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BRIEF REPORT

Interpretation Bias Modification Affects Autobiographical Memory

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Abstract

Background and Objectives Autobiographical memories have been found to be related to one's current psychological state. Biases in autobiographical memories in terms of valence, content, and specificity are thought to be related to one's well-being and mental health. Previous studies have shown that by using cognitive bias modification techniques that aim to alter one's interpretation bias, memory valence bias could also be altered. The goal of the current study was to investigate if these techniques can also alter overgenerality of autobiographical memory, a phenomenon strongly associated with different psychopathologies. We hypothesized that creating a positive interpretation would decrease overgenerality of autobiographical memories while a negative interpretation bias would increase overgenerality.

Methods Sixty participants were recruited and divided into two groups, positive vs. negative imagery Cognitive Bias Modification (i-CBM). Both groups completed an Autobiographical Memory Test (AMT) before and after undergoing one i-CBM session (positive or negative).

Results positive i-CBM reduced overgenerality of autobiographical memories, while negative i-CBM increased it.

Conclusions These results suggest that changing one's cognitive interpretation bias also changes one's memory bias. Thus, the same task that reduces negative bias from autobiographical memories also reduces overgenerality of autobiographical memories. In addition, the results strengthen the suggestion that the use of imagery and the ability to generate specific autobiographical memories are related. These findings hold great potential for our understanding of the interconnection between the different cognitive memory biases that lay at the base of several psychopathologies.

Keywords Overgeneral Autobiographical Memory · Interpretation bias · Cognitive bias Modification · Memory Specificity

Autobiographical memory comprises a subsystem of episodic memory dedicated to personal experiences. According to the 'self-memory system' model proposed by Conway and Pleydell-Pearce (2000), autobiographical memories are transient mental constructions of autobiographical knowledge, formed either in response to environmental cues or through conscious retrieval. The ability to reflect on one's life using autobiographical memories is believed to serve various functions in relation to well-being (Bluck et al., 2014). Specifically, autobiographical memories have been shown to be linked to psychological states. For instance, individuals with clinical mood disorders, including anxiety and depressive disorders, tend to exhibit a bias toward negative and trauma-related autobiographical memories (Matt et al., 1992; Sutherland & Bryant, 2008). Interestingly, it has been shown that not only the content of these memories but also their construct is associated with psychopathology. For example, the tendency to recall autobiographical memories in a less specific and more overgeneral manner (e.g., recalling categories of events), a phenomenon often referred to as *overgeneral autobiographical memories* (OGM), has been linked to poor mental health (Barry et al., 2021). Interestingly, several previous investigations have demonstrated a bidirectional relationship between OGM and psychological state, wherein an individual's psychological state can influence the specificity of autobiographical memory retrieval (Barry et al., 2021), and the specificity of autobiographical memories can impact one's current psychological state (Hallford et al., 2021). Such a bidirectional relationship can

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result in a vicious cycle that might play a key role in different psychopathologies. Thus, influencing the manner in which individuals retrieve autobiographical memories could be a crucial tool in enhancing psychological well-being. The current study employed a computerized task, the Imagery-Cognitive Bias Modification task (i-CBM), to test its ability to target the overgenerality of autobiographical memory.

The content of autobiographical memories is connected to psychological state. For example, individuals diagnosed with major depressive disorder (MDD) were found to retrieve more negative than positive information in autobiographical memories (Matt et al., 1992). This link between psychological state and memory valence bias was also found in a non-clinical sample, where depressive symptoms and lower life satisfaction were found to be correlated with more negative valence of autobiographical memories (McFadden & Siedlecki, 2020). In addition, one's current psychological state was found to affect not only the valence of autobiographical memories but also the content of these memories. For example, individuals with high levels of social anxiety symptoms were found to retrieve more social anxiety related memories, compared to individuals with low levels of symptoms (Krans et al., 2014). Similarly, individuals with post-traumatic stress disorder (PTSD) were found to retrieve more trauma-related memories than individuals who were exposed to trauma but did not develop PTSD (Sutherland & Bryant, 2008). In summary, there is ample evidence suggesting that current psychological state can affect the valence and content of autobiographical memories. As mentioned above, the reverse relationship has also been documented, indicating that the content of autobiographical memories can impact an individual's current psychological state. For example, retrieving positive autobiographical memories was shown to buffer acute stress response (Speer & Delgado, 2017). In addition, asking people to retrieve autobiographical memories with a specific valence (e.g. positive, negative) has been shown to affect their mood in accordance with the valence of the memories that were retrieved (Gillihan et al., 2007). These studies demonstrate a well-established bidirectional relationship between the content of autobiographical memories and psychological state, which potentially can be influenced using targeted interventions. However, other aspects of autobiographical memories might also take part in this bidirectional relationship between memory and psychological state.

