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Running head: RESTRAINED EATING AND MEMORY SPECIFICITY

Restrained Eating and Memory Specificity

Christopher T. Ball^a, Shereen Singer^a, Eva Kemps^b, and Marika Tiggemann^b

^aPsychology Department,

College of William & Mary,

P.O. Box 8795,

Williamsburg, VA 23187-8795,

USA

^bSchool of Psychology,

Flinders University,

GPO Box 2100,

Adelaide, South Australia 5001,

Australia

Corresponding author.

ctball@wm.edu (Chris Ball)

not for publication

1-757-221 1760 (office); 1-757-221 3896 (fax)

Abstract

Autobiographical memories are personal experiences that we store across our life-span. A reduced ability to retrieve specific autobiographical experiences has been reported for a number of clinical populations. Previous research has found that the size of the memory specificity effect can predict disorder occurrence, severity, and treatment success. The current research examined whether a similar relationship could be found between memory specificity and restrained eating in a female college student population.

Participants retrieved autobiographical memories that related to cue-words associated with dieting and body image. Individual differences in restrained eating were measured with the Restraint Scale (RS). Participants who scored higher on the Concern-with-Dieting sub-scale of the RS retrieved fewer specific autobiographical memories regardless of their current dieting activity. The memory specificity effect has the potential to serve as a predictor of eating disorder occurrence and treatment success, and may also assist with the development of interventions targeting such disorders.

Keywords: restrained eating, dieting, autobiographical memory, memory specificity, over-general memory

Introduction

Autobiographical memory is the storehouse for personal experiences that help shape our lives. These experiences can range from mundane daily activities, such as having a meal, to highly distinctive and important life experiences, such as getting married or losing a loved one. Williams, Conway, and Cohen (2008) suggest that autobiographical memory serves three important functions: (1) Social: the sharing of memories facilitates social interactions, (2) Directive: memories of past events assist in problem solving and predicting behavior, and (3) Self: autobiographical memory is the personal history from which the self is constructed. Autobiographical memory may also play a role in the development and maintenance of some behavioral pathologies.

Recent research has found that patients from a variety of clinical populations have difficulty retrieving specific, affect-related experiences from autobiographical memory. The “memory specificity” or “over-general memory” effect has now been reported for affective disorders (Brittlebank, Scott, Williams, & Ferrier, 1993; Dalgleish, Spinks, Yiend, & Kuylen, 2001; Kleim & Ehlers, 2008; Mackinger, Pachinger, Leibetseder, & Fartacek, 2000; Raes, Hermans, Williams, Beyers, Brunfaut, & Eelen, 2006), anxiety and stress related disorders (Bryant, Sutherland, & Guthrie, 2007; Kleim & Ehlers, 2008), memory disorders (Moses, Culpin, Lowe, & McWilliam, 2004), schizophrenia (Warren & Haslam, 2007; Wood, Brewin, & McLeod, 2006), and eating disorders (Dalgleish et al., 2003; Laberg & Andersson, 2004; Nandrino, Doba, Annick, Christophe, & Pezard, 2006). In addition, research with depressed individuals has revealed that the size of the memory specificity effect can predict symptom severity, illness duration, and treatment success (Brittleback et al., 1993; Dalgleish et al., 2001; Gibbs & Rude, 2004; Kleim &

Ehlers, 2008; Mackinger et al., 2000; van Minnen, Wesse, Vershoak, & Smeenk, 2005; Raes, Hermans, Williams, Beyers, Brunfaut, & Eelen, 2006).

It is unclear whether autobiographical memory plays a causal role in the development of a disorder (Williams et al., 2007), but there is now enough empirical evidence to suggest that its measurement can play an important role in the diagnosis, assessment, and treatment of some disorders. Of particular interest to the authors of the current paper is the role that autobiographical memory may play in the development of eating disorders. Restrained eating is often identified as a precursor to eating disorders, and measures of restrained eating can predict the intensity of eating disorder symptoms (Johnson & Wardle, 2005; Killen et al., 2006; Neumark-Sztainer et al., 2006; Stice, 2001; Stice, Killen, Hayward, & Taylor, 1998; Wertheim, Koerner, & Paxton, 2001). Previous research has already identified a memory specificity effect with eating disorder patients when using affect-based cues for retrieving autobiographical memories (Dalgleish et al., 2003; Laberg & Andersson, 2004; Nandrino et al., 2006). Laberg and Anderson (2004) also reported the memory specificity effect with bulimia patients who were in remission at the time of testing. This finding suggests that restrained eating in its less pathological form could also show the memory specificity effect.

