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The relationship between impulsivity, weight concern and the yoyo-effect in healthy women

ORIGINAL PAPER

Weight cycling, or the so-called yoyo-effect, is an unhealthy aspect of eating behaviour. It is hypothesized that being more impulsive is related to more weight cycling. Furthermore, the yoyo-effect is expected to follow from an interaction between impulsivity and weight concern; high-impulsive, high weight concerned eaters might experience the yoyo-effect to a higher degree than low-impulsive, high weight concerned eaters. In the current study, 214 women aged 25-50 were recruited. Weight cycling, weight concern and two concepts of impulsivity were assessed, namely trait impulsiveness and reward sensitivity. It is found that trait impulsive people and weight concerned people show a higher degree of weight cycling. The results do not reveal an interaction between both aspects of impulsivity and weight concern. This study suggests that impulsivity, as well as weight concern, might play a role in maintaining a healthy body weight and reducing the risks of the yoyo-effect.

Keywords: Weight cycling; yoyo-effect; impulsivity; weight concern; eating behaviour

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INTRODUCTION

In western societies, the increasing prevalence of overweight and obesity is a reason for concern. In the last decades, the overall silhouette of people has changed dramatically from lean to overweight. The World Health Organization (WHO) has acknowledged obesity as a global epidemic (WHO, 2011). The WHO reported that worldwide 1.5 billion adults were overweight in 2008, of whom 500 million

obese. The consequences for obese individuals are, for instance, higher risks of cardiovascular diseases, diabetes, musculoskeletal disorders and certain types of cancer (WHO, 2011). Furthermore, we must not forget the impact of overweight and obesity on social and psychological aspects of life (i.e. discrimination, contempt of body image) (Wadden & Stunkard, 1985).

Today, people are living in tempting environments, as highly palatable, high calorific food is amply available. As a consequence, an imbalance between calorific intake and energy expenditure is easily achieved. The most popular method for decreasing bodyweight is dietary restraint. The problem arises when weight loss is achieved and diets are finished. People then tend to regain the weight loss and may even put on additional weight or become obese (Amigo & Fernandez, 2007). As a consequence, a lot of people experience weight cycling or the so-called yoyo-effect. When it comes to the overall health of a person, weight cycling appears to be a risk factor of mortality (Jefferey, 1996). For instance, Lissner et al. (1991) demonstrated that weight fluctuations are associated with ischaemic heart disease and cancer. Therefore, it is generally recommended to maintain a healthy body weight throughout life or when obese, try to lose the extra weight without weight cycling.

Multiple factors come into play when eating behaviour is studied. One psychological factor that is thought to be important in explaining differences in susceptibility to overeating is impulsivity. An impulsive act is defined as inaccurate or maladaptive behaviour that is executed without sufficient forethought, planning and control (Solanto et al., 2001). In the context of eating behaviour, impulsivity could, for instance, direct to unhealthy choices when eating on the spur of the moment. Instead of choosing healthy, nutritious foods, one might prefer foods that are high in fat, salt and sugars with greater rewarding value (Davis et al., 2007). Impulsivity can be measured by means of both self-report questionnaires and behavioural tasks. In general, the findings of those measurements correlate weakly (e.g., Wingrove & Bond, 1997) and associations between these tasks are weak (e.g., Marsh, Dougherty, Mathias, Moeller, & Hicks, 2002). This could imply that there are different aspects of impulsivity and this is why researchers recognize impulsivity as a multi-dimensional construct with several interrelated concepts.

The impulsivity construct can be divided into three main aspects, namely response inhibition, sensitivity to reward and self-reported trait impulsivity (Guerrieri et al., 2007; Guerrieri et al., 2008). Firstly, insufficient response inhibition, also known as premature responding, is mostly measured by behavioural tasks. Logan, Schachar, and Tannock (1997) suggested the stop-signal procedure as a paradigm for studying inhibitory control, which consists of a primary task (also referred to as the go task) and a stop task during which the participants have to inhibit their responses.