One crucial aspect of autobiographical memories is the level of specificity in memory recall. Lack of specificity, known as overgeneral autobiographical memory (OGM), refers to the phenomenon that when asked to come up with a specific autobiographical memory (e.g., in response to a cue), individuals are less specific and/or more general in their recollection (Williams & Broadbent, 1986). Rather than retrieving a specific memory for an event that occurred at a particular time and place (e.g., specific events such as "When I went to the supermarket last Thursday afternoon"), individuals with a tendency to OGM, often retrieve memories that are summaries or classes of events (e.g., non-specific categorical memories such as "When I'm with my family"), or memories of events that lasted longer than a day (e.g., extended memories such as "My trip to Spain"). OGM has been strongly linked to depression, as evidenced by studies showing higher OGM prevalence in individuals with suicidal tendencies (Williams & Broadbent, 1986) and with MDD (Nandrino et al., 2002; Williams et al., 2007), compared to healthy controls. Furthermore, in a recent meta-analysis, it has even been suggested that OGM can serve as a transdiagnostic feature of mental illness (Barry et al., 2021). Interestingly, consistent with the notion of a bidirectional connection between autobiographical memories and psychological state, the specificity of autobiographical memory recall is not only influenced by one's psychological state but can also influence it. For instance, OGM has been identified as a risk factor for the development (Gibbs & Rude, 2004; Rawal & Rice, 2012), relapse (Champagne et al., 2016), and a worse course of symptoms of MDD (Hallford et al., 2021; Liu et al., 2016). This bidirectional relationship between OGM and psychological state suggests that influencing one's psychological state may affect the retrieval of autobiographical memories, potentially disrupting the vicious cycle of negative mood and OGM.

One potential method to influence an individual's current psychological state is by targeting cognitive interpretation biases. Cognitive interpretation bias refers to the tendency to interpret ambiguous stimuli in either a negative or positive manner (Krantz & Hammen, 1979). Research has demonstrated that altering cognitive interpretation bias can lead individuals to recall past events in a more positive or a more negative light (Joormann et al., 2015; Salemink et al., 2010; Tran et al., 2011). Since cognitive biases do not operate in isolation, but instead interact with one another (Hirsch et al., 2006), and given that both negative interpretation bias and OGM are common among individuals with MDD and other psychopathologies (Krantz & Hammen, 1979; Williams et al., 2007; Leung et al., 2022; Barry et al., 2021), it is possible that changing one bias may affect the other. This novel suggestion regarding the connection between cognitive interpretation mechanisms and autobiographical memory processes could potentially inform the development of new intervention strategies to mitigate or prevent the onset of psychopathology. Although the association between interpretation bias and memory valence bias is well-established (Everaert et al., 2012), the possible link between interpretation bias and the tendency toward OGM has not been previously explored.

The present study was designed to investigate whether implementing an intervention to manipulate cognitive interpretation bias will affect overgeneralty of autobiographical memories, measured by the frequency of categorical memories (as previous studies found it to be the most reliable and valid measure for OGM; Park et al., 2002; Williams et al., 2007). To manipulate participants' interpretation bias, we randomly assigned participants to a positive or negative interpretation training group using the imagery-Cognitive Bias Modification task (i-CBM; Holmes et al., 2006). The i-CBM is a CBM technique which is aimed at changing negative interpretation bias using imagination. In comparison to other CBM techniques, the i-CBM has been observed to have the most robust effect in changing interpretation bias (for a meta-analysis see: Jones & Sharpe, 2017). In line with our hypothesis that negative cognitive interpretation bias and OGM are interconnected, we predicted that participants in the positive i-CBM group would exhibit fewer categorical memories following the i-CBM session whereas the participants in the negative i-CBM group would exhibit more categorical memories following the i-CBM.

