gain a more comprehensive understanding of what aspects of the exercises might have contributed to these changes.

Bodyscan exercise

The quantitative results indicate that the bodyscan might have increased positive affect and decreased negative affect and total emotion dysregulation scores. Although these results did not reach significance, a nearly significant result was detected on a subscale level with improved awareness scores between baseline and mid-intervention. Interestingly, for the group that practiced with the bodyscan exercise (group A), the awareness subscale scores where moderately skewed to the right (γ=+.818) revealing a moderate floor effect. However, even with participants scoring towards the lower end of the subscale, the bodyscan exercise was still able to produce a nearly significant improvement in awareness scores between baseline and mid-intervention.

The qualitative results revealed that the majority of participants, who practiced with the bodyscan exercise, appreciated that they were prompted to pay attention to physical sensations and potential physical or emotional causes. According to participants, practicing with the bodyscan exercise improved relaxation and observation skills and provided insights in causes of their physical discomfort, like negative emotions or poor self-care. Subsequently, based on the qualitative answers of participants, it can be stated that both the observational component (challenge 1, appendix C) and explanatory component (challenge 2, appendix C) of the bodyscan contributed to gaining insight in how to recognize and differentiate bodily sensations associated with emotions, which was one of the needs of emotional eaters identified by Dol et al (2020).

However, two recommendations for supplementing the bodyscan exercise can be made. Firstly, in addition to recognizing and differentiating bodily sensations associated with emotions, participants in the study of Dol et al (2020) also mentioned the desire to gain insight in how to recognize and differentiate sensations caused by food cravings to, in the end, also be able to differentiate between sensations caused by emotions or food cravings. Thus, future research could focus on supplementing the bodyscan exercise by adding a component which prompts participants to pay attention to specific hunger sensations and help them distinguish these hunger sensations from emotionally evoked physical sensations. Findings of Murray and Vickers (2009) could help with the development of this supplementing component as they describe various physical (e.g., empty/hollow feeling) and mental experiences (e.g., lack of concentration on task) of typical and extreme hunger.

Secondly, special attention should be given to one of the participants' remarks about increased bodily tension experienced while practicing with the bodyscan exercise. Tihanyi,

Ferentzi and Köteles (2017) describe this phenomenon as attention-related body sensations. In their research they explain that focused attention on the body can trigger (automatic) thoughts and judgments about the body or experienced sensations. These thoughts and judgments can activate negative emotions, like shame or fear, which in turn can bring about changes in physiological sensations (e.g., muscle stiffness). Based on the explanation of Tihanyi et al. (2017), it is recommended for the further development of the bodyscan exercise to include a component focused on making emotional eaters aware of and helping them deal with these (automatic) thoughts and judgments about their body or bodily sensations, to help decrease potential negative emotions, like shame or fear, and uncomfortable attention-related body sensations like muscle stiffness while practicing with the bodyscan exercise.

In the end, both recommendations were aimed at optimizing the bodyscan exercise for emotional eaters. However, to determine if the bodyscan exercise is actually optimized by adding these supplementary components, a full factorial design study is recommended as it allows the exploration of which combination of components provides the highest level of effectiveness within a sample of emotional eaters.

Opposite action exercise

The current study was unable to describe scientifically relevant quantitative results for the opposite action exercise, because of the particularly low sample size throughout the two-week training protocol (n_{T0}= 5, n_{T1}= 2, n_{T2}= 2). During analysis the results revealed that group B did not significantly differ from group A on any of the baseline questionnaires. Subsequently, as the allocation of participants across the three intervention groups was based on screening for emotion dysregulation differences at baseline, the lack of a significant difference between group A and B can explain the low number of participants in group B. However, to get a more thorough understanding, it could be interesting to replicate the current study measuring other potentially relevant baseline variables and explore the differences between the group of emotional eaters that score high on the awareness subscale, in comparison to the group of emotional eaters that score high on the impulse subscale.

Regarding the qualitative results, one participant shared their feedback and mentioned that he had experienced the opposite action exercise as useful and reported increased insight in: (1) his behavior, (2) which emotion could have affected his behavior, and (3) alternative behavior. This answer could indicate that the opposite action exercise tailors to the need of

emotional eaters for action plans that inspire alternative behavior, when self-control difficulties were experienced. However, the latter statement should be read with absolute caution as no conclusions about the effects of the opposite action exercise can be drawn based on the answers of one participant. Additional research is recommended to explore the effects of the opposite action exercise within a larger sample of emotional eaters experiencing self-control difficulties to determine if the exercise can be considered as useful to be included in a smartphone coach application as proposed by Dol et al. (2020).