Secondly, sensitivity to reward is measured both by self-report and by behavioural tasks. The concept of reward-sensitivity is predominantly examined in addiction research. As is the case for nicotine, alcohol and drugs, it has been suggested that food has the potential for abuse (Kelley, Bakshi, Haber, & Steininger, 2002). Consequently, this concept is frequently used in eating related research. Reward-sensitive people are prone to stimuli that have a greater rewarding value

and tend to approach these stimuli (Davis et al., 2004). A link between reward-sensitivity and the Behavioural Activation System (BAS), as described by Gray (1987), can be made. The BAS (or the appetitive system/'go' system), is responsible for appetitive motivation and it is supposed to respond to signals of reward and non-punishment. The more sensitive the BAS is, the more one is believed to be impulsive.

Thirdly, impulsivity is thought to play an important role in personality systems. In this context, impulsivity is referred to as self-reported trait impulsivity or impulsiveness, which is measured by self-report questionnaires, exclusively. With respect to eating behaviour, research has shown links between all three aspects of impulsivity and overeating. For instance, obese women with Binge Eating Disorder are found to be more impulsive as measured by self-report (Nasser et al., 2004). In addition, Nederkoorn, Smulders, Havermans, Roefs and Jansen (2006a) found that obese women could inhibit their responses less effectively compared to normal weight women, as measured by the stop signal task. In the same study, no differences between obese women and normal weight women were found on self-report measures that measured trait impulsiveness and sensation seeking. As for obese children, Nederkoorn, Jansen, Mulken, and Jansen (2006b) have shown that these children display higher scores of impulsivity as measured by self-report. Moreover, impulsivity acts as a predictor for treatment outcome in obese children; the children that were the most impulsive, assessed using the stop-signal paradigm, lost less weight during treatment (Nederkoorn et al., 2006b). Nederkoorn, Braet, Van Eijs, Tanghe and Jansen (2006c) found similar results, but they also demonstrated that obese children, who were least effective in inhibiting responses as measured by the stop-signal task, were also more sensitive to reward as compared to normal-weight children. In general, this suggests that obese people could be more sensitive to the rewarding value of food. Indeed, research has shown that reward-sensitive children consumed more during a taste test including foods that differed in colour, shape, taste and texture as compared to less reward-sensitive children (Guerrieri, Nederkoorn and Jansen, 2008).

Even in healthy, slender women impulsivity is connected with eating behaviour. By administering the bogus taste test (a test during which participants are asked to try different palatable products and rate the taste, while actually the level of consumption is measured) to normal-weight women, it was demonstrated that high-impulsives eat more when presented with palatable food compared to low-impulsives as measured by self-report, but no significant differences were found for the stop-signal task (Guerrieri, Nederkoorn and Jansen, 2007).

To sum up, it has been shown that impulsivity, measured with response inhibition, sensitivity to reward tasks, and with self-report questionnaires, is related to eating behaviour in healthy populations, obese populations, Binge Eating Disorder patients, and children, although there are exceptions (e.g., Nederkoorn et al., 2006a; Guerrieri et al., 2007).

Another important variable that is frequently examined in eating research is eating restraint. Restrained eaters are believed to worry about their weight and are constantly trying to lose weight. They are not content with their current figure. It has been demonstrated that restraint is important when examining eating behaviour.

For instance, restrained eaters are significantly worse at the stop-signal task (i.e., response inhibition) compared to unrestrained eaters (Nederkoorn, Van Eijs, & Jansen, 2004). Furthermore, Jansen et al. (2009) reasoned that overeating might be the result of an interaction between eating restraint and impulsivity, and indeed, high-impulsive high-restrained women appeared to eat more after exposure to a tasty preload compared to low-impulsive high-restrained women. No differences were found between the two low-restrained groups. In conclusion, impulsive restrained eaters have a greater tendency to overeat.

Restraint eaters often try to lose weight using a hypocaloric diet, but seldom succeed (Brownell & Rodin, 1994). As a consequence, these restraint eaters often experience the yoyo-effect. It could be the case that weight cycling is related to impulsivity. One could imagine that extreme dieting and extreme overeating are displayed by impulsive people, while long-term lifestyle adaptations are more difficult to maintain for this group. Hence, impulsive people could experience weight fluctuations to a greater degree.