Williams et al. (2007) recently provided the CaR-FA-X model to explain the memory specificity effect in clinical populations. They hypothesized that three factors underlie the memory specificity effect, which we argue also apply to the non-clinical population of restrained eaters. The first factor, capture and rumination (CaR), refers to the fact that many clinical populations have self-schemas that operate at the general level of memory organization, making it difficult to retrieve specific autobiographical events.

In parallel, restrained eaters have self-schemas that relate to eating, body image, and exercising (Morris, Goldsmith, Roll, & Smith, 2001), and chronically ruminate about body-image and weight loss (Polivy & Herman, 1985). The second factor, functional avoidance (FA), refers to the avoidance of recollecting specific episodes of trauma and adversity, resulting in truncated searches of autobiographical memory (Conway & Pleydell-Pearce, 2000). Similarly, restrained eaters avoid food and eating memories in an effort to control the hunger they may be experiencing (Herman & Polivy, 1993). The final factor, impaired executive capacity and control (X), refers to a reduction in executive resources that leads to memory specificity through inadequate inhibition of interfering information (Conway & Pleydell-Pearce, 2000). Similarly, chronic dieting can deplete the cognitive resources of restrained eaters (Polivy & Herman, 1985) and has been shown to lead to decrements in the performance of cognitive tasks (Green et al., 2003; Green & Rogers, 1995; Green, Rogers, Elliman, & Gatenby, 1994; Jones & Rogers, 2003; Kemps & Tiggemann, 2005; Rogers & Green, 1993; Shaw & Tiggemann, 2004; Vreugdenburg, Bryan, & Kemps, 2003). The capture and rumination (CaR) component of the model accounts for the involuntary capture of memory searches by highly activated self-schemas in individuals who ruminate excessively about concepts that relate to this level of memory organization. A “memory capture” mechanism can also be hypothesized for highly restrained eaters who have highly activated self-schemas that relate to eating, body image, and exercising (Morris, Goldsmith, Roll, & Smith, 2001), and who also, by definition, chronically ruminate about body image and weight loss. The functional avoidance (FA) component highlights the avoidance of specific memories of trauma and adversity because those memories are likely to elicit unwanted strong

negative affect when retrieved. A similar explanation could apply equally well to highly restrained eaters who likely avoid specific food and eating episodes so that these experiences do not trigger additional thoughts about the eating behaviors they are trying to control or the hunger they may be experiencing (Herman & Polivy, 1993). The depletion of executive control resources (X) in clinical populations is also argued by Williams and colleagues to play a significant role in the memory specificity effect, because the executive control system plays an important role in facilitating and verifying search successes, as well as inhibiting the “capture” of searches by interfering information. There is growing evidence that dieting and restrained eating can also lead to decrements in central executive resources (Green & Rogers, 1998; Green et al., 2003; Vreugdenburg, Bryan, & Kemps, 2003; Kemps & Tiggemann, 2005). Consequently, the CaR-FA-X model provides strong theoretical support grounds for expecting memory specificity to be related to chronic restrained eating in our study.

For the current study, we used cue-words associated with eating and dieting to prompt the retrieval of specific autobiographical memories. The Restraint Scale (RS) developed by Herman, Polivy, Plimer, Threlkeld, and Munie (1978) was used to measure individual differences in restrained eating. Analogous to previous research with clinical populations, we expected to find a significant negative relationship between scores on the restrained eating scale and the number of specific memories retrieved by non-clinical participants.

Method

Participants

Sixty female undergraduate college students with a mean age of 19.1 years participated in this study. Participants received course credit for their participation. Five participants were deemed to possibly have an eating disorder, as indicated by their score on the SCOFF eating-disorder screening test (Morgan, Reid, and Lacey, 2000), and thus were excluded from the analyses. The mean Body Mass Index (BMI) for the remaining sample of 55 participants was 23.54 ($SD = 3.81$), and 29% of these women were on a diet to lose weight at the time of the experiment.