Positive reframing exercise

The quantitative results indicated that the positive reframing exercise might have increased positive affect and decreased negative affect and total emotion dysregulation scores. However, similar as to group A, the results for the group C did not reach significance. In contrast to the study's expectations, no significant improvements on the strategies subscale were detected. Interestingly, additional explorations of the strategies subscale scores revealed a high floor effect, with scores being highly skewed to the right (γ=+.977). Thus, participants in group C experienced low difficulties with accessing emotion regulation strategies at the start of the study. This could explain why improvements on this subscale were hardly measurable throughout the two-week training protocol. Therefore, the lack of significant results might more so indicate to the previously highlighted limitation regarding the representativeness of the current study sample, than to the ineffectiveness of the positive reframing exercise.

The latter reasoning was reinforced by the qualitive results revealing that participants, who practiced with the positive reframing exercise, appreciated that they were prompted to reflect on and reframe negative events. According to participants they gained reflection skills and insights in more specific emotion regulation strategies for tackling negative emotions, like recognizing positive aspects, distancing oneself from and reevaluating the negative situation. These strategies, described by participants, closely relate to specific strategies of reappraisal (i.e., thinking about a situation differently) and benefit finding (i.e., thinking about how one could learn from the situation), which Tang and Huang (2019) have included in their 32-counting overview of emotion regulation strategies for negative and positive affect. Subsequently, the questions included in step four of the positive reframing exercise (see appendix E), which prompt reappraisal ("Which positive explanation can you think of that may explain what

happened?" and "What is good or positive about this situation?") and benefit finding ("What can you learn from this situation?" and "How can this situation help you?") could be considered as components of the positive reframing exercise that contributed to the previously described effects.

However, specific attention should be given to participants' remarks about not considering the exercise for everyday use and questioning its usefulness in a variety of situations because of its extensiveness. These answers raise questions about situational factors influencing the perceived usefulness of the positive reframing exercise. Similar questions were asked in the current emotion regulation literature, where there is an increased focus on acknowledging the importance of the context when people select emotion regulation strategies (Tang & Huang, 2019). For example, in their study Tang and Huang (2019) showed that contextual factors, like location (e.g., home, social or professional setting) and social context (e.g., alone or with others) could predict the selection of specific emotion regulation strategies. Subsequently, when taking the importance of context into account, specific recommendations for future research on the positive reframing exercise can be made. First, it is recommended to set up an ecological momentary assessment study (EMA) to identifying which contextual factors (e.g., location and/or social context) may predict the willingness of emotional eaters to practice with the positive reframing exercises. In other words, the EMA could help identify the context in which the positive reframing exercise was deemed as useful by emotional eaters and in which context a different exercise may be needed. Subsequently, the second recommendation is to explore which other exercises, may potentially be included in the smartphone coach application for situations in which the positive reframing exercise was deemed as not useful. Overall, these two recommended studies could provide valuable information for the further development of the smartphone coach application proposed by Dol et al. (2020) about how to tailor to the contextual needs of emotional eaters and subsequently adapt exercise recommendations based on real time information of the context provided by the user.

Drop-out

The online character of both the sampling strategies and the two-week training protocol can be seen as an important strength of the current study as it might have tackled one of the personal barriers for both seeking and completing face-to-face treatment in adults with binge-eating disorder and overweight or obesity, namely: fear of stigma and shame (Ali et al.; Corrigan, Duss

& Perlick; Vall & Wade as cited in Puls et al., 2019). This fear of stigma and shame could also explain why many participants in the current study (43.8%) have never had any contact with a dietician before. Although the online character can be seen as a strength of the current study in regard to personal barriers like fear of stigma and shame, the drop-out rate was still disproportionately high and has to be noted as an important limitation. At the end of the two-week training protocol drop-out rates ranged from 60.0% for group B to 80.5% for group A, and 85.3% for group C. Overall, studies show a low adherence for internet-based interventions (Wangberg, Bergmo & Johnsen, 2008) and e-therapy (Eysenbach; Linardon & Fuller-Tyszkiewicz as cited in Linardon, Shatte, Tepper, & Fuller-Tyszkiewicz, 2020). However, compared to other studies the drop-out rates in the current study lie far above the discontinuation rates of a web-based weight management intervention (45%) for people with overweight (Carter, Burley, Nykjaer & Cade, 2013); internet-based guided self-help trials (47%) for people with binge eating disorder and bulimia nervosa (Dölemeyer, Tietjen, Kersting, & Wagner, 2013); and the mean drop-out rate of 23% (range 0% - 83%) for e-therapy trials (Donkin et al., 2011). Subsequently, when aiming to improve retention, a systematic review and meta-analysis about retention strategies in longitudinal cohort studies (Teague et al., 2018) shows that reminder strategies contribute to an additional 10 percent of drop-out in contrast to barrier-reduction strategies which have been found to aid in retention of an additional 10 percent of study samples. Therefore, a plausible explanation for the high drop-out rates in the current study could be the noticeable participant burden of practicing every other day for +/- 15 minutes per session, in combination with the amount of email reminders (eight in total) across the two-week training protocol. Another potential reason could have been increased boredom due to the lack of variation provided in exercises throughout the two-week training protocol. Thus, to decrease potential drop-out, future research could focus on further reducing participant burden, optimizing the use of reminders and provide variation in exercises.