To further investigate the role of impulsivity in eating behaviour, the current study is the first to examine whether impulsivity, in combination with weight concern, is related to the degree of weight cycling or the so-called yoyo-effect. To examine whether aspects of impulsivity are differentially related to the yoyo-effect, the concept of impulsivity is operationalized as sensitivity to reward and as a self-reported personality trait using the Barratt Impulsiveness Scale (BIS) and the BAS scale of the BIS/BAS scales, respectively. It is hypothesized that there will be a main effect of impulsivity; that is, the more a person fails to inhibit impulsive acts, the more the person will experience weight cycling. Furthermore, it is hypothesized that the yoyo-effect follows from an interaction between impulsivity and weight concern; high-impulsive, high weight concerned eaters experience the yoyo-effect to a higher degree.

METHODS

Participants

Data of 214 women (mean age 39.2 +/- 7.3, mean BMI 25.7 +/- 5.5kg/m²) recruited by Flycatcher Internet Research were collected, analysed and included in the study. Exclusion criteria were: age (i.e. below 25 and above 50), pregnancy and weight fluctuations caused by recent illness or illness in the past. In total, 55 participants were excluded before data analysis; 9 participants did not complete the questionnaires, 10 participants were excluded due to pregnancy, and 36 participants reported weight fluctuations caused by illness or pregnancy.

Flycatcher Internet Research is an independent research institute that has access to a panel that consists of 15.000 members, representative for the Dutch population. Background variables (such as age, gender, education) of these members are known and therefore, a relevant sample could be selected. The institute uses a special reward system; by participating in different studies conducted by Flycatcher, participants can collect a different number of points per participated research. After collecting 900 points, the participant receives a digital gift card worth 10 euros. After

participating in the present study, the participant received 80 points. Participants who did not meet the criteria were excluded from the sample. These participants received 20 points. The present study was approved by Maastricht University, Faculty of Psychology and Neuroscience Ethical Committee.

Measures

Dieting Restraint

The Restraint Scale (RS) developed by Herman and Polivy (1980), was used to reflect dieting restraint. The RS is a self-report questionnaire consisting of 11 items collecting information on current weight, weight fluctuations, dieting behaviour and concern about dieting and weight control. Factor analysis has shown that the RS can be divided into two subscales: subjective concern with dieting (CD) and weight fluctuation (WF) (Polivy, Herman & Howard, 1988). Items 1, 2, 3, 4, 7 and 9 correspond to the subscale CD and items 5, 6, 8, 10 and 11 correspond to the subscale WF. The WF subscale was used to verify the five self-construed weight cycling items (see next section). Scores range from 0 to 40. Restraint eaters are believed to obtain higher scores.

In the present study, only the subscale CD was used to measure dieting restraint, because the items of subscale WF would have acted as a confounder. Higher subscale CD scores imply higher eating restraint.

Yoyo-effect

In order to measure the yoyo-effect, five items were constructed. For instance, it was asked what the maximum weight loss of the participant was in one month and what the maximum weight gain was in one week. As mentioned before, these items were verified using the WF subscale of the RS.

Impulsivity

The Barratt Impulsiveness Scale

Trait impulsiveness was measured by the Barratt Impulsiveness Scale (BIS; Patton et al., 1995). The BIS is a 30-item questionnaire designed to measure three specific aspects of trait impulsiveness; motor impulsiveness (item 2, 3, 4, 16, 17, 19, 21, 22, 23, 25 and 30), attentional impulsiveness (item 5, 6, 9, 11, 20, 24, 26 and 28) and non-planning impulsiveness (item 1, 7, 8, 10, 12, 13, 14, 15, 18 and 27). Motor impulsiveness expresses itself when one does not sufficiently contemplate before action. Attentional impulsiveness involves easy distraction from the task at hand and non-planning impulsiveness comprises a lack of taking future events into account. Questions are rated on a 4-point scale (1 = rarely/never, 2 = occasionally, 3 = often, 4 = almost always/always). The summed score indicates the level of impulsiveness; the higher the summed score, the more impulsive one is believed to be. Item 1, 7, 8, 9, 10, 12, 13, 15, 20, 29 and 30 were reverse coded to avoid a response set (i.e. the tendency for participants to respond to the questions in such a manner that it leaves a certain impression).

