

# Effects of implementation intentions on binge eating

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## Summary

### 1) **Is a Brief Implementation Intention Intervention Effective to Reduce Subthreshold Binge Eating in a Student Population?**

The studies described in Chapters 2, 3, and 4 were designed to answer this first research question. All three studies were single blinded randomized controlled trials. Most of the participants were psychology students. All of them exhibited regularly (at least once a week during the past three months) self-reported subthreshold binge eating behavior. Binge eating was defined according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5): A discrete period (e.g., two hours or less) in which large amounts of food are consumed, associated with a sense of loss of control (American Psychiatric Association, 2013). *Subthreshold* binge eating was checked by comparing the average caloric size of binge eating at baseline (approximately 600 kcal per

eating binge) with the caloric size of binge eating typical for BED and BN (> 2,000 kcal per eating binge) (Bartholome et al., 2006; Guertin, 1999). The participants were at least 18 years old, had a body mass index (BMI) of 18.5 or higher, and were not treated for an eating disorder at the time of the study. A total of 301 participants completed one of the three studies. All three studies required participants to keep an online food diary three times a day for four weeks. In it, the three possible main meals and snacks could be noted, as well as any binge eating. The food diary started exactly one week before the first session and ended one week after the last session. All participants received three individual, weekly sessions offered by master's students Mental Health Care Psychology, trained, and supervised by the study coordinator (J.T.). All studies had a control condition in which participants set goals regarding the reduction of binge eating (e.g., "Starting today, I will eat healthily and regularly and refrain from binge eating"). In the experimental conditions, participants additionally set an implementation intention related to their goal (e.g., "If I feel like snacking late at night, then I will grab a delicious fruit salad from the fridge").

The research question was answered with repeated measures analyses of variance (ANOVAs) using pre-measurement data as the first time-point. The analyses with the number of eating binges in the food diary (week 1 versus week 4) as outcome measure showed significant interaction effects for all studies. Effects sizes ranged from small to large. The food diary data in all three studies showed that adding implementation intentions to goal setting leads to a significantly larger reduction in subthreshold binge eating than goal setting alone. In summary, this brief implementation intention intervention aimed at binge eating leads to a significant decrease in subthreshold binge eating.

## **2) Is a Brief Implementation Intention Intervention Effective in Reducing Binge Eating in Patients with BED or BN?**

The research described in Chapter 5 was specifically designed to answer this second research question. This study was a single-blind, randomized, controlled trial conducted at GGNet Amarum,

Expert Center for Eating Disorders The participants were on the waiting list for treatment at GGNet Amarum and had been diagnosed with BED, BN, or eating disorder not otherwise specified (EDNOS) with dynamics of BED or BN (American Psychiatric Association, 2013). They were at least 18 years old, had a BMI of 18.5 or higher, and would not start regular treatment within five weeks. A total of 64 participants completed the study. All participants kept an online food diary three times a day for four weeks, in which the three main meals and snacks were noted, as well as any binge eating. The food diary started exactly one week before the first session and ended one week after the final session. All participants received three individual, weekly sessions offered by master's students Mental Health Care Psychology, trained, and supervised by the study coordinator (J.T.). In the control condition, participants set goals related to binge reduction. In the experimental conditions, participants, under the guidance of their therapist, formulated an implementation intention in addition to their goal.

To answer the research question, repeated measures ANOVAs were used with pre-measurement data as the first time point. The analysis with the number of eating binges in the food diary (week 1 versus week 4) as an outcome measure showed significant and large interaction effects. Based on these findings, we conclude that adding implementation intentions to goal setting leads to a significantly greater reduction in binge eating than goal setting alone. In summary, this brief implementation intention intervention aimed at reducing binge eating during the waiting list period leads to a significant reduction in binge eating in patients with BED or BN.

### **3) What Influence Does Plan Type (Behavior-Focused Versus Emotion-Focused Implementation Intentions) Have on the Effects of the Implementation Intention Intervention?**

The studies described in Chapters 2 and 5 were also intended to answer this third research question. A total of 153 participants (89 in the Chapter 2 study and 64 in the Chapter 5 study) completed these studies, 97 of whom were in the experimental conditions (59 in the Chapter 2 study and 38 in the Chapter 5 study). Both studies had three conditions: A control condition in which only

goals about binge eating were set, and two experimental conditions in which implementation intentions were added. Plan type was manipulated by having participants in one experimental condition only set behavior-focused implementation intentions (e.g., “If I am home alone and feel like snacking, then I will leave the house for a nice walk”), and in the other experimental condition only emotion-focused implementation intentions (e.g., “If I come home from work frustrated, then I will call a friend to vent”).

