Randomized test of a brief psychological intervention to reduce and prevent emotional eating in a community sample

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ABSTRACT

Background Emotional eating is associated with mental health problems and weight gain, but research has focussed on treatment rather than prevention. The present research tests a brief theory-based psychological intervention to reduce and prevent emotional eating in a community sample.

Methods Two hundred and forty women were randomized to a control condition in which they were asked to identify emotional eating triggers and strategies for change (a 'volitional help sheet') or to an experimental condition in which they were asked explicitly to use the volitional help sheet to link emotional eating triggers with strategies for change and so form implementation intentions.

Results Results showed that eating in response to boredom was more common than eating in response to anxiety or depression. There was a significant condition × time interaction showing that the formation of implementation intentions resulted in significantly lower levels of emotional eating in response to boredom at follow-up ($d = 0.29$).

Conclusions The intervention shows promise in reducing and preventing emotional eating, but further research is required to refine the tool and to examine whether eating in response to anxiety or depression is more common among clinical populations.

Keywords boredom, brief intervention, emotional eating, implementation intention, volitional help sheet

Introduction

Emotional eating is an automatic response to negative emotions (e.g. anxiety, depression) that leads to overconsumption[1] irrespective of feelings of hunger.[2] Emotional eating increases the chances of weight gain,[3] has 74% co-morbidity with Axis I (anxiety disorders and mood disorders) and has 68% co-morbidity with Axis II (personality disorders and developmental disorders) in DSMIV.[4] Emotional eating is also implicated in the aetiology of eating disorders, which directly affect 1.1 million people in the UK and costs the National Health Service up to £100 million each year.[5] Addressing emotional eating before it progresses to pathology is therefore vital. The present study tests a brief psychological intervention to prevent and reduce emotional eating in a community sample.

Therapies associated with emotional eating often focus on addressing the automaticity of the individual's overeating response to negative emotions.[6] However, such therapies are costly and not appropriate for community-based prevention programmes. The basis for the present intervention harnesses the strategic automaticity of implementation intentions as a way of overcoming the automatic overeating response to negative emotions. Implementation intentions[7] are 'if-then' plans that work by making critical cues salient ('if') and associated responses automatic ('then'). In the context of emotional eating, negative emotions represent the critical cues, and strategies such as consciousness raising and stimulus control[8] represent appropriate responses.[9–12] Gollwitzer and Sheeran's[13] meta-analysis shows that implementation intentions are successful in changing behaviour, exerting a medium–large effect size ($d = 0.65$) across 94 studies. A more recent meta-analysis[14] reported that implementation intention-based interventions were more effective at promoting health eating ($d = 0.51$) than preventing unhealthy eating ($d = 0.29$). Although several studies tested the effects of

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implementation intention-based interventions on unhealthy snacking,[14] no studies to date have used implementation intentions to help people overcome emotional eating specifically. This omission is potentially important, because generic avoidance of unhealthy snacking might not capture fully the influence of emotions on eating behaviour and might explain why implementation intentions were better at promoting healthy eating than preventing unhealthy eating.[14]

Recently, research into emotional eating has demonstrated that boredom, as opposed to the more intensively researched anxiety or depression, is a key determinant of overeating. Koball and colleagues[15] found that undergraduate psychology students ate more often in response to boredom than to depression and anxiety, and that students' overeating in response to boredom was distinct from anxiety and depression. The present research was designed to extend this work by (i) considering emotional eating in a sample broader than the undergraduate psychology student population; (ii) employing an unaltered established measure of emotional eating, as opposed to adding 'boredom' items to an established emotional eating scale;[15] and (iii) testing a brief psychological intervention designed to deploy automaticity strategically to reduce emotional eating.

It is predicted that: (i) boredom will emerge as an emotional eating trigger that is distinct from anxiety and depression,[15] (ii) emotional eating triggered by anxiety and depression will be rarer than emotional eating triggered by boredom in a community sample,[15] and (iii) an implementation intention-based intervention will reduce/prevent boredom-related emotional eating.

Method

Participants

The University ethics committee gave approval to conduct the research: Participants were assured of their confidentiality and anonymity (personal codes were used to identify individuals) and were made aware of their right to withdraw from the study or have their data removed at any point.

