

Effects of thought suppression on eating behaviour in restrained and non-restrained eaters.

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Abstract

Recent research has shown that suppressing food related thoughts can cause a subsequent increase in consumption relative to groups not suppressing, or thinking about food. The present study examined whether the effects of thought suppression on subsequent eating behaviour would interact with participants restrained eating status. One hundred and sixteen female participants were split into three groups. One third suppressed thoughts of chocolate, one third thought about chocolate and the final third thought about anything they wished. Following this, participants took part in a task where they rated two brands of chocolate on several taste characteristics. Participants were unaware that the dependent variable was the amount of chocolate consumed and not taste preference. Participants also completed measures of dietary restraint, craving, guilt and thought suppression. Results indicated that restrained eaters in the suppression condition consumed significantly more chocolate than restrained eaters in the expression or control condition. Participants low on restraint ate statistically equivalent amounts in all three groups. In addition, participants reporting frequent use of thought suppression (assessed by the White Bear Suppression Inventory) reported greater chocolate cravings.

Keywords: Thought suppression, behavioural rebound, self-regulation, eating behaviour, dietary restraint.

The use of thought suppression has long been known to result in an intensification of intrusive thoughts rather than reduction (Wegner, Schneider, Carter & White, 1987). This is supported by meta-analytic findings showing that thought suppression does indeed cause subsequent thought rebound (Abramowitz, Tolin, & Street, 2001). Therefore it is generally accepted that suppressed thoughts will often subsequently return more strongly, and that thought suppression represents a poor method of achieving control over the mind (Wegner & Pennebaker, 1993). In further support of the relationship between thought suppression and uncontrollability, studies commonly report associations between greater use of thought suppression and psychopathology (Erskine, Kvavilashvili & Kornbrot, 2007; Wegner & Zanakos, 1994). Importantly, recent work suggests that thought suppression can also result in behavioural consequences that mirror its effects on thought. Thus, studies have demonstrated that avoiding thoughts about a skinhead can result in one keeping a greater social distance from a skinhead in later interactions, and that suppressing thoughts of alcohol can result in one subsequently smoking more intensively (Macrae, Bodenhausen, Milne, & Jetten, 1994; Palfai, Colby, Monti, & Rohsenow, 1997).

More recently, Erskine (2008) demonstrated that suppressing thoughts of chocolate resulted in greater subsequent chocolate consumption, relative to groups that thought about anything or thought about chocolate. The present study will also investigate the effects of suppressing thoughts of food on later consumption. However, it will seek to address an unanswered question from the previous study of Erskine (2008). Thus, the previous study of Erskine (2008) recruited all non-dieting participants and did not measure dietary restraint, and was therefore unable to investigate the effects of dietary restraint on participants' consumption. This last point needs to be taken into consideration as there is evidence to suggest that dietary restraint is linked to both a tendency to restrict food intake but also to overeat (Herman & Polivy, 1993; Polivy & Herman, 1985). Dietary restraint is

often viewed as commensurate with a chronic tendency to diet (Polivy, 1996). Furthermore, recent laboratory work has indicated that the effects of behavioural dietary restriction often interact with restrained eating status, causing subsequent overeating in restrained but not unrestrained eaters (Polivy, Coleman & Herman, 2005). Thus, Polivy et al. (2005) divided 103 participants into three groups that were either deprived of chocolate, vanilla or non-deprived for one-week. After this, participants were presented with a laboratory task involving tasting and rating foods. Results indicated that restrained eaters deprived of chocolate, ate more chocolate in the food comparison task and experienced more cravings. Polivy et al. (2005) conclude that deprivation can cause craving and overeating in restrained eaters. In addition, there is also evidence linking increased craving to dietary restraint (Fedoroff, Polivy & Herman, 2003).