Conclusion

This study explored the usefulness of a concept for screening emotional eaters with three of the six subscales of the Difficulties in Emotion Regulation Scale Short Form (DERS-SF) (i.e., awareness, impulse, and strategies) and the effectiveness of three tailored exercises on affect (positive and negative) and emotion dysregulation. In regard to the screening, two of the three DERS-SF subscales (i.e., awareness and strategies) showed good internal consistency and promising face validity within a sample of emotional eaters. Based on these findings, it may be concluded that the awareness and strategies subscales were able to detect reliable and valid differences in emotion regulation difficulties among emotional eaters and may be useful as a screening instrument within a smartphone coach application. However, additional validation research with the Levels of Emotional Awareness Scale (LEAS) is recommended to determine whether the third DERS-SF subscale (i.e., impulse) may still be determined as useful for screening emotional eaters, as this subscale failed to distinguish emotion regulation difficulties in regard to controlling impulsive behavior when negative emotions arise. Another recommendation in regard to optimizing the screening includes controlling for emotional eating scores.

Regarding the tailored exercises, the current study was unable to describe scientifically relevant results for one of the exercises (i.e., opposite action exercise) because of the particularly low sample size throughout the two-week training protocol. Subsequently, additional research is recommended to explore the effects and usefulness of the opposite action exercise within a larger sample of emotional eaters. On the contrary, the current study showed that the bodyscan and positive reframing exercise, may contribute to increasing positive affect, decreasing negative affect and decreasing overall emotion dysregulation. These effects were small and did not reach significance. However, with the feedback of participants, the current study was able to gain a more comprehensive understanding in which specific components of the bodyscan (i.e., observational and explanatory component) and positive reframing exercise (i.e., reappraisal and benefit finding component) may have contributed to these changes in affect and emotion dysregulation. Furthermore, based on the feedback leads for further research could be identified in order to optimize both exercises and potentially increase their usefulness.

Firstly, for the bodyscan exercise future research should aim to develop an exercise component that focuses on: (1) differentiating hunger sensations from emotionally evoked

physical sensations, and (2) coping with automatic thoughts and judgments during the exercise. Subsequently, a full factorial design study is recommended to explore which combination of components provides the highest level of effectiveness within a sample of emotional eaters. Secondly, for the positive reframing exercise, it is recommended to explore, by means of ecological momentary assessments, which contextual factors influence the perceived usefulness of the positive reframing exercise and identify situations in which additional support may be needed. Which exercises may be best to provide this additional support, remains to be determined by future research. In the end, this should allow for adaptive exercise recommendations within a smartphone coach application, based on real time information of the context provided by the user. Overall, the results of the current study provide promising starting points for optimizing screening methods and tailored exercises for emotional eaters and may spark advancements in the treatment of emotional eating.

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Appendix A. Informed consent

Beste deelnemer,

Hierbij nodig ik u van harte uit om deel te nemen aan het onderzoek **"Een Op Maat Gemaakte Aanpak voor Emotionele Eters: een Verkenning."** Dit onderzoek wordt uitgevoerd door **Lysanne Schwartz** van de **Faculteit der Gedrags-, Management- en Sociale Wetenschappen** aan de **Universiteit van Twente.**

Het onderzoek heeft als doel om informatie te verzamelen voor de ontwikkeling van een smartphone applicatie voor emotie eters. De smartphone applicatie heeft als doel om de emotionele behoeften van emotie eters in kaart te brengen en vervolgens een oefening aan te bieden die passende ondersteuning geeft bij het bewust worden van en omgaan met (ook wel reguleren van) emoties.

Hoe gaan we te werk?
U neemt deel aan een onderzoek dat zal bestaan uit vier stappen:

- **Stap 1:** U start met het invullen van een aantal algemene gegevens, waarna wij u een drietal vragenlijsten voorleggen. Het invullen van de algemene gegeven en de drie vragenlijsten zal ongeveer 15 minuten van uw tijd in beslag nemen.
- **Stap 2:** Na stap 1, wordt u direct doorgeleid naar één van de drie oefeningen binnen dit onderzoek, die ondersteuning bieden bij het reguleren van emoties. Naar welke oefening u wordt doorgeleid, is gebaseerd op uw antwoorden in stap 1. U kunt gedurende twee weken (om de dag) oefenen met de toegewezen oefening. Om de dag ontvangt u dan ook een email van ons waarmee u toegang krijgt tot de oefening binnen de online onderzoeksomgeving. Het oefenen neemt maximaal 15 minuten per dag in beslag.
- **Stap 3:** Na de eerste week oefenen, leggen wij u een tweetal vragenlijsten voor. Het invullen hiervan duurt maximaal 5 minuten.
- **Stap 4:** Na twee weken oefenen, sluit het onderzoek af met opnieuw een tweetal vragenlijsten en drie afsluitende vragen gericht op uw ervaring met de toegewezen oefening. Dit zal weer ongeveer 15 minuten van uw tijd in beslag nemen.