Materials

Autobiographical Memory Task

Each participant was required to retrieve specific personal experiences (i.e., an event that took less than a day to complete) that related to cue-words presented by the experimenter. Nine cue-words were presented to participants: “restaurant”, “hungry”, “exercise”, “weigh”, “bikini”, “chocolate”, “diet”, “mirror”, and “celebrate”. The participant wrote a brief description for each memory recalled. For each memory retrieved, the participant also answered the following two questions: “When did this event happen (e.g., 1 day ago, 1 year ago)?” and “When the memory came to mind—was it of a specific episode or a general category of related events?”. Two independent judges also read the memory descriptions provided by participants and classified the memories as specific or general. The percentage of agreement between the two judges was 92%, and the agreement between the classifications (for one judge) and the participants’ own classifications approached 100%. In the few cases of discrepancy, the participants’ own classification was used.

Restraint Scale (RS)

The Restraint Scale measures individual differences in dietary restraint (Herman et al., 1978). It consists of 10 questions that measure different aspects of restrained eating. Factor analysis of the RS suggests a two factor structure for this scale: Concern-with-Dieting (RS-CD) and Weight-Fluctuation (RS-WF) (van Strien, Breteler, & Ouwens, 2002). The RS-CD measures the individual's preoccupation with weight control and body shape, and an example item is "Do you give too much time and thought to food?". The RS-WF measures the amount and frequency of weight changes the individual has typically experienced in the past, and an example item is "In a typical week, how much does your weight fluctuate?". Scores range from 0 to 19 for RS-CD and from 0 to 16 for RS-WF, with higher scores indicating greater dietary restraint. Cronbach's alpha was ~~calculated for each sub-scale and found to be~~ 0.81 for the RS-CD and 0.66 for the RS-WF.

SCOFF Eating-disorder Screening Test (SCOFF)

The SCOFF is a brief screening test for eating disorders developed by Morgan et al. (2000). The SCOFF is made up of five questions, e.g., "Do you make yourself sick because you feel uncomfortably full?". The authors of the test suggest that an individual who answers yes to two or more of these questions may have an eating disorder. Cotton, Ball, and Robinson (2003) suggest this cut-off is too liberal, and consequently, we removed participants from the data analysis if they answered yes to three or more questions.

Procedure

Participants carried out the autobiographical memory task first and then completed the RS questionnaire. Participants then provided their demographic and

dieting information. Two questions addressed their dieting behavior. The first question asked if they were currently on a diet to maintain their weight and the second question asked if they were currently on a diet to lose weight. Only the participant's response to the second question was used to determine their dieting status for data analysis. Finally, participants completed the SCOFF screening test.

Results

Descriptive statistics for all variables are provided in Table 1. Only three participants failed on only one occasion each to retrieve a memory to a cue-word and these instances were coded as missing data. The experiences recalled by participants happened on average around one year previously. The mean number of specific memories retrieved by each participant was six of the nine cue-words, i.e., 67%. There was no difference in the number of specific memories retrieved by dieters ($M = 5.8$; $SD = 1.3$) when compared with non-dieters ($M = 6.0$; $SD = 1.2$), $t(53) = 0.77$, $p > .05$.

Table 2 provides the correlations between BMI, ~~dieting status~~, RS-CD, RS-WF, and the number of specific memories retrieved. A multiple regression analysis (see Table 3) was conducted to determine which variables (BMI, dieting status, RS-CD, and RS-WF) uniquely predicted the number of specific memories retrieved. The only significant predictor was the RS-CD measure, $\beta = -.39$, $p < .05$. This finding highlights that participants who were chronically concerned about their weight and body image provided fewer specific memories.