The previous work of Soetens and colleagues also directly relates to the current study. Thus, Soetens & Braet (2006) had clinically obese and non-obese boys and girls (12 to 18 years old) suppress thoughts of food or merely monitor them. Soetens & Braet (2006) then examined subsequent levels of thinking about food. The results indicated no overall rebound effect (increased food thoughts after suppression). However, restrained eaters that were also obese did show a thought rebound, again demonstrating an interaction between restrained eating and an experimental manipulation involving suppression. In a further study, Soetens, Braet, Van Vlierberghe & Roets (2008) examined the effects of prohibition and restrained eating on laboratory consumption. Specifically, half of the participants were prohibited from eating a favourite food for 24 hours, while simultaneously being exposed to it, the remaining participants were not prohibited. All participants then attended a laboratory eating session. Participants were also not only classified as restrainers versus non-restrainers but also as high or low in disinhibition. Disinhibition is taken to indicate a predisposition to overeating (Westenhoefer, Broeckmann, Munch & Pudel, 1994). Results

indicated that participants consumed more in the laboratory following prohibition and exposure. However a significant interaction between experimental group (prohibition vs. no prohibition) and high restraint/high disinhibition was also reported such that the results were strongest in this sub group. Therefore, restrained eaters that were also disinhibited showed particular sensitivity to the effects of prohibition.

The present study will examine eating behaviour in the laboratory, but will take measures of dietary restraint, guilt and cravings to examine how these factors impact upon the previously demonstrated effects of thought suppression (Erskine, 2008). This is important as previous research has not yet examined the effects of thought suppression of food thoughts on subsequent consumption in restrained and non-restrained eaters. Polivy et al. (2005) examined the effects of behavioural restraint on subsequent consumption and Soetens et al (2008) examined a combination of thought suppression and behavioural restriction on subsequent consumption. In addition, both studies divided their participants into restrainers and non-restrainers. Thus, the study reported here is the first to examine subsequent consumption in participants only using thought suppression. In addition, we also wanted to investigate previously reported correlates of overeating such as guilt and cravings. Therefore, participants will be asked to either suppress, express or monitor their thoughts about chocolate for five minutes. They will then be introduced to an ostensibly unrelated task where they will have the opportunity to try two brands of chocolate and answer a questionnaire about their preference. Participants will be unaware that the real variable of interest is the amount consumed. It is anticipated that the results will show an interaction between experimental group (suppression vs. expression vs. control) and participants' restraint status (restrained vs. non-restrained), such that a clear behavioural rebound will be evident in the restrained eaters with the suppression group consuming

significantly more chocolate than the expression and control conditions. It is anticipated that non-restrainers will show a similar effect but of weaker magnitude.

It is anticipated that restraint, cravings and body mass index will be significantly and positively related. If cravings are predictive of consumption then one would anticipate that participants reporting greater chocolate cravings would have higher BMI's. Furthermore, if restraint is related to overeating again one would anticipate a positive relationship between restraint and participants BMI scores. Importantly there is previous support for positive relationships between cravings and BMI (Burton, Smit & Lightowler, 2007; Rodin, Mancuso, Granger & Nelbach, 1991) and between dietary restraint and cravings (Hill, Weaver & Blundell, 1991). One final aim was to examine participants' use of thought suppression in everyday life and how this relates to guilt, cravings and body mass index. It is anticipated that participants using thought suppression frequently would report greater guilt and cravings, and would have higher body mass index scores.

Method

Participants

One hundred and twenty seven female undergraduates took part. However, the final sample consisted of 116 participants (mean age 22.57 years; SD=6.38) as five failed to follow the experimental instructions, and six were outliers on the body mass index. There were 41, 39 and 36 participants in the suppression, expression and control groups respectively.

Materials

Restraint scale (Herman & Polivy, 1980). This ten-item questionnaire assesses people's dietary habits and weight fluctuations. Scores range from 0-35. Statements include 'Do you have feelings of guilt after overeating?' or 'In a typical week, how much

does your weight fluctuate?’ Higher scores indicate greater weight fluctuation and concern over dieting.

Attitudes towards chocolate scale (ACQ-Benton, Greenfield, & Morgan, 1998).