Uw antwoorden zullen gebruikt worden als input voor de ontwikkeling van een smartphone

applicatie gericht op het aanbieden van op maat gemaakte oefeningen voor emotionele eters.

Potentiële risico's en ongemakken

Er zijn geen fysieke, juridische of economische risico's verbonden aan uw deelname aan dit onderzoek. Er kunnen vragen worden gesteld die u als persoonlijk kunt ervaren, vanwege de gevoelige aard van het onderwerp. Wij stellen deze vragen enkel en alleen in het belang van het onderzoek. U hoeft echter geen vragen te beantwoorden die u niet wilt beantwoorden. Uw deelname is vrijwillig en u kunt uw deelname op elk gewenst moment stoppen.

Tijdens dit onderzoek zal alles in staat worden gesteld om uw privacy te beschermen. Echter, net als bij elke online gerelateerde activiteit, is het risico van een inbreuk altijd mogelijk. Naar best vermogen zal uw privacy gewaarborgd worden en uw antwoorden in dit onderzoek vertrouwelijk blijven. De risico's worden geminimaliseerd door:

(1) uw data op te slaan op een beveiligde server van de Universiteit van Twente welke voldoet aan de Algemene Verordening Gegevensbescherming (AVG)),
(2) uw data te anonimiseren, en
(3) uw data niet te delen met derden.

De uiteindelijke studieresultaten kunnen mogelijk wel gedeeld worden met vakgenoten. Dit zal echter alleen in geanonimiseerde vorm gebeuren, waarin de resultaten niet terug te leiden zijn naar u als individuele deelnemer aan deze studie. Tot slot, uw email adres zal alleen worden gebruikt om u de e-mails te sturen, waarmee u toegang kunt krijgen tot de online onderzoeksomgeving om de vragenlijsten in te vullen en te oefenen met de toegewezen oefening.

Dit onderzoek is goedgekeurd door de ethische commissie van de BMS-faculteit aan de Universiteit van Twente (bestandsnummer: 200091).

Vrijwilligheid

Deelname aan dit onderzoek is geheel vrijwillig. U kunt als deelnemer uw medewerking aan het onderzoek te allen tijde stoppen, zonder redenen. Als u tijdens het onderzoek besluit om uw medewerking te staken, zullen de gegevens die u reeds hebt verstrekt tot het moment van intrekking van de toestemming in het onderzoek gebruikt worden.

Wilt u stoppen met het onderzoek, of heeft u vragen en/of klachten? Neem dan contact op met de onderzoeksleider.

Contactgegevens onderzoeker:

Lysanne Schwartz
l.m.schwartz@student.utwente.nl

[Ja], ik heb bovenstaande informatie gelezen en ben voldoende geïnformeerd over het onderzoek. Het is mij duidelijk dat mijn deelname aan dit onderzoek geheel vrijwillig is. Er is geen expliciete of impliciete dwang voor mij om aan dit onderzoek deel te nemen. Het is mij duidelijk dat ik deelname aan het onderzoek op elk moment, zonder reden, kan beëindigen. Ik hoef een vraag niet te beantwoorden als ik dat niet wil.

Appendix B. Demographic questions

Geslacht:

- Man
- Vrouw
- Anders
- Dat zeg ik liever niet

Burgerlijke staat

- Ongehuwd
- Gehuwd
- Verweduwd
- Gescheiden

Woonsituatie

- Alleen
- Alleen met kind(ern)
- Met partner/echtgenoot(e)
- Met partner/echtgenoot(e) en kind(ern)
- Met ouder(s)
- Anders: namelijk, …

Hoogst genoten opleiding

- Geen opleiding
- Basisonderwijs (lager onderwijs)
- Lager beroepsonderwijs (LBO, huishoudschool, LEAO, LTS, etc.)
- MAVO, (M)ULO, 3-jarige HBS of VMBO
- Middelbaar beroepsonderwijs (MBO)
- 5-jarige HBS, HAVO, MMS, atheneum, VWO, of gymnasium
- Hoger beroepsonderwijs (HBO)
- Wetenschappelijk onderwijs (universiteit, postdoctoraal onderwijs)

Arbeidsstatus

- Student
- Werkende (deeltijd: minder dan 35 uur per week)
- Werkende (voltijd: 35 uur per week of meer)
- Werkeloos
- (Gedeeltelijk) arbeidsongeschikt
- Gepensioneerd
- Anders: namelijk, …

Leeftijd:

Lengte (in cm):

Gewicht (in kg):

Aantal consulten bij diëtist:

- Geen
- 1-2
- 3-4
- 5-6
- 7-8
- 9-10
- >10

Appendix C. Bodyscan exercise

Beste deelnemer,

Welkom bij de **"bodyscan oefening"**.