Two hundred and forty women were recruited via e-mail from the volunteer list of a University in England. All women were eligible as long as they were aged 18 years or older. The average age was 28 years ($M = 28.48$ years, $SD = 11.31$; range: 18–69 years). Consistent with the sampling frame, the women in the present sample were better educated and had a lower BMI than the population at large, but the ethnic make-up of the sample was broadly comparable to that of England (Table 1).

Design

A mixed measures design was employed with one between-participants factor and one within-participants factor. 'Condition'

(control versus experimental) was the between-participants factor; and 'time' (baseline versus follow-up) was the within-participants variable. The main outcome measure was emotional eating. The follow-up took place 1 month post-baseline.

Procedure

All who responded to the initial request for help with a study about their 'personal and social beliefs' in May 2012 received a link to an online questionnaire and were randomly allocated to conditions. The manipulation was placed at the end of identical questionnaires. Participants were asked to provide contact details (e-mail addresses) if they were willing to be contacted again to complete follow-up measures. No incentives were offered for participation. Seventy-six participants (31.7%) offered their contact details, were contacted again and completed follow-up questionnaires; equivalent numbers dropped out of the experimental and control conditions, $\chi^2(1, N = 240) = 2.59, P = 0.11$) (Fig. 1). Baseline and follow-up questionnaires were matched using personal codes: Contact details were kept separate from the data. The data were analysed according to intention to treat, with the last observation carried forward. Per protocol analysis made no substantive differences to the findings.

Manipulations

Participants in both conditions were presented with a 'volitional help sheet' at the end of their questionnaires. The content of the volitional help sheet was similar to that used to support implementation intention formation and assist health behaviour change in previous research on smoking,[9] weight loss,[10] alcohol consumption[11] and self-harm.[12] The volitional help sheet consisted of 13 critical situations and 10 appropriate responses. The 13 critical situations were derived from items used to measure emotional eating.[2] The 10 appropriate responses were taken from the processes of change and were derived from Prochaska and DiClemente's[8] transtheoretical model. These processes of change have been shown to be effective in changing a range of health behaviours.[9–12] The emotional eating items were translated into 'if' statements, for example: 'If I am tempted to eat high-calorie snacks when I am depressed or discouraged...'; the processes of change items were translated into 'then' statements, for example, 'then I will tell myself that if I try hard enough I can resist temptations to eat high-calorie snacks'.

Participants in both conditions were informed that identifying situations in which they were tempted to eat high-calorie snacks and identifying ways to overcome those temptations had been shown to reduce high-calorie snack consumption. Participants in the experimental condition were presented

Table 1 Baseline characteristics of the sample

Variable	Control condition (n = 105)	Experimental condition (n = 135)	Full sample (n = 240)	Population[b] (N = 49 138 831)
Age (%)				
0–15 years	0	0	0	20.1
16–74 years	100	100	100	72.3
75 years and older	0	0	0	7.5
Education (%)				
No formal qualifications	0	0	0	20.9
University-level qualification	51.4	47.4	49.2	14.4
Ethnicity (%)				
White	86.7	86.7	86.7	90.9
Asian	5.7	4.4	5.0	3.5
Black	1.9	3.0	2.5	1.1
Other	5.7	5.9	5.8	4.5
Body mass index[a]				
M	23.7	22.0	22.7	27.1
SE	0.4	0.3	0.2	0.1

[a]Six individuals (2.5%) did not report their height/weight; population body mass index data are from the Health Survey for England (2010; 15).

[b]Demographic data are for England. Source of demographic data: National Statistics website: www.statistics.gov.uk. Crown copyright material is reproduced with the permission of the Controller of HMSO.

with a list of 13 critical situations with dropdown menus. The 10 appropriate responses derived from Prochaska and DiClemente's[8] processes of change formed the content of the dropdown menus. Participants were asked to use the dropdown menus to make links between as many critical situations and appropriate responses as they wanted and thereby form implementation intentions. This procedure is consistent with Gollwitzer's[7] specification that making 'links' between critical situations and appropriate responses is needed to form implementation intentions.[9–12]

Participants in the control condition were presented with a table with two columns containing the same lists of critical situations and appropriate responses that participants in the experimental group saw. Each critical situation and appropriate response had a tick box next to it; participants in the control condition were asked to identify critical situations and appropriate responses and to place a tick next to each one that they thought might be useful to them. Thus, participants in the control condition were not asked to form implementation intentions.