The BAS scale of the BIS/BAS scales

Impulsivity as reward sensitivity was measured by the BAS scale of the BIS/BAS scales (Carver & White, 1994). This 20-item questionnaire consists of four subscales, one Behavioural Inhibition System scale and three BAS scales, namely Drive (DRV), Fun Seeking (FS) and Reward Responsiveness (RR). The BAS scale exists of 12 items and is developed to measure the Behavioural Activation System (BAS), as defined by Gray (1987). The items corresponding to the BAS are believed to measure impulsivity (higher BAS scores represent higher impulsivity). The BIS scores were not analysed in the current study.

Procedure

350 women who met the criteria to take part in the current study were selected by Flycatcher and received an email invitation that included a hyperlink. By clicking on this link a new webpage would be opened. First, the participants had to sign an informed consent. Then the participants were asked to report their current height and weight and whether they were pregnant at the time. Next, they completed the questions concerning the yoyo-effect, the RS, BIS, and BIS/BAS scales. Finally, the participants were thanked for participation, received a debriefing and earned 80 Flycatcher points. After sending the 350 selected members a reminder, 20 extra members were invited in order to obtain a sufficient number of participants.

Data analysis

The current study is observational and cross-sectional in nature. The study has a 2 (impulsivity: high vs. low) by 2 (weight concern: high vs. low) Between Subjects design with the yoyo-effect as the dependent variable and weight concern and impulsivity as the independent variables. Data were collected individually and analysed separately for the two different measures of impulsivity. Statistical analyses were conducted using the software programme the Statistical Package for Social Sciences version 20 (SPSS Inc., USA). In all tests, statistical significance was assumed to exist at $p < 0.05$. Items of the RS, BIS and BAS scale were recoded and overall scores were computed before data analyses could start.

First, descriptive statistics were studied. Reliability analyses were computed in order to study the internal consistency of the questionnaires. The data collected with the five questions that were added in order to measure the yoyo-effect were analysed by means of Pearson correlation coefficients to determine whether these questions give a good impression of the yoyo-effect. Furthermore, data from the questionnaires were analysed using two-way ANOVA. The data were analysed for the two different measures of impulsivity, separately.

RESULTS

General statistics

The total sample was divided into a high-impulsive and low-impulsive group, based on a median split for each measure of impulsivity (BIS: 60, BAS: 35), and in a high weight concern group and low weight concern group, based on a median split of the RS weight concern subscale (6). Participants with BIS scores of 60 and lower and BAS scores of 35 and lower were classified as low-impulsive ($n = 101$, $n = 109$), participants with BIS scores higher than 35 and BAS scores higher than 60 were classified as high-impulsive ($n = 113$, $n = 105$). Participants with weight concern scores of 6 and lower were classified as low weight concerned.

General statistics (means and standard deviations) are presented in Table 1 for impulsivity as trait impulsiveness and in Table 2 for impulsivity as reward sensitivity. In terms of internal consistency, the three questionnaires proved to be generally reliable. Cronbach's alpha's are summarized in Table 3. All alpha's are above 0.60 and varied between 0.63 and 0.83, except for the BAS fun seeking subscale ($\alpha = 0.48$).

Table 1 Means (standard deviations) for age, BMI, weight concern and impulsivity as trait impulsiveness (BIS)

	Low impulsive low weight concern n = 77	High impulsive low weight concern n = 53	Low impulsive high weight concern n = 39	High impulsive high weight concern n = 45	F(3,210)
Age	38.91 (7.72)	38.62 (7.06)	39.74 (7.24)	40.07 (6.90)	0.73
BMI	23.57a (3.93)	24.51a (5.11)	27.59b (5.30)	28.89b (6.47)	13.11**
Weight concern	3.81a (1.58)	4.13a (1.68)	9.18b (2.04)	9.60b (2.17)	153.03**
BIS	54.68a (4.83)	67.77c (5.52)	52.72d (5.31)	68.91b (6.26)	124.69**

BMI; Body Mass Index = kg/m², RS; Restraint Scale, BIS; Barratt Impulsiveness Scale. Means with same superscript are not significantly different; means with different superscripts (a, b, c) are significantly different (Bonferroni corrected); ** $p < 0.01$. For instance, the mean BMI of low-impulsive, low weight concerned women does not significantly differ from the mean BMI of high-impulsive, low weight concerned women. However, it did significantly differ from the mean BMI of low-impulsive, high weight concerned women.