Deze oefening heeft als doel je bewuster te maken van wat je voelt in jouw lichaam. Daarbij laat het je nadenken over wat de oorzaak hiervan kan zijn. Zo kunnen sensaties in ons lichaam niet alleen veroorzaakt worden door *lichamelijke processen* (bijv. spierpijn in je benen na het sporten), maar ook door onze *emoties*. Denk bijvoorbeeld aan je hart dat bonkt in je keel, omdat je verliefd bent. Of het zweet dat in je handen staat, omdat je nerveus bent voor een sollicitatiegesprek.

Ons lichaam kan ons dus veel vertellen over de emoties die wij ervaren en ons helpen deze makkelijker te herkennen. Het herkennen van onze emoties is een belangrijke stap om beter met onze emoties om te kunnen gaan (ook wel reguleren). De **"bodyscan oefening"** laat je daarom eerst nadenken over hoe verschillende lichaamsgebieden aanvoelen (aangenaam of onaangenaam). Daarna word je uitgedaagd om na te denken over wat de oorzaak zou kunnen zijn van deze (on)aangename sensatie(s).

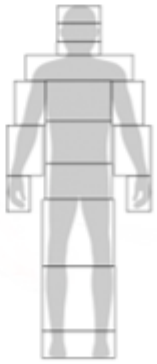
De oefening bestaat uit twee uitdagingen en duurt maximaal 15 minuten.

Veel succes en oefen plezier!

Uitdaging 1: Scan je lichaam

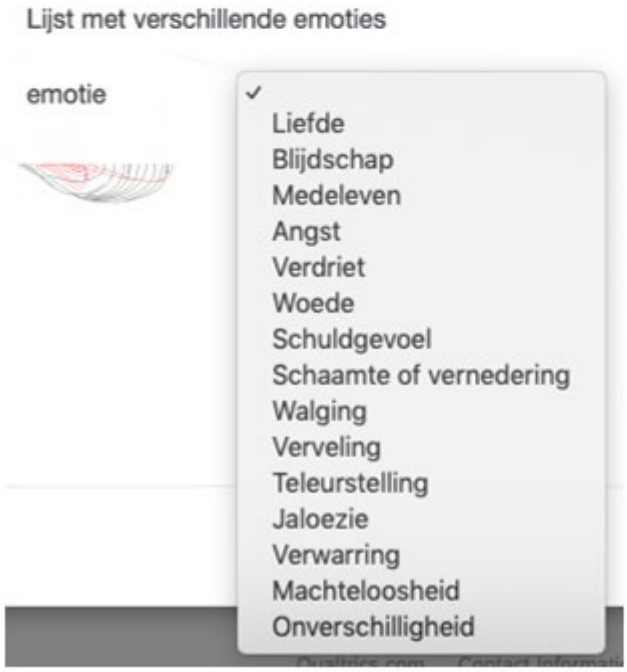
- **Stap 1:** Bekijk de verschillende lichaamsgebieden in onderstaand plaatje.
- **Stap 2:** Concentreer je kort op **wat je voelt** in elk lichaamsgebied (+/- 15 seconden).
- **Stap 3:** Geef per lichaamsgebied aan of dat **wat je voelt**, ***aangenaam/neutraal*** aanvoelt (door 1x op het lichaamsgebied te klikken), of ***onaangenaam*** aanvoelt (door 2x op het gebied te klikken).

Kleur legenda
- **groen** (één klik) = aangenaam of neutraal
- **rood** (dubbelklik) = onaangenaam



Uitdaging 2: Zoek de verklaring

- **Stap 1:** Denk terug aan de "bodyscan oefening".
- **Stap 2:** Denk na over een mogelijke verklaring(en) voor wat jij hebt gevoeld in jouw lichaam.
- **Stap 3:** Geef antwoord op onderstaande stelling.



Appendix D. Opposite action exercise

Beste deelnemer,

Welkom bij de **"oefening voor tegengesteld gedrag".**

Het zal je vast wel eens zijn opgevallen dat je emoties je gedrag beïnvloeden. Soms op een positieve manier, bijvoorbeeld: je ziet bedorven eten -> je voelt walging -> je houdt afstand -> je eet het niet op -> je wordt niet ziek.

Maar emoties zijn zeker niet altijd de perfecte gids. Zo kan het bijvoorbeeld zijn dat je wel eens zo overmand bent geweest door een bepaalde emotie, dat je iets gedaan hebt wat je misschien liever niet had willen doen. Een strategie om de hevigheid van een emotie te verminderen is het veranderen van het gedrag dat de emotie oproept. Handelen op een manier die tegengesteld is aan de emotie, kan dus bijvoorbeeld helpen.

De **oefening voor tegengesteld gedrag** helpt jou daarom om:
(1) je bewust te worden van je eigen gedrag,
(2) na te denken over welke emotie jouw gedrag veroorzaakt zou kunnen hebben, en
(3) een stukje regie terug te krijgen over je eigen gedrag, door te oefenen met tegengesteld gedrag.