Measures

'Emotional eating' was assessed using the emotional eating subscale of the Dutch Eating Behaviour Questionnaire,[2] which comprises 13 items. Participants responded by ticking one of five boxes, labelled: 'Never', 'seldom', 'sometimes', 'often' and 'very often'.

'Metacognitive processing'—one possible mechanism by which implementation intentions might exert their effect—was also measured at both baseline and follow-up. Adaptations of Sniehotta *et al.*'s[16] six items were used to capture three facets of action control[17] on 7-point (+1 to +7) 'strongly disagree'–'strongly agree' scales. Awareness of standards was measured with two items, (i) 'During the last month I often had my intention to reduce the number of high-calorie snacks I ate each day on my mind' and (ii) 'During the last month I was always aware of my ideal levels of high-calorie snacks'. Self-monitoring was assessed with the following: (i) 'During the last month I constantly monitored my intake of high-calorie snacks to make sure it was not too much' and (ii) 'During the last month I watched myself to make sure I wasn't having too many high-calorie snacks'. Self-regulatory effort was measured with the following: (i) 'During the last month I tried my best to act in a way that was consistent with my personal standards regarding eating high-calorie snacks' and (ii) 'During the last month I really tried to reduce the number of high-calorie snacks I ate each day'. All the metacognitive processing variables loaded on a single factor, which was labelled 'metacognition' and used as a scale in subsequent analyses (Cronbach's $\alpha = 0.87$).

Data analysis

Principal components analysis with Direct Oblimin rotation was used to assess whether it was possible to distinguish
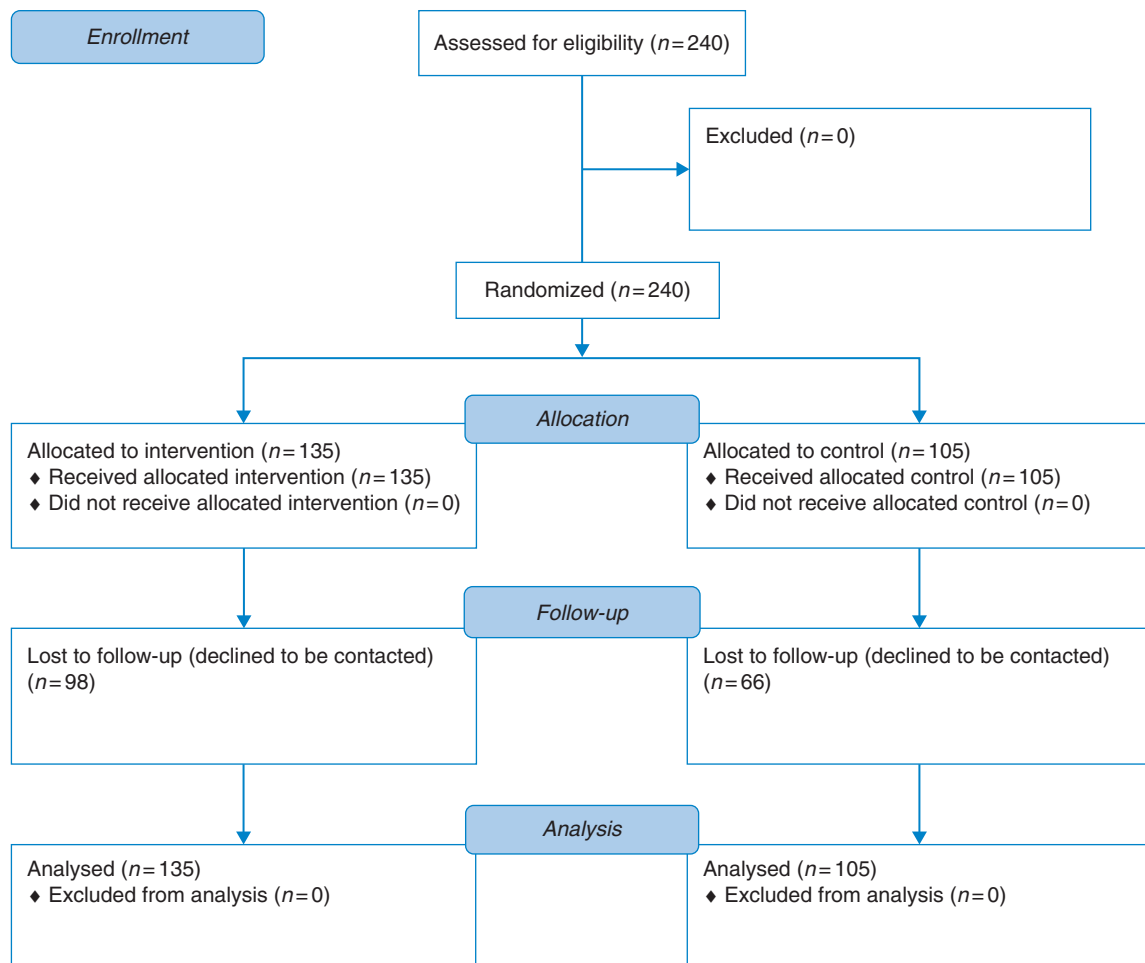
Fig. 1 Flow of participants through the trial.