This 24-item questionnaire contains subscales assessing craving, guilt and a functional use of chocolate. Ten items measure craving, ten measure guilt and four index functional approach. The scores combine to give a total attitude to chocolate score. Items include “Chocolate often preys on my mind” and “I feel depressed and dissatisfied with life after eating chocolate”. Answers are made on 5-point Likert scales where 1=strongly disagree and 5=strongly agree. Higher scores indicate greater craving, guilt and functional use of chocolate.

The White Bear Suppression Inventory (WBSI-Wegner & Zanakos, 1994) is a 15-item questionnaire measuring people’s use of thought suppression. It contains statements such as ‘There are things I prefer not to think about’ or ‘There are images that come to mind that I cannot erase’. Ratings are made on a five point scale from “strongly disagree” to “strongly agree”. Scores range from 15-75. Higher scores indicate greater use of thought suppression.

Participants were also asked to indicate how hungry they were and how much they liked chocolate on a 10-point scale (0=strongly dislike/not at all hungry; 10=strongly like/very hungry). Finally they were asked to report whether they were currently on a diet. Currently being on a diet was defined as deliberately trying to control food intake for the purpose of losing weight or maintaining their current weight. Finally participants were weighed in kg’s on a standard scale and their height was measured using a wall mounted height scale in cm’s to calculate their body mass index.

Procedure

Participants completed the study individually. All participants were asked to refrain from eating or drinking in the hour prior to the start of the study. On arrival they were introduced to a study on thinking and taste preference. Participants were informed that there would be two periods of thought verbalisation during which they would be asked to think aloud while alone. It was made clear that during these think aloud periods they may additionally be given concepts to either think or not think about. Next participants were told that the verbalisation periods would be followed by a taste preference task where they would have the opportunity to try two brands of chocolate and answer a series of questions regarding their preference. Once clear that the participants understood the instructions they signed a consent form. Next they were asked to rate how hungry they were and how much they liked chocolate on a 10-point scale (see materials).

Participants were then told to start thinking aloud and that there were no restrictions on what they might think about. The experimenter then started a tape recorder and left the room. After 3 minutes the experimenter returned and provided instructions for the 5-minute verbalisation period.

Verbatim instructions for suppression, expression and control groups appear below:

Suppression

“Please try not to think about your intention to eat chocolate later on in the experiment. This includes suppressing thoughts about holding chocolate, the taste, smell and texture of chocolate, what it looks like, different brands etc. If you do say or think anything about chocolate I would like you to press this buzzer”.

Expression

“Please try to think about your intention to eat chocolate later on in the experiment. This includes expressing thoughts about holding chocolate, the taste, smell and texture of

chocolate, what it looks like, different brands etc. If you do say or think anything about chocolate I would like you to press this buzzer”.

Control

“Please continue verbalizing your thoughts for a further five minutes. Once again feel free to talk about anything you like, there are no restrictions or expectations. If you do say or think about chocolate I would like you to press this buzzer”.

The experimenter then started the tape recorder and left the room. After 5 minutes the experimenter returned and unveiled two bowls of chocolate labelled “A” and “B”. Bowl A contained 20 “Maltesers” and bowl B contained 20 “Galaxy Minstrels”. Participants were provided with a questionnaire asking for detailed feedback on the characteristics of the two chocolate brands. It was made clear that in order to answer the questions participants would have to try at least one of each chocolate and that they could try as many as they wished in order to answer the questions as fully as possible. Participants were left alone during the taste preference task.

Next all participants filled in the dietary restraint scale (Herman & Polivy, 1980), the Attitudes towards chocolate scale (Benton, Greenfield, & Morgan, 1998) and the White Bear Suppression Inventory (Wegner & Zanakos, 1994). Participants were then weighed and their height was measured. Finally all participants were probed for insight and debriefed.