De oefeningen bestaat uit twee uitdagingen en zal maximaal 15 minuten duren. Als je eerst kort wilt oefenen met het herkennen van gedrag, dat kan voortkomen uit verschillende emoties, start dan eerst met een korte introductie oefening.

Veel plezier!

- ➔ Start met de introductie oefening!
- ➔ Begin direct met de oefening voor tegengesteld gedrag!

➔ Introductieoefening

Start met de introductie oefening en ontdek hoe emoties ons gedrag beïnvloeden!

Sleep het gedrag naar naar de juiste emotie. *(Let op: elk gedrag past maar bij één van de twee emoties.)*

Items	Vreugde of geluk	Angst
- vermijden of vluchten.		
- samenkomen, deelnemen of delen met anderen.		

Sleep het gedrag naar naar de juiste emotie. *(Let op: elk gedrag past maar bij één van de twee emoties.)*

Items	Verdriet	Woede
- ons terug te trekken of troost zoeken. - aanvallen, uithalen naar de ander, of voor onszelf opkomen.		

Page Break

Sleep het gedrag naar naar de juiste emotie. *(Let op: elk gedrag past maar bij één van de twee emoties.)*

Items	Schuldgevoel	Schaamte of vernedering
- Goedmaken of herstellen wat we gedaan hebben. - verstoppen, iets geheim houden of onszelf straffen.		

Sleep het gedrag naar naar de juiste emotie. *(Let op: elk gedrag past maar bij één van de twee emoties.)*

Items	Walging	Medeleven, empathie of sympathie
- troost bieden. - onszelf terugtrekken, of afstand houden.		

Page Break

Sleep het gedrag naar naar de juiste emotie. *(Let op: elk gedrag past maar bij één van de twee emoties.)*

Items	Verwarring	Machteloosheid
- opgeven. - iets (opnieuw) proberen, of besluiteloosheid.		

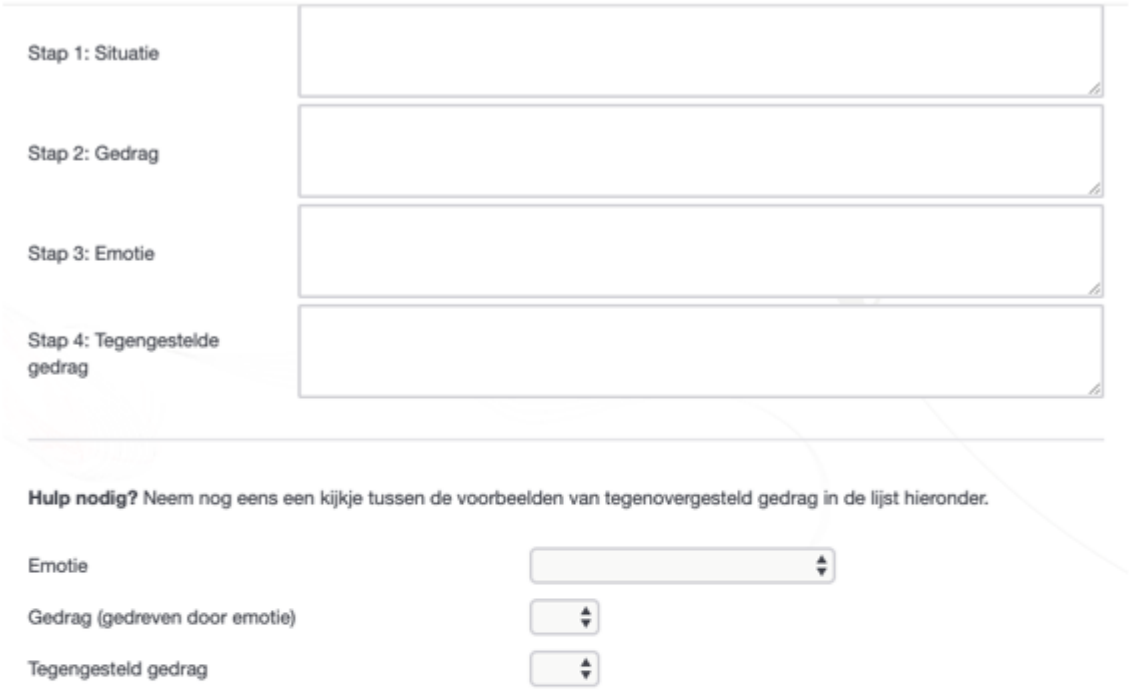
Sleep het gedrag naar naar de juiste emotie. *(Let op: elk gedrag past maar bij één van de twee emoties.)*

→ **Oefening voor tegengesteld gedrag**

Oefening voor tegengesteld gedrag

Uitdaging 1
- **Stap 1:** Denk na over een **situatie** die je vandaag hebt meegemaakt en beschrijf deze.
- **Stap 2:** Beschrijf het **gedrag** dat jij hebt vertoond in deze situatie.
- **Stap 3:** Denk na over welke **emotie** jouw gedrag beïnvloed zou kunnen hebben en beschrijf deze emotie.
- **Stap 4:** Bedenk en beschrijf gedrag dat het **tegengestelde** is van je gedrag bij stap 2.