In both studies, repeated measures ANOVAs using binge eating from the food diary (week 1 versus week 4) as an outcome measure showed no significant interaction effects of plan type. Participants in both implementation intention conditions showed similar reductions in binge eating compared to the control condition. Based on these findings, plan type in the form of behavior-focused versus emotion-focused implementation intentions does not appear to be a moderating variable in reducing binge eating.

#### **4) What Influence Does Motivation (Regulatory Fit Versus Non-Regulatory Fit Implementation Intentions) Have on the Effects of the Implementation Intention Intervention?**

The research described in Chapter 3 was intended to answer also this fourth research question. The study was completed by 117 participants, 57 of whom were in the experimental conditions. There were four conditions: Two control conditions in which goals were set around binge eating, and two experimental conditions in which implementation intentions were added. Motivation was manipulated through regulatory fit: In one of the control conditions and in one of the experimental conditions, participants, guided by their therapist, formed goals and implementation intentions in accordance with their regulatory orientation (regulatory fit), in the other control condition and experimental condition, participants, guided by their therapist, formed goals and implementation intentions contrary to their regulatory orientation (regulatory non-fit).

A repeated measures ANOVA using binge eating from the food diary (week 1 versus week 4) as an outcome measure showed no significant effect of regulatory fit. Participants in both

implementation intention conditions showed similar reductions in binge eating compared to the control conditions. Based on these findings, motivation conceptualized by regulatory fit does not seem to be a moderating factor for the effects of the implementation-intention intervention on the reduction of subthreshold binge eating. However, it is important to note that there was a possible floor effect; in both conditions, participants had less than one binge per week after the third session.

### **5) What Influence Does Degree of Plan Formation (Implementation Intentions With Mental Imagery Versus Implementation Intentions Without Mental Imagery) Have on the Effects of the Implementation Intention Intervention?**

The research described in Chapter 4 was intended to answer also this fifth research question. In total, 95 participants completed the study, 62 of whom were in the experimental conditions. There were three conditions: A control condition in which only goals about binge eating were set, and two experimental conditions in which implementation intentions were added. Degree of plan formation was manipulated by adding mental imagery to only one of the two experimental conditions. In the implementation intentions plus mental imagery condition, participants additionally impressed their implementation intentions under the guidance of their therapist by forming a mental imagery of their implementation intention.

A repeated measures ANOVA with the number of binges in the food diary (week 1 versus week 4) as outcome measure showed no significant Condition x Regulatory fit x Time interaction effect. Participants in both implementation intention conditions showed similar reductions in binge eating. Based on these findings, degree of plan formation in the form of mental imagery does not appear to be a moderating factor of the effects of the implementation intention intervention on the reduction of subthreshold binge eating.

## 6) What Are the Long-Term Effects of the Implementation Intention Intervention in Treating (Subthreshold) Binge Eating?

The studies described in Chapters 2, 3, 4, and 5 were co-designed to answer this sixth research question. A total of 365 participants completed the studies, 216 of whom were in the experimental conditions. We operationalized long term as a period of six months following the intervention. A Dutch adaptation of the 28-items Eating Disorder Examination-Questionnaire (EDE-Q 6.0) was used as pre-test (Day 7), post-test (Day 28), and one-month, three-months, and six-months follow-up measurement (Fairburn & Beglin, 2008; Van Furth, 2000). In all studies, control conditions in which only goals about binge eating were set were compared with experimental conditions in which implementation intentions were added.

This sixth research question was answered with repeated measures ANOVAs using pre-measurement data as the first time-point. The analyses with the outcome measure EDE-Q item 14 (“Over the past three weeks [21 days], on how many of *these times* [emphasis added] did you have a sense of having lost control over your eating [at the time you were eating]?”) (pre-test versus one-month follow-up, three-months follow-up, and six-months follow-up measurement) showed significant interaction effects for all studies. Post hoc tests showed significant differences between the pre-measurement and the six-months follow-up measurement for all four studies. Effects sizes ranged from medium to large. The study from Chapter 4 also showed significant and medium differences at the one-month follow-up measurement and significant and large differences at the three-months follow-up measurement. In the study from Chapter 5, the differences were also significant and large at the one-month follow-up measurement and three-months follow-up measurement. Based on the follow-up data from these four studies, we conclude that adding implementation intentions to goal setting leads to a significantly greater reduction in both subthreshold binge eating and binge eating in patients with BED or BN in the long term. In summary, this brief implementation intention intervention aimed at (subthreshold) binge eating leads to a significant and long-term decrease in (subthreshold) binge eating.