Discussion

The current study revealed a significant relationship between memory specificity and restrained eating. Participants who scored higher on a restrained eating scale (RS:

Concern-with-Dieting) retrieved fewer specific autobiographical memories when prompted with cue-words that related to dieting, body image, and eating. The CaR-FA-X model developed by Williams and colleagues to explain the memory specificity effect in clinical populations applies equally well to the results of our study. In accord with the first component (CaR) of the model, Highly restrained eaters are chronic dieters who are preoccupied with their body image and weight, and routinely ruminate about weight loss and dieting (Polivy & Herman, 1985). They are known to possess highly-activated-self-schemas that relate to eating, body image, and exercising (Morris, Goldsmith, Roll, & Smith, 2001). Further, they actively inhibit thoughts associated with food and eating behaviors, and many of these thoughts probably relate to past experiences that center on such behaviors (Herman & Polivy, 1993). in accord with the second component (FA) of the model. Finally, Dieting and restrained eating can also lead to decrements in central executive resources (X; Green & Rogers, 1998; Green et al., 2003; Vreugdenburg, Bryan, & Kemps, 2003; Kemps & Tiggemann, 2005). Thus the All of these factors are important components of the CaR-FA-X model offers a plausible explanation for the demonstrated memory specificity effect among restrained eaters.

Johannessen and Berntsen (2008) recently reported a memory specificity effect when comparing dieters with non-dieters. We did not find such a dieting effect in our study. However, the majority of dieters who participated in the Johannessen and Berntsen study were recruited from a weight control center and it is unknown whether any of these participants were chronic dieters or suffering from an eating disorder. Here we found a significant correlation between dieting status and RSS-CD ($r = .51$) that suggests the dieters in our study may have had a history of restrained eating. More generally, the

results from our study suggest that the memory specificity relationship is stronger for long-term restrained-eating than for a temporary change in eating habits when on a diet. However, further research with a larger sample of dieters is needed to verify this suggestion.

Like all previous studies, the present findings do not address whether the memory specificity effect relates to the retrieval of all autobiographical memories or only relates to memories associated with a specific problem, as elicited by targeted cue-words. The simple functional avoidance explanation proposed by Conway and Pleydell-Pearce (2000) would suggest that the memory specificity effect only applies to memories associated with the behavior of concern. However, the CaR-FA-X model (Williams et al., 2007) which explains the memory specificity effect in terms of more general memory mechanisms (executive control of memory retrievals; capture by the self of the memory search at the general level of memory organization) would predict that the specificity effect will result for any memory retrieval regardless of the cue-word used. We plan to conduct a follow-up study with highly restrained eaters that will involve memory retrievals to a variety of cue-words that may or may not relate to eating and dieting. The results of this future study will help distinguish the merits of these different explanations.

-If we assume that restrained eating is a precursor to eating disorders as suggested by some researchers (Johnson & Wardle, 2005; Killen et al., 2006; Neumark-Sztainer et al., 2006; Stice, 2001; Stice et al., 1998; Wertheim et al., 2001), the findings of the current research may have important practical implications. More generally, n

The role of autobiographical memory in the development of eating disorders is already implicated by previous research that has revealed a memory specificity effect

with eating disorder patients when using affect-related cue words (Dalgleish et al., 2003; Laberg & Andersson, 2004; Nandrino et al., 2006). It is unclear whether the memory specificity effect relates to the retrieval of all autobiographical memories or only relates to memories associated with a problem behavior. The functional avoidance explanation proposed by Conway and Pleydell-Pearce (2000) would suggest that the memory specificity effect only applies to memories associated with the behavior of concern. However, other explanations for the memory specificity effect propose more general memory mechanisms. These explanations focus on the executive control of memory retrievals and the schematic capture by the self of the memory search at the general level of memory organization (Williams et al., 2007). These latter explanations would suggest that the specificity effect will result for any memory retrieval regardless of the cue word used. We plan to conduct a follow-up study with highly restrained eaters that will involve memory retrievals to a variety of cue words that may or may not relate to eating and dieting. The results of this future study will help distinguish the merits of these different explanations.