Data treatment

Data analysis used two different statistical approaches. First, in line with Polivy and Soetens we planned to use univariate ANOVA with amount of chocolate consumed as the dependent variable and group (suppression vs. expression vs. control) and restraint (high vs. low scores) as between subjects variables. This would make for easy comparisons with

previous studies (Polivy et al 2005; Soetens et al 2008). In addition, we also wanted to examine the data from a regression approach using dummy coded categorical predictors.

Preliminary analysis examined participants' scores on the individual difference measures collected by group (suppression vs. expression vs. control) and restraint scores (restrainers vs. non-restrainers). Participants did not differ significantly on any of the individual difference measures collected by group. However, participants did differ on several variables when examined by restraint status. Restrainers scored significantly higher on BMI ($p=.0001$), Guilt after chocolate ($p=.0001$) and the total attitudes towards chocolate scale score ($p=.05$). Furthermore restrainers narrowly missed scoring higher on chocolate cravings ($p=.07$).

Prior to conducting analyses we examined whether participants followed the experimental instructions. Therefore, the number of times participants reported thinking of chocolate in the 5-minute verbalisation period was examined by a 3 group (suppression vs. expression vs. control) between subjects ANOVA. Results indicated a main effect of group $F(2, 113)=79.40, p=.0001 \eta^2 =.58$. The expression group thought about chocolate on average 37.08 (SE=2.15) times, the control group thought 6.92 (SE=2.24) times and the suppression group thought 6.49 (SE=2.10) times. Tests of simple effects indicated that the expression group were significantly above the control and suppression groups ($p=.0001$ in both cases). However the suppression and control groups were not different ($p=.82$). Thus participants followed the experimental instructions.

Results

The number of chocolates consumed and times participants reported thinking about chocolate were non-normally distributed. Therefore, scores on both measures were square root transformed prior to all analyses. However, for clarity untransformed means are reported throughout.

Participants were divided (by median split) into restrainers and non-restrainers on their scores on the restraint scale¹. This variable was then used as an additional between subjects factor in further analyses.

The first analysis investigated the main experimental hypothesis by examining the amount of chocolate consumed by group (suppression vs. expression vs. control) and restraint status (restrainer vs. non-restrainer) using a between subjects ANOVA. Results indicated a main effect of group $F(2, 110)=4.86, p=.01, \eta^2 = .08$, no main effect of restraint $F(1, 110)=2.92, p=.09, \eta^2 = .02$, but a significant interaction of group and restraint $F(2,110)=3.04, p=.05, \eta^2 = .05$. Tests of simple effects indicated that non-restrainers demonstrated no differences in consumption between the suppression, expression and control groups ($p>.44$ in all cases). However, for restrained eaters the suppression group consumed significantly more than the expression and control groups ($p=.0001$ and $p=.02$ respectively). The control and expression groups consumption was statistically equivalent ($p=.16$). See Figure 1 for means. Alternatively, for the control and expression conditions there were no differences in the amount consumed for restrainers and non-restrainers ($p=.28$ & $p=.43$ respectively). However for the suppression group the restrainers consumed significantly more than the non-restrainers $p=.007$.

Regression analysis

In order to examine the effects of group (suppression vs. expression vs. control) and restraint on the amount of chocolate consumed in the study the group variable was dummy coded in order to enter into a regression model predicting chocolate consumed. The continuous variable of restraint was centred and used to calculate the interaction of group and restraint for use in the regression model. The stepwise regression procedure was used to predict the amount of chocolate consumed from the following predictors: The dummy coded group variables, restraint, the interaction of group and restraint, BMI and liking for

chocolate. These predictors were chosen as they showed significant correlations with the amount of chocolate consumed (see Table 1). The final model accepted explained 14% of the variance in chocolate eaten ($R^2 = .14$) and was significant $F(3, 115) = 6.11, p=.001$. The model had three significant predictors, (1) Group (suppression) $t=3.02, p=.003, \beta = .27$ (2) the interaction of suppression and restraint $t=2.20, p=.03, \beta = .19$, and (3) liking for chocolate $t=1.99, p=.05, \beta = .18$. This indicated that group, the interaction of group and restraint and liking for chocolate were all significant predictors of the amount of chocolate consumed in the laboratory.