emotional eating in response to depression from eating in response to anxiety or boredom. MANOVA was used to establish that the two groups of participants were similar at baseline in terms of their demographics and other descriptive characteristics. The effect of the manipulation was tested initially using a series of mixed ANCOVAs. Condition was the between-participants factor, time (baseline versus follow-up) was the within-persons factor, and body mass index was entered as a covariate. Significant interactions were decomposed by: (i) between-participants ANCOVAs controlling for body mass index and baseline and (ii) within-participants ANCOVAs controlling for body mass index run separately for the experimental and control groups.

Results

Psychometric evaluation of principal measures

The emotional eating questionnaire items were subject to a principal components analysis with Direct Oblimin rotation. This produced three factors according to Velicer's minimum average partial test,[18] all of which had Eigen values >1, and accounted for 78.23% of the variance (Table 2). The first factor included items such as, 'when you are depressed or discouraged', which was labelled 'emotional eating ('depression')' (Cronbach's $\alpha = 0.94$). The second factor consisted of two items, including 'when you have nothing to do', which was labelled 'emotional eating ('boredom')' (Cronbach's $\alpha = 0.94$). The third factor consisted of four items, such as 'when you are anxious, worried or tense', which was labelled 'emotional eating ('anxiety')' (Cronbach's $\alpha = 0.91$). Scrutiny of the zero-order correlations among the new scales revealed adequate discriminant validity (rs < 0.73, Table 3).

Prevalence of emotional eating

Within-persons ANOVA revealed significant differences among participants' reports of their emotional eating due to anxiety, depression or boredom, $F(2, 238) = 306.95$, $P < 0.01$, $\eta_p^2 = 0.72$. Simple contrasts confirmed that emotional

Table 2 Rotated factor matrix for principal components analysis of emotional eating items

Items	Factor loadings		
	Depression	Boredom	Anxiety
Emotional eating 1: 'let down'	**0.93**	0.04	0.02
Emotional eating 2: 'things…against you'	**0.93**	0.01	0.02
Emotional eating 3: 'disappointed'	**0.89**	0.03	0.05
Emotional eating 4: 'irritated'	**0.48**	<0.01	0.41
Emotional eating 5: 'nothing to do'	0.02	**0.96**	0.01
Emotional eating 6: 'depressed or discouraged'	**0.90**	0.05	0.06
Emotional eating 7: 'feeling lonely'	**0.72**	0.23	0.03
Emotional eating 8: 'cross'	0.25	0.06	**0.62**
Emotional eating 9: 'unpleasant'	0.12	<0.01	**0.80**
Emotional eating 10: 'anxious, worried or tense'	0.13	0.02	**0.79**
Emotional eating 11: 'frightened'	0.17	0.05	**0.94**
Emotional eating 12: 'emotionally upset'	**0.74**	0.07	0.13
Emotional eating 13: 'bored or restless'	0.01	**0.94**	0.05
Cronbach's α	0.94	0.94	0.91
Per cent variance explained	58.84	11.63	7.76

Values in bold highlight items loading >0.45 on a factor.