Johannessen and Berntsen (2008) recently reported a memory specificity effect when comparing dieters with non-dieters. We did not find such a dieting effect in our study. However, the majority of dieters who participated in the Johannessen and Berntsen study were recruited from a weight control center and it is unknown whether any of these participants were chronic dieters or suffering from an eating disorder. Here we found a significant correlation between dieting status and RSS-CD that suggests the dieters in our study may have had a history of restrained eating. More generally, the results from our study suggest that the memory specificity relationship is stronger for long-term

~~restrained eating than for a temporary change in eating habits when on a diet. However, further research with a larger sample of dieters is needed to verify that suggestion.~~

Numerous researchers have suggested that the memory specificity effect could be a marker for the development of clinical disorders, as well as a predictor of the effectiveness of treatments targeting these disorders (Brittlebank et al., 1993; Bryant et al., 2007; Crane et al., 2007; Dalglish et al., 2001; Gibbs & Rude, 2004; Kleim & Ehlers, 2008; Mackinger et al., 2000; van Minnen et al., 2005; Raes, Hermans, Beyers, Brunfeut, & Eelen, 2006). Thus it is possible that the memory specificity effect observed here among restrained eaters may serve as a marker for the development of eating disorders. However, the correlational design of our study (as well as previous studies) cannot rule out the possibility of reverse causation. Only longitudinal designs that track the development of both the memory specificity effect and disordered eating in restrained eaters over time could offer more definitive causal conclusions. The results of the current study suggest that performance on our memory retrieval task could provide a marker for eating disorders. We will conduct further research to evaluate the capability of our autobiographical memory task to predict symptom intensity and treatment success with eating disorder populations.

If the memory specificity effect is found to play a role in the development of eating disorders (or indeed any clinical condition), then interventions might usefully target the effect. There is some preliminary evidence that the memory specificity effect is modifiable. appears to be modifiable and some researchers have suggested that reducing the effect could help lessen the symptoms and occurrence of disorders. One approach has concentrated on is to develop methods for reducing self-focused, ruminative thinking that

may underlie the memory specificity effect (Barnard, Watkins, & Ramponi, 2006; Raes, Watkins, Williams, & Hermans, 2008; Watkins, Teasdale, & Williams, 2000; Watkins & Teasdale, 2001). An other approach ~~alternative intervention~~ involves training individuals to ~~be~~ better ~~at~~ retrieving specific autobiographical experiences (Serrano, Latorre, Gatz, & Montanes, 2004; Raes, Williams, & Hermans, 2009). Future research could usefully examine whether such memory specificity modification has any benefit for restrained eaters or people suffering from eating disorders ~~interventions benefit an eating disorder population. Importantly, this benefit might apply also to highly restrained eaters who have not developed an eating disorder.~~

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Table 1

Means (Standard Deviations) for All Measured Variables Presented Separately for Participants on a Diet (Dieters), Participants Not on a Diet (Non-Dieters), and All Participants.

Variable	Dieters (<i>n</i> = 16)	Non-dieters (<i>n</i> = 39)	All participants (<i>n</i> = 55)
Weight (lbs)	146 (28.6)	137 (201.7)	139 (23.7)
BMI	24.8 (4.5)	23.0 (3.4)	23.5 (3.8)
RS-CD	16.4 (3.6)	11.6 (3.0)	13.0 (3.8)
RS-WF	7.3 (1.9)	5.7 (2.1)	6.2 (2.1)
Specific memories	5.8 (1.3)	6.0 (1.2)	6.0 (1.2)
Memory age (yrs)	1.1 (1.3)	1.4 (1.2)	1.3 (1.2)

Note. Range RS-CD = 0-19; range RS-WF = 0-16; specific memories scored out of 9.

Table 2

Correlations Between Number of Specific Memories (Specific), Body Mass Index (BMI), Dieting Status (Diet), Restrained Scale-Concern with Dieting (RS-CD), and Restrained Scale- Weight Fluctuations (RS-WF)

Variable	BMI	Diet	RS-CD	RS-WF
Specific	-.09	-.02	-.32**	-.20
BMI		.34**	.23*	.19
Diet			.51***	.22
RS-CD				.44***

* $p < .05$ ** $p < .01$ *** $p < .001$

Table 3

Summary of Regression Analysis for Variables (Body Mass Index [BMI], Dieting Status [Diet], Restrained Scale- Concern With Dieting [RS-CD], Restrained Scale – Weight Fluctuations [RS-WF]) Predicting Number of Specific Memories Recalled (Specific) (N = 55)

Variable	<i>B</i>	<i>SE B</i>	β
BMI	-.02	-.05	-.06
Diet	.50	.39	.21
RS-CD	-.12	.05	-.39*
RS-WF	-.04	.08	-.06

Note: $R^2 = .14$ * $p < .05$