Given the significant interaction between group and restraint status we also wanted to examine whether restraint would show interactions with frequency of use of thought suppression as assessed by the WBSI (high vs. low). A 2 restraint (restrained eater vs. non-restrained eater) by 2 use of thought suppression (high vs. low) ANOVA on participants' cravings demonstrated a main effect of thought suppression ($p=.02$) but no main effect of restraint ($p=.08$) and no interaction ($p=.66$). With chocolate cravings being higher in frequent suppressors. The ANOVA was also calculated with guilt as the dependent variable. Guilt was higher in restrained eaters ($p=.001$) and showed a trend towards being greater in frequent suppressors ($p=.06$) but they did not show interactive effects ($p=.33$).

In order to examine hypotheses regarding the relationship between the individual difference measures collected in this study, correlations between variables collected were calculated, Table 1 shows this data. Significant positive correlations are evident between participants BMI and amount of chocolate consumed ($r=.22, p=.02$), between cravings and amount of chocolate consumed ($r=.19, p=.04$), between participants BMI and Guilt over chocolate ($r=.40, p<.001$) and between BMI and Restraint ($r=.51, p<.001$). In addition, the amount participants report liking chocolate correlates significantly with their cravings ($r=.57, p<.001$) and their functional use of chocolate ($r=.25, p<.01$). Other important

relationships were found between craving for chocolate and guilt over chocolate ($r=.24, p<.01$) and between cravings and functional use of chocolate ($r=.37, p<.001$). A highly significant relationship between restraint and guilt over chocolate was also present ($r=.68, p<.001$).

Discussion

The main hypothesis was that participants asked to suppress thoughts of chocolate in the laboratory would subsequently consume more chocolate than participants that had been asked to think about anything or express thoughts of chocolate. In line with this hypothesis participants demonstrated a behavioural rebound by consuming more chocolate after suppression than after expression or thinking anything. However, the general rebound was qualified by a significant interaction of group (suppression vs. expression vs. control) and dietary restraint (restrainer vs. non-restrainer). On closer inspection behavioural rebound occurred significantly only in the restrained participants. While non-restrainers did demonstrate a numerically higher consumption in the suppression condition than the two alternate groups, this was not significantly different. Therefore it seems that restrained eaters are especially susceptible to the behavioural effects of thought suppression. This suggests that use of thought suppression among restrained eaters is a risk factor for overeating. However, the present study also collected data on participants' routine use of thought suppression and showed that restrained eaters are not more likely to use thought suppression than non-restrainers per se. Thus, restrained eaters did not report greater use of thought suppression in everyday life than non-restrained eaters in the current study.

These findings indicate that in addition to direct behavioural restriction which has been shown to result in subsequent overeating in restrained eaters (Polivy et al., 2005) thought suppression may also have similar effects. In addition, given previous work

indicating that cues often elicit cravings (Fletcher et al., 2007) it is interesting that thought expression did not enhance subsequent consumption. Little is known about the effects of overt thought on subsequent consumption, but the current findings suggest it may not be as consequential as one might imagine. However, it is evident that the effects of thought expression on subsequent consumption require further study. The current study also supports the previous work of Soetens et al. (2008) where they reported a similar interactive effect of restraint and prohibition of a food item for 24 hours on subsequent laboratory consumption. However, on inspection of the method used in the Soetens study it is apparent that participants were instructed to both avoid the snack behaviourally but also to suppress thoughts of the snack, Soetens et al. (2008) state “They were instructed to wear the bag at all times and to try to avoid the snack during the whole 24h, by not eating it and by trying not to think about it.” (p203). Thus, it would appear that in conjunction with previous findings, behavioural avoidance (Polivy et al., 2005) thought avoidance (present study and Erskine, 2008) and both behavioural and thought avoidance together (Soetens et al. 2008) can cause a subsequent increase in consumption in restrained eaters. Further research is necessary to tease apart the relative strength of these effects and whether behavioural prohibition and thought suppression together result in an amplification of either of the effects alone. Importantly, examining the current results using a regression approach demonstrated that the best model predicting the amount of chocolate consumed in the laboratory was a model including group, the interaction of group and restraint and liking for chocolate as predictors. This model explained 14% of the variance in the amount of chocolate consumed.