Table 2 Means (standard deviations) for age, BMI, weight concern and impulsivity as reward sensitivity

	Low impulsive low weight concern	High impulsive low weight concern	Low impulsive high weight concern	High impulsive high weight concern	F(3,210)
	n = 67	n = 63	n = 42	n = 42	
Age	40.81b (7.02)	36.65a (7.31)	41.31b (6.28)	38.52b (7.50)	5.26**
BMI	24.28b (4.73)	23.60a (4.15)	30.11 (6.87)	26.45b (4.22)	16.82**
Weight Concern	3.75a (1.72)	4.14a (1.50)	9.26b (2.19)	9.55b (2.04)	152.95**
BAS	32.04a (2.69)	39.76b (3.26)	31.81a (2.59)	39.29b (2.61)	128.89**

BMI; Body Mass Index = kg/m², RS; Restraint Scale, BAS; Behavioural Activation System of the BIS/BAS scale. Means with same superscript are not statistically different, means with different superscripts (a,b) are statistically different (Bonferroni corrected); ** p < 0.01.

Table 3 General statistics (means, standard deviations and reliability coefficients) of the RS, the BIS and the BAS scale of the BIS/BAS scales

	Total sample (N = 214) M (SD)	α
RS	11.26 (5.33)	0.80
Weight Concern	6.08 (3.24)	0.71
Weight Fluctuation	5.17 (2.74)	0.70
BIS	60.56 (8.96)	0.83
Motor Impulsiveness	20.09 (3.50)	0.66
Attentional Impulsiveness	16.41 (3.32)	0.70
Non-planning Impulsiveness	21.64 (3.75)	0.65
BIS/BAS scales		
BAS Drive	9.65 (2.31)	0.72
BAS Fun Seeking	10.45 (1.77)	0.48
BAS Reward Responsiveness	15.60 (2.15)	0.63
BAS total	35.69 (4.75)	0.76

RS; Restraint Scale, BIS; Barratt Impulsiveness Scale, BAS; Behavioural Activation System of the BIS/BAS scale

Yoyo-effect and RS subscale Weight fluctuation

Pearson product-moment correlations between the RS weight fluctuation subscale and the five yoyo-items were computed to test whether the yoyo-items were an adequate measure of weight cycling. There was a strong positive correlation between the two scales ($r = 0.62$, $p < 0.01$) and thus the five yoyo-items served as dependent variable in the subsequent analysis.

Trait impulsiveness and the yoyo-effect

A 2 (trait impulsivity: high vs. low) by 2 (weight concern: high vs. low) between-subjects analysis of variance (ANOVA) with the yoyo-effect as dependent variable was conducted to test the prediction that trait impulsive people will experience the yoyo-effect to a greater degree. Indeed, as is shown in Figure 1, impulsive participants showed higher weight cycling scores when trait impulsivity was measured by the BIS ($F(1, 210) = 4,18, p < 0.05$). This effect is only significant when classifying median scores of weight concern of 6 and lower as low weight concerned and median scores of BIS of 60 and lower as low impulsive. Non-significant effects pointing to the same direction are found when classifying weight concern and BIS median scores as high weight concerned and high impulsive. Furthermore, a strong effect of weight concern was found ($F(1, 210) = 86.97, p < 0.01$): the more one was concerned about one's weight, the more one experienced the yoyo-effect.

The second hypothesis stated that impulsive people who are at the same time concerned about their weight, will experience weight cycling to a higher degree. However, this hypothesis was not confirmed ($F(1, 210) = 0.01, p = 0.94$). Removing the non-significant interaction effect did not affect the main effects.