Vul hier je antwoorden in:



Uitdaging 2
Je weet nu welk gedrag kan helpen om de emotie te verminderen (zie stap 4). Probeer het uit door bij een soortgelijke situatie (of emotie) bewust te oefenen met het tegengestelde gedrag en observeer wat het doet met je emotie.

Tip: *Wees niet te streng voor jezelf als het niet meteen lukt. Wees trots op het feit dat je het geprobeerd hebt en probeer het een andere keer nog eens.*

Heel veel succes!

Appendix E. Positive reframing exercise

Beste deelnemer,

Welkom bij de **"OMdenk oefening"**

Deze oefening zal je uitdagen om een vervelende situatie vanuit een positieve hoek te gaan bekijken. Hoe wij ons voelen wordt namelijk sterk beïnvloed door hoe wij denken over een bepaalde situatie. Stel je bijvoorbeeld eens voor dat je een conflict hebt gehad met je collega, partner of een familielid. Je kunt op twee manieren terugdenken aan dit conflict

> Voorbeeld 1: Je denkt: "Bah, ik haat hem/haar! Ik wou dat hij/zij mij gewoon met rust liet."
>
> Voorbeeld 2: Je denkt: "Ach, hij/zij heeft waarschijnlijk een slechte dag achter de rug. Ik trek het me niet te veel aan."

Merk jij het verschil? De kans is groot dat jij je positiever voelt na het lezen van voorbeeld 2.

Met de OMdenk oefening kun jij nu zelf oefenen met het herinterpreteren van vervelende situaties. De oefening zal maximaal 15 minuten duren.

Veel plezier!

OMdenk oefening

- **Stap 1:** Beschrijf een vervelende **situatie** (Wie was erbij betrokken? Wat is er gebeurd? Waar en wanneer is het gebeurd?).
- **Stap 2**: Beschrijf wat je **dacht** (Welke gedachten gingen er door je hoofd?).
- **Stap 3:** Beschrijf hoe jij je **voelde** (Welke emotie(s) riep de situatie bij jou op?).
- **Stap 4**: Probeer de situatie vanuit een **positieve hoek** te bekijken.

Vul hier je antwoorden in:

- Stap 1: Situatie (wie, wat, waar, wanneer

- Stap 2: Gedachten

- Stap 3: Gevoel

- Stap 4: Probeer de situatie vanuit een positieve invalshoek te bekijken.

Welke positievere verklaring kan ik bedenken voor wat er gebeurd is?

Wat is er fijn/goed/positief aan deze situatie?

Wat kan ik leren van deze situatie?

Hoe kan deze situatie mij helpen?

Vraag & antwoord

1. Ik heb vandaag geen vervelende situatie meegemaakt, wat nu?
Als je toch wilt oefenen, kan je ook een situatie gebruiken die al wat langer geleden is gebeurd. Hoe vaker je oefent, hoe makkelijker het wordt om oude denkpatronen te doorbreken.

2. Het lukt mij niet om alle vragen bij stap 4 te beantwoorden, wat nu?
Dit is geen probleem! De vragen zijn er om jou uit te dagen anders naar een situatie te kijken. Het kan natuurlijk zijn dat dit niet bij elke situatie even goed lukt. Ook al heb je maar antwoord kunnen geven op 1 van de 4 vragen, dit betekend dat je al een eerste stap hebt gezet om jouw oude denkpatronen te doorbreken. Dit is niet makkelijk. Je mag best trots zijn op jezelf!

3. De situatie die ik heb meegemaakt is te persoonlijk. Ik wil de vragen bij de OMdenk oefening liever niet beantwoorden via de survey, wat nu?
Het is goed om te weten, dat jouw antwoorden bij de OMdenk oefening niet worden gebruikt voor het onderzoek. Toch mag jij er natuurlijk altijd voor kiezen om de vragen in de survey niet te beantwoorden. Misschien voelt het voor jou prettiger om de oefening met pen & papier te doen? Het belangrijkste is dat jij de oefening op die manier doet die goed voelt.

Appendix F. Dutch Eating Behavior Questionnaire - Emotional Eating Scale (DEBQ-E)

Geef aan de hand van de volgende 13 vragen aan, in hoeverre verschillende emoties bij jou de zin in eten verhogen. Antwoordopties variëren van "nooit" tot "zeer vaak".

Hoe vaak komt het voor dat je zin krijgt om iets te eten als, ...

	1 Nooit	2 Zelden	3 Soms	4 Vaak	5 Zeer vaak
1. ...je geïrriteerd bent?					
2. ...je niks te doen hebt?					
3. ...je terneergeslagen of ontmoedigd bent?					
4. ...jij je alleen voelt?					
5. ...jij je in de steek gelaten voelt?					
6. ...je boos bent?					
7. ...jou iets onprettigs te wachten staat?					
8. ...je ongerust, bezorgd of gespannen bent?					
9. ...iets tegenzit of verkeerd gaat?					
10. ...je opgewonden bent?					
11. ...jij je verveelt of rusteloos voelt?					
12. ...je angstig bent?					
13. ...jij je teleurgesteld voelt?					