Method

Participants

Sixty university students participated in the study in return for partial course credit or a small monetary payment (~15 USD). Participants were recruited through the University Experiment Registration System. To minimize the effect of individual differences in mood and affect, and to ensure the study procedures (specifically, the negative i-CBM) are tolerable for the participants, current or past psychopathology was ruled out using a structured clinical interview based on the DIAMOND (Tolin et al., 2018). All participants had a normal or corrected-to-normal vision and were naïve as to the purpose of the experiment. Three participants failed to complete the Autobiographical Memory Test (AMT) correctly as their description did not include memories (see further explanation below) and were thus excluded from the analyses. Of the 57 valid participants, 27 participants were randomly assigned to the positive i-CBM condition (9 males, 18 females, mean age = 24.27, SD = 3.16, range = 18–33) and 30 participants were randomly assigned to the negative i-CBM condition (8 males, 22 females, mean age = 24.07, SD = 1.80, range = 21–29).

An a priori power analysis was conducted using G*Power 3.1.9.7 (Faul et al., 2007), (based on the results of Reas et al., 2008 (t(99) = 2.17). This value was converted to Cohen's f using the statistical software R-studio (2022.02.3)). The analysis indicated that the current sample has sufficient power (> 90%) to examine the two-way interaction (group X time) for medium effect sizes, with a Type 1 error rate ($\alpha < 0.05$). The parameters that were used in G*Power were as follows: Cohen's f effect size of 0.22, power = 0.90, 2 groups, 2 measurements, and an α error probability = 0.05. The rest of the variables were set to default.

Procedure

The study was approved by the Institutional Ethics Committee. This study was not preregistered. The complete data of this study is available (https://data.mendeley.com/datasets/mth8s8s6ww/3). After signing an informed consent form, participants completed a clinical interview based on the DAIMOND (Tolin et al., 2018) to rule out present or past psychiatric diagnoses. Participants then completed the Autobiographical Memory Test (AMT) followed by two questionnaires that were meant to verify that there were no baseline differences between the two groups in emotion regulation strategies usage: the Brief State Rumination Inventory (BSRI), a self-report questionnaire that is used to measure baseline state levels of ruminative negative thinking (Marchetti et al., 2018), and the Cognitive Emotion Regulation Questionnaire (CERQ-short), a self-report questionnaire that measures cognitive emotion regulation strategies in coping with negative life events (Garnefski & Kraaij, 2006). Next, participants completed the imagery-Cognitive Bias Modification (i-CBM) task according to the condition to which they were assigned (positive i-CBM vs. negative i-CBM). After that, they completed a short masking task to reduce the potential influence of the i-CBM on mood and finally, participants completed the AMT again.

Materials and Design

Autobiographical Memory Test (AMT)

The AMT is a tool for assessing specificity of autobiographical memory (Williams & Broadbent, 1986; Raes et al., 2003; Debeer et al., 2009). In the current experiment, we used the Minimal Instructions AMT, which was found to better identify differences in autobiographical memory specificity in non-depressed samples (Debeer et al., 2009). In the Minimal Instructions AMT, individuals were asked to generate memories in response to cue words. The cue words were embedded in a frame sentence (Please write down an event that you are reminded of by the word 'X'). Overall, each participant completed 16 trials (sentences) that were presented in the same order for all participants– eight before the i-CBM and eight after the i-CBM. Half of the cue words had a positive emotional meaning (i.e., confidence, pleasurable, courage, calm, inspiration, power, friendship, and surprise), and half had a negative emotional meaning (i.e., scared, angry, sad, bold, failure, insult, difficulty, and stupid). In each time point, participants were presented with four positive and four negative cues. Each trial appeared separately and contained one cue word. Participants had a 60 s time limitation for each sentence. Importantly, the instruction did not stress the level of specificity required and questions about this issue (if asked) were answered vaguely without indicating whether the memories should be specific. The instructions did emphasize that one could not refer to events from the past 7 days nor could one refer to events that had already been mentioned in response to a previous cue. These instructions were written on the computer screen and read aloud by the experimenter. Participants were asked to type their responses using the computer.