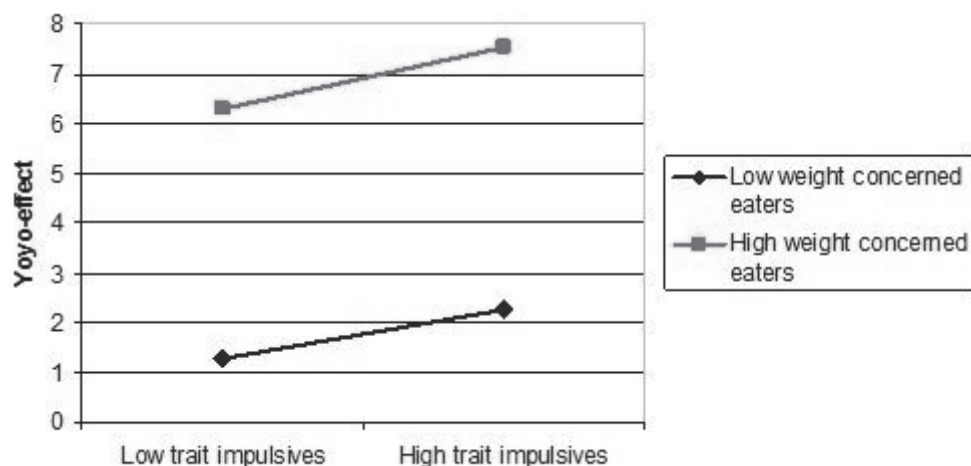


Figure 1. Estimated Marginal Means of the main effects of trait impulsiveness (low vs. high) and weight concern (low vs. high) on the yoyo-effect.

Reward sensitivity and the yoyo-effect

For the measurement of impulsivity as reward sensitivity, we utilised a 2 (impulsivity as reward sensitivity: high vs. low) by 2 (weight concern: high vs. low) between-subjects analysis of variance (ANOVA) with the yoyo-effect as dependent variable to test the prediction that reward sensitive people will experience the yoyo-effect to a higher degree. There appeared to be no significant main effect of impulsivity as measured by the BAS scale of the BIS/BAS scales ($F(1, 210) = 0.22, p = 0.64$).

Furthermore, our second hypothesis was also not confirmed. Reward sensitive

people, who are at the same time concerned about their weight, did not experience the yoyo-effect significantly more than reward sensitive, low weight concerned people ($F(1, 210) = 2.03, p = 0.16$). However, a strong main effect for weight concern was found ($F(1, 210) = 91.96, p < 0.01$), demonstrating that higher scores on weight concern are associated with weight cycling. Again, removing the non-significant interaction effect did not influence the main effects.

DISCUSSION AND CONCLUSION

The current study aimed to investigate the effects of impulsivity and weight concern on weight cycling. It was examined whether two aspects of impulsivity (i.e. trait impulsiveness and reward sensitivity) by themselves and in combination with weight concern, are related to the yoyo-effect. First, for the measurement of trait impulsivity, it was found that impulsivity is related to the degree of weight cycling; the more impulsive one is, the more one experiences the yoyo-effect. A similar effect of weight concern was found; the more one is concerned about weight, the more the yoyo-effect is experienced. Second, when impulsivity was measured as reward sensitivity, weight concerned people proved to experience the yoyo-effect to a higher degree as well. However, results of this measurement did not reveal a significant association between reward sensitivity and the yoyo-effect. Furthermore, results from both measurements of impulsivity failed to show that weight cycling follows from an interaction between weight concern and impulsivity.