Appendix G. I-PANAS-SF

Geef aan de hand van de volgende 10 emoties aan hoe jij je de afgelopen week over het algemeen gevoeld hebt.

De antwoordopties variëren van "nooit" tot "altijd".

	1 Nooit	2 Zelden	3 Soms	4 Vaak	5 Altijd
1. Overstuur					
2. Vijandig					
3. Alert					
4. Beschaamd					
5. Geïnspireerd					
6. Nerveus					
7. Vastberaden					
8. Aandachtig					
9. Bang					
10. Actief					

Appendix H. Difficulties in Emotion Regulation Scale Short Form (DERS-SF)

Geef aan de hand van de volgende 18 stelling aan in hoeverre jij verschillende moeilijkheden ervaart met het reguleren van je emoties. Antwoord opties variëren van "bijna nooit" tot "bijna altijd".

Geef aan in hoeverre de onderstaande uitspraken op jou van toepassing zijn?

	1 Bijna nooit	2 Soms	3 Ongeveer de helft van de tijd	4 Meestal	5 Bijna altijd
1. Ik besteed aandacht aan hoe ik me voel.					
2. Ik heb geen idee hoe ik me voel.					
3. Ik heb er moeite mee mijn gevoelens te begrijpen.					
4. Ik vind het belangrijk hoe ik me voel.					
5. Ik weet niet zeker hoe ik me voel.					
6. Als ik van streek ben, erken ik mijn emoties.					
7. Als ik van streek ben, geneer ik me daarvoor.					
8. Als ik van streek ben, vind ik het moeilijk om werk uit handen te krijgen.					

9. Als ik van streek ben,
raak ik buiten zinnen.

10. Als ik van streek ben,
denk ik dat ik uiteindelijk
heel depressief wordt.

11. Als ik van streek ben,
heb ik er moeite mee me op
andere dingen te concentreren.

12. Als ik van streek ben,
voel ik me schuldig.

13. Als ik van streek ben,
vind ik het moeilijk om
me te concentreren.

14. Als ik van streek ben,
heb ik er moeite mee mijn
gedrag te beheersen.

15. Als ik van streek ben,
denk ik dat er niets is wat
ik kan doen om mezelf
beter te laten voelen.

16. Als ik van streek ben,
raak ik geïrriteerd over mezelf.

17. Als ik van streek ben,
verlies ik de controle over
mijn gedrag.

18. Als ik van streek ben,
duurt het heel lang voor ik me weer beter voel.

Appendix I. Invitation

Voel jij je een emotie eter?
Dan zoeken wij jou!

Emotioneel eetgedrag

Emotioneel eetgedrag kenmerkt zich vooral door te veel eten als reactie op bepaalde emoties, zoals verdriet of irritatie. Om meer te weten te komen over hoe emotioneel eetgedrag beter behandeld kan worden, is veel wetenschappelijk onderzoek nodig. Vanuit de **Universiteit van Twente** is een onderzoek gestart om een op-maat-gemaakte aanpak voor emotie eters te ontwikkelen. Deze aanpak zal in de toekomst worden aangeboden via een smartphone applicatie.

Wil jij ons helpen met de ontwikkeling van deze smartphone applicatie? Neem dan nu deel aan ons onderzoek!

Het doel van het onderzoek

De toekomstige smartphone applicatie heeft als doel om de emotionele behoeftes van emotie eters in kaart te brengen en daarvoor passende oefeningen aan te bieden. De oefeningen zijn bedoeld om te kunnen oefenen met het effectief reguleren (in goede banen leiden) van emoties. Met het onderzoek is het nu de bedoeling om informatie te verzamelen over de effectiviteit van drie oefeningen, die mogelijk in de smartphone applicatie voor emotie eters aangeboden zullen gaan worden.

Jouw deelname en ervaring is belangrijk voor de optimale ontwikkeling van de toekomstige smartphone applicatie voor emotie eters!

Wie zoeken wij?

Voor dit onderzoek zoeken wij mensen die:

- problemen ervaren met **emotioneel eetgedrag**
- **18 jaar of ouder** zijn
- de **Nederlandse taal** beheersen
- in staat zijn om via de **telefoon of laptop**:
  - meerdere vragenlijsten in te vullen
  - gedurende **2 weken** (om de dag) te oefenen met een toegewezen oefening

Voldoe jij aan bovenstaande beschrijving? Aarzel dan niet en doe mee!

Geïnteresseerd?

Je kunt op 2 manieren meedoen:

1. Klik op onderstaande link

https://utwentebs.eu.qualtrics.com/jfe/form/SV_ahL9BqpqYn21AO1

2. Scan de QR code met je telefoon

Heb je nog vragen?

Neem dan contact op met:

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