Similar to previous studies (Park et al., 2002; Debeer et al., 2009), responses were coded by two independent and blind raters using the following procedure: The raters were asked to code the memories as either categorical, extended, or specific. Memories were coded as categorical if they described a category of events (e.g., "when I am sad"), as extended if they described an event that lasted more than 24 h ("my vacation in Italy"), and as specific if they described an event that occurred at a specific time and place and lasted less than 24 h (e.g., "a month ago, on Tuesday afternoon, I went with my friends to the beach"). Responses that were not related to personal memories, descriptions of events or situations not personally experienced by the participant (e.g., "a character from a TV show being fired from their job"), were considered as participant omissions and were excluded from the analysis (a total of 1.5% of the responses were excluded due to this criteria). Participants who omitted more than four responses in one of the sessions (pre-i-CBM or post-i-CBM) were excluded from the analyses (as mentioned above, three participants were excluded due to this criterion). The raters had a very high interrater reliability (acceptance rate of 96%). In the rare cases where raters disagreed on the coding of a memory, it was sent to a third rater (an independent and blind research assistant) for final coding. The dependent variable was the trial-level memory type (categorical/non categorical;for the elaborated resultes of all types of memories see Table 1).

Imagery-Cognitive Bias Modification (i-CBM) Task

The i-CBM task (Holmes et al., 2006) was used to alter the participants' interpretation bias by introducing a series of situation descriptions that are implied to end in a negative or neutral way, and to then end them in either a positive way (positive i-CBM group), a negative way (negative i-CBM group) or a neutral way. The task was programmed and administered using E-Prime software (version 3.0, Pittsburgh; Psychology Software Tools Inc.). Eighty descriptions were taken from Holmes et al. (2006), each describing a real-life everyday situation. The descriptions were digitally recorded and played to the participants via headphones in a monotonous and uniform rhythm (1 word per second) in a male voice, each description lasting approximately 10–13 s. The structure of the descriptions was designed so that the outcome of the situation only becomes clear in the last few words. Each participant received a series of 40 descriptions that began with a potentially negative situation being implied and 40 descriptions of a benign situation. In the positive i-CBM group 60 descriptions (all negative beginnings and half of the neutral beginnings) were resolved to have a positive outcome and 20 descriptions (neutral beginning) were resolved to have a neutral outcome. In the negative i-CBM group, 60 descriptions were resolved to have a negative outcome, and 20 were resolved to have a neutral outcome. All scenarios were identical in both groups, except of the ending of the 60 emotional scenarios which was positive or negative depending on the group. For example, a negative description read as follows: "You are at home alone watching TV. You must have been dozing because you suddenly woke up. You have the impression that you heard a frightening noise and then realize *with relief that it was your partner returning home"* (positive) *or "…you have a burglar in your house"* (negative). An example of a neutral description would be: "Your best friend convinces you to go on a blind date and as you sit in the bar waiting to meet your date, you think about how it will go *You feel excited and look forward to meeting the person"* (positive) or *"…You feel nervous and think that it might be a bad idea"* (negative). An example of a neutral description with a neutral ending would be. "You wake up, get out of bed, stretch, and notice how you feel today". In order to enhance task engagement, after each description participants were asked to rate the vividness of

Table 1 Full proportions table of all types of memories in the autobiographical memory test

	Before the i-CBM				After the i-CBM			
	Categorical	Extended	Specific	Omit	Categorical	Extended	Specific	Omit
Group								
Positive	0.14(0.11)	0.15(0.09)	0.63(0.21)	0.08(0.10)	0.05(0.06)	0.19(0.14)	0.66(0.22)	0.10(0.08)
Negative	0.07(0.07)	0.19(0.14)	0.62(0.20)	0.11(0.13)	0.15(0.11)	0.21(0.15)	0.54(0.22)	0.10(0.10)

Note. Elaborated results of the autobiographical memory test (AMT). The positive group completed a session of positive i-CBM whilst the negative group completed a session of negative i-CBM between the two time points of the autobiographical memories' measurements their imagery ("How vividly could you imagine the situation that was described?") on a 7-point scale (1 = not at all and 7 = very). The full list of sentences can be found in the supplementary materials.

Masking Task

The filler was used as a brief masking after the completion of the i-CBM task to reduce to minimum the influence the task might have had on participants' mood. For 10 min, participants were asked to listen to a series of classical music excerpts, each lasting 40 s. Participants were asked to rate each excerpt for how pleasant they found it on a scale of 1 (extremely unpleasant) to 9 (extremely pleasant).