Table 3 Zero-order correlations between measured variables

	A	B	C	M	SD
A. Emotional eating ('Depression')	—			2.66	1.02
B. Emotional eating ('Anxiety')	0.73**	—		1.87	0.86
C. Emotional eating ('Boredom')	0.53**	0.37**	—	3.51	1.05
D. Metacognition	0.14*	0.08	0.10	3.94	1.73

*$P < 0.05$.
**$P < 0.01$.

eating in response to boredom was more common than emotional eating triggered by depression, $F(1, 239) = 171.07$, $P < 0.01$, $\eta_p^2 = 0.42$, and anxiety, $F(1, 239) = 550.86$, $P < 0.01$, $\eta_p^2 = 0.70$.

Baseline equivalence check

Equivalence between the two groups at baseline was checked using MANOVA. The independent variable was condition with two levels: Control versus experimental. The dependent variables were age, body mass index, emotional eating ('depression'), emotional eating ('anxiety'), emotional eating ('boredom') and metacognitive processing. The multivariate

Table 4 Effects of the volitional help sheet on emotional eating and metacognitive processing

Variables	Baseline		Follow-up	
	M	SD	M	SD
Emotional eating ('Depression')				
Control	2.73	1.03	2.74	1.06
Experimental	2.65	1.00	2.62	1.00
Emotional eating ('Anxiety')				
Control	1.94	0.87	1.96	0.88
Experimental	1.85	0.86	1.88	0.85
Emotional eating ('Boredom')				
Control	3.50	1.09	3.59[a]	1.09
Experimental	3.54	1.03	3.51[b]	1.03
Metacognition				
Control	3.73	1.60	3.68	1.62
Experimental	4.08	1.82	4.06	1.77

The reported means are 'raw' and not adjusted for baseline values or body mass index. The condition × time interaction associated with emotional eating ('boredom') is statistically significant, $F(1, 231) = 5.04$, $P = 0.03$, $\eta_p^2 = 0.02$. Columns with different superscripts indicate significant differences at follow-up controlling for initial emotional eating ('boredom') and body mass index.

test was significant, $F(6, 227) = 2.64$, $P = 0.02$, $\eta_p^2 = 0.06$, indicating potential problems with randomization. Scrutiny of the univariate tests revealed just one significant difference, $F(1, 232) = 12.23$, $P < 0.01$, $\eta_p^2 = 0.05$: participants in the control group had a higher BMI at baseline ($M = 23.69$, SD = 4.19) than participants in the experimental group ($M = 22.01$, SD = 3.17). BMI was statistically controlled in subsequent analyses.

Effects of the manipulation

The effect of the manipulation was tested initially using a series of mixed ANCOVAs. Condition was the between-participants factor, time (baseline versus follow-up) was the within-persons factor, and body mass index was entered as a covariate. Emotional eating and metacognitive processing were the dependent variables (Table 4), but the only significant effects were observed for emotional eating ('boredom'). Given the low frequency of emotional eating ('depression') and emotional eating ('anxiety'), it is perhaps unsurprising that these were unaffected by the manipulation. The following analyses therefore focus on emotional eating ('boredom').

There was a significant interaction between condition and time for emotional eating ('boredom'), $F(1, 231) = 5.04$, $P = 0.03$, $\eta_p^2 = 0.02$, $d = 0.29$. Between-participants ANCOVA controlling for baseline emotional eating ('boredom') and

BMI showed significant differences in emotional eating ('boredom') between conditions at follow-up, $F(1, 230) = 4.66$, $P = 0.03$, $\eta_p^2 = 0.02$ (Table 4). Thus, participants in the experimental group engaged in significantly less emotional eating due to boredom at follow-up ($M_{\text{adjusted}} = 3.49$, SE = 0.04) compared with participants in the control group ($M_{\text{adjusted}} = 3.62$, SE = 0.04). Within-persons ANCOVAs controlling for baseline BMI showed that the decreases in emotional eating ('boredom') across time in the experimental group were non-significant, $F(1, 130) = 1.59$, $P = 0.21$, $\eta_p^2 = 0.01$, as were the increases in emotional eating ('boredom') in the control group, $F(1, 100) = 2.85$, $P = 0.09$, $\eta_p^2 = 0.03$.