The first hypothesis was partly confirmed; impulsivity was related to the yoyo-effect when it was measured as trait impulsiveness. In addition, the concept of reward sensitivity was not related to the yoyo-effect. The fact that no strong association was found between reward sensitivity and the yoyo-effect could be due to the use of self-report questionnaires instead of behavioural tasks for impulsivity assessment. Self-report questionnaires provide a measurement for how participants perceive themselves, while behavioural tasks give an impression of actual behaviour. A study by Nederkoorn et al. (2006a) demonstrated different results for self-report and behavioural measures of impulsivity. Obese women appeared to be more impulsive when impulsivity was measured using a behavioural task, whereas three self-report measures did not reveal such effect. This denotes that behavioural tasks might be more appropriate to measure impulsivity in eating research. In the case of self-report, participants have to be able to introspect. Furthermore, participants could fill in the questionnaires in a manner that they think would be most appropriate, which leads to biased data. Therefore, it is suggested that future research should focus on whether impulsivity, as measured by behavioural tasks, is associated with the yoyo-effect.

Another explanation for the absence of a strong effect of impulsivity on weight cycling is that the role of impulsivity in eating behaviour is not as profound as previous research suggests. Maybe another variable plays an important role in eating behaviour and has not yet been discovered. A number of studies exist that did not find an influence of impulsivity on eating behaviour. For instance, a study by

Nederkoorn et al. (2006a) showed no differences in trait impulsiveness and sensation seeking between obese and normal weight women as measured by self-report. In addition, research revealed that anorexia nervosa patients (AN-R) score lower on self-report measures than purging-anorexia (AN-P), bulimia nervosa (BN) patients and controls as measured by self-report (BIS, BIS/BAS scale and Eysenck's Impulsiveness scale) (Claes, Nederkoorn, Vandereycken, Guerrieri, and Vertommen, 2006), but a significant difference between the different populations on the stop-go task was not discovered. These results do not prove that eating disordered populations that typically overeat are more impulsive; only AN-R patients are less impulsive than AN-P patients, BN patients and controls. Furthermore, high-impulsives eat more at a bogus taste test compared to low-impulsives as measured by self-report, but not when measured by a behavioural task (Guerrieri, Nederkoorn, & Jansen, 2007). Thus, further research has to be careful to not only focus on impulsivity as a variable in eating research.

The present study revealed, however, a strong association between weight concern and the yoyo-effect. In this study, the subscale weight concern of the RS was taken as a measure for eating restraint. The observed effect of weight concern on weight cycling is peculiar, as one would expect that especially participants who are concerned about their weight would want to lose and/or maintain weight. Earlier research indicates that restraint eaters have a greater tendency to overeat (Jansen et al., 2009). Taking this into account, it can be hypothesized that restraint eaters experience weight cycling to a greater degree, because of attempts to lose weight after committing the subjective sin of eating more food than a person permits oneself to eat.

Our second hypothesis stated that high-impulsive, high weight concerned eaters experience the yoyo-effect to a higher degree than high-impulsive, low weight concerned eaters. However, no interaction between weight concern and impulsivity was found, which rejects our second hypothesis. This is not in concordance with outcomes of a study by Jansen et al. (2009), who found that overeating is a result of an interaction between eating restraint and impulsivity. The difference in results could be due to the fact that Jansen et al. (2009) utilized a behavioural task for the measurement of impulsivity, while the present study relied on self-report measurements.

The current study suffered from some limitations. First, as noted before, only self-report measures were utilised. Second, the current design was cross-sectional in nature, which makes it impossible to establish a possible cause-effect relationship between impulsivity and weight cycling. A third shortcoming of this study is that only trait impulsiveness and reward sensitivity were measured and not response inhibition. Several studies have suggested that response inhibition is related to overeating (Nederkoorn et al., 2006a; Nederkoorn et al., 2006b, Nederkoorn et al., 2006c; Nederkoorn et al., 2010). Therefore, response inhibition seems to be an important variable in eating behaviour and further research is needed to explore the relationship between response inhibition and the yoyo-effect.

To conclude, key findings of the present study suggest a role for trait impulsiveness and weight concern in yoyo dieting. Trait impulsive people and weight concerned people show a higher degree of weight cycling. The hypothesis

that weight cycling is the result of an interaction between weight concern and impulsivity was not confirmed. Further research is warranted examining the underlying mechanisms of weight cycling. Discovering what makes some people yo-yo-dieters and others not is of importance, as prevention and treatment of weight cycling would bring positive outcomes for individual's health.

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