Results

All analyses were conducted using the R-studio statistical software (2022.02.3). To assess differences between the groups (positive i-CBM vs. negative i-CBM) in the demographic and clinical measures, a series of *t*-tests were used for continuous variables (age, BSRI, CERQ-short) and a chi-squared test was used for the non-continuous variable (gender). There were no significant differences between the groups in any of the demographic or clinical measures (age: $t(55) = 0.30$, $p = .77$, BSRI $t(55) = 0.20$, $p = .85$, CERQ-short, adaptive emotion regulation $t(55) = 1.66$, $p = .10$, maladaptive emotion regulation $t(55) = 0.71$, $p = .48$, and gender, $\chi^2(1, N = 57) = 0.07$, $p = .80$).[1]

To test our main hypothesis, regarding the effect of the i-CBM session on the frequency of categorical memories in the autobiographical memory test (AMT), we carried out a general mixed-model regression (GLMM) on the binary data (categorical memory (= 1) vs. non-categorical memory (= 0) with group (positive i-CBM vs. negative i-CBM), time (pre-i-CBM vs. post-i-CBM), and their interaction as fixed effects[2]. The model also included random intercepts for participant and cue word. The independent variables group and time were effect coded. Results yielded no main effects for time β=-0.07, $SE = 0.15$, $p = .65$, $OR = 0.93$, nor for group β=-0.14, $SE = 0.16$, $p = .37$, $OR = 0.87$. As predicted, the results yielded a significant two-way time X group interaction, β=-0.50, $SE = 0.12$, $p < .001$, $OR = 0.61$. To further analyze this two-way interaction according to our a-priori hypotheses, we carried out two planned comparisons to compare the two time points (pre-i-CBM vs. post-i-CBM) for each group (positive i-CBM vs. negative i-CBM) separately. Results indicated that compared to baseline, participants in the positive i-CBM group exhibited a decrease in the frequency of categorical memories following the i-CBM, β=-0.86, $SE = 0.36$, $p = .02$, $OR = 0.42$, whilst participants in the negative i-CBM group exhibited an increase in the frequency of categorical memories following the i-CBM, $\beta = 1.14$, $SE = 0.42$, $p < .01$, $OR = 3.12$ (see Fig. 1).

[1] There were significant differences between the groups in their ratings of the vividness of the scenarios in the i-CBM. The positive group rated their imagination of the scenarios as more vivid than the negative group ($t(55) = 2.64$, $p = .01$).

[2] Since analysis of variance (ANOVA) is less appropriate for binary variables (Jaeger, 2008), we used the GLMM. However, the results were qualitatively identical using ANOVA (i.e., significant effects remained significant, and non-significant effects remained non-significant).

Discussion

The current study examined how imagery-Cognitive Bias Modification (i-CBM), a task that aims to affect interpretation bias, can affect overgenerality of autobiographical memories – a key component in various mood disorders. The results indicated a significant relationship between the type of interpretation bias that the i-CBM aimed to create (positive i-CBM vs. negative i-CBM) and the tendency to recall overgeneral autobiographical memory. When i-CBM aimed to alter interpretation bias so that it would be more positive, it reduced overgeneral autobiographical memory (OGM), whilst when i-CBM aimed to alter interpretation bias so that it would be more negative, it increased OGM. Our results indicate that i-CBM can alter overgenerality of autobiographical memory.

Our finding, that a task that is aimed to affect interpretation bias can affect overgenerality of autobiographical memory bias, adds to the growing literature supporting a link between cognitive biases in general and interpretation and memory biases, in particular. For example, Leung and colleagues' (2022) meta-analysis showed a significant relationship between different cognitive biases in anxiety. In this meta-analysis, the researchers also found that among the different cognitive biases, interpretation bias, and memory bias are the two most highly correlated biases. In addition, this meta-analysis suggested that CBM techniques may work in a more general manner and affect not just the targeted cognitive mechanism but other cognitive biases as well. Therefore, it is also possible that in our study i-CBM affected overgenerality of autobiographical memory directly and not through its effect on interpretation bias. Consistent with these ideas, the current study's results showed that an intervention attempting to change one's cognitive interpretation bias also changes one's memory bias. Taken together with the findings from the meta-analysis discussed above (Leung et al., 2022), we suggest that interpretation biases and memory biases are linked and that aiming to change one will affect the other. Importantly, previous studies that