Discussion

Main finding of this study

The present study showed that a tool designed to help people to form implementation intentions, a volitional help sheet, was able to reduce and prevent emotional eating through boredom significantly.

What is already known on this topic

Much previous research focuses on anxiety and depression as triggers for emotional eating, yet research by Koball et al.[15] suggest that boredom constitutes a major trigger for emotional eating. Concurrently, research into volitional help sheets suggests that implementation intentions can overcome automatic responses to critical cues, including emotions.[9–12]

What this study adds

The aim of the present research was to see whether volitional help sheets could overcome the automatic effect of emotions on eating behaviour. In contrast with much research into emotional eating, the present research demonstrates a major role for boredom in emotional eating.[15] The present research also provides support for Koball et al.'s[15] findings while using an alternative measure of boredom and recruiting a broader participant base. The present research extends Koball et al.'s[15] research by significantly reducing and preventing emotional eating triggered by boredom using a brief low-intensity psychological intervention. It would be valuable in future research to see whether a volitional help sheet devoted solely to boredom-related cues would exert larger effects on emotional eating in a community sample. Koball et al.'s[15] work provides additional boredom-related cues that could be used to widen the potential influences on emotional eating.

From a broader perspective, the present findings chime with a meta-analysis[14] showing that implementation intentions were more effective at promoting healthy eating ($d = 0.51$) than in preventing unhealthy eating ($d = 0.29$): The effect size associated with the present intervention was similarly $d = 0.29$. Nevertheless, the nature of the present light-touch internet-delivered public health intervention meant that participants were not screened prior to intervention, and it is interesting to note that the effect was larger if people scoring below the midpoint on the emotional eating ('boredom') sub-scale were excluded, $F(1, 136) = 8.56$, $P < 0.01$, $\eta_p^2 = 0.06$, $d = 0.50$. Future research with this tool will need to trade-off the costs of screening participants with the smaller effect size observed through mass distribution.

Although the present study was designed with prevention in mind, it is notable that there was evidence for both prevention (control group increased emotional eating) and reduction (experimental group decreased emotional eating). The implication is that the present brief psychological intervention might be valuable in clinical practice in addition to community settings. Indeed, the effects of the intervention might be more pronounced in a clinical session with a health professional guiding patients through the formation of implementation intentions to reduce emotional eating. Again, it is worth noting that the effects were more pronounced among those who were initially eating more through boredom.

Consistent with much previous implementation intention research,[19] the present study showed that no questionnaire measures significantly mediated the effects of the implementation intentions. It would be valuable to develop measures of critical cue salience and cue-response links that could be used in the field.[13] In addition, recent research shows that eating through boredom is driven by alleviation of monotony as opposed to increased desire for positive stimulation, which illuminates an additional mechanism that might be explored in future research.[20]

Limitations of this study

Although the present research takes the literature into emotional eating and implementation intentions forward in some important respects, it is important to consider some potential limitations. First the sample was not representative of the population at large and had BMIs in the 'normal' (<25) range, and it would be valuable to repeat this research in overweight/obese and other clinical populations. It is plausible that other negative emotions, such as depression and anxiety, might be more important determinants of emotional eating in these populations. Second, although the way in which the intervention was delivered without providing incentives implies that the intervention could be cost-effective and have good public health 'reach', it is not clear how many people did not respond to our initial request to participate, which may have biased the sample. Relatedly, although intention to treat analysis (last observation carried forward) was conducted, the attrition was

substantial and it would be wise to exercise caution before generalizing the present findings. Nevertheless, the low cost and potential reach of the intervention means it would be useful to repeat the study with resources targeted at preventing attrition.

Conclusion

The present research shows that an implementation intention-based intervention was able to reduce and prevent emotional eating associated with boredom. It would be valuable to replicate these effects in clinical samples and see if it is possible to augment the present effects with additional health professional support.

Acknowledgements

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