The present results indicate the significant failure of thought suppression as a form of self control, particularly as it is often used in the service of attempted behavioural avoidance (Baumeister, Heatherton, & Tice, 1994). Furthermore, these results indicate that

those least able to manage their eating behaviour (restrained eaters) are most susceptible to the ironic behavioural effects of thought suppression.

While thought suppression and restraint status interact to result in greater consumption following thought suppression in restrained eaters, they may also have non-interactive effects in everyday life on cravings and guilt. This is evidenced by raised craving and guilt scores in both restrained eaters and high thought suppressors, with an absence of interactive effects. Previous work from Soetens, Braet & Moens (2008) has reported that disinhibited restrainers are more likely to use thought suppression. The present report did not find greater use of thought suppression in restrained eaters, but in contrast to Soetens et al. (2008) we did not divide the sample into inhibited and disinhibited restrainers.

The present results also show consistent positive relationships between body mass index and guilt over chocolate and dietary restraint. While correlational, the current experimental findings suggest causal effects of restrained eating on participants' body mass index, that are also indexed correlationally.

Previous research sometimes reports relationships between dietary restraint and craving (Rodin, Mancuso, Granger, & Nelbach, 1991) which were not present in this sample. However, there was a very strong ($r=.68$) relationship between restraint and guilt over chocolate. In addition, craving was positively related to guilt over chocolate. As restrained eating can be viewed as a form of chronic dieting, chocolate consumption would usually represent dietary failure, hence greater guilt. Thus, the current study not only demonstrates behavioural effects of thought suppression in restrained eaters, but also effects on cravings and guilt for participants reporting frequent use of thought suppression.

In conclusion, suppression of thoughts about chocolate can result in a behavioural rebound whereby participants consume more subsequently. This effect is reported in

restrained eaters but not in non-restrained eaters. To our knowledge this study represents the first evidence demonstrating interactive effects of an individual difference variable such as restrained eating on the behavioural consequences of thought suppression. Future research is necessary to investigate the mechanisms underpinning the effects of thought suppression and food deprivation on subsequent consumption particularly it would seem in restrained eaters.

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Footnotes

¹ Participants were also dichotomised (restrained vs non-restrained) on the basis of cut-off points previously reported by Polivy and colleagues however this resulted in no changes to the results (Polivy, Coleman & Herman, 2005).

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Table 1 – Correlations between measures collected

	Choc	BMI	LFC	H	WBSI	C	G	F	T	R
Chocolate	1									
BMI	.22*	1								
LFC	.19*	.06	1							
Hunger	.17	-.10	-.04	1						
WBSI	-.11	-.11	-.12	-.05	1					
Craving	.07	-.03	.57***	-.09	.15	1				
Guilt	.14	.40***	.09	-.11	.13	.24**	1			
Function	.00	-.10	.25**	.14	.13	.37***	.11	1		
Total sum	.00	.13	.08	-.03	.09	.18*	.27**	.11	1	
Restraint	.09	.51***	.03	-.05	.05	.08	.68***	-.8	.13	1

Key: Choc= amount of chocolate consumed in the experiment; BMI=body mass index; LFC=liking for chocolate; H=Hunger ratings; C=craving subscale from attitudes to chocolate questionnaire; G=guilt subscale from attitudes to chocolate questionnaire; F=functional subscale from attitudes to chocolate questionnaire; T=total sum score of attitudes to chocolate questionnaire; R=eating habits questionnaire score.

*=.05

**=.01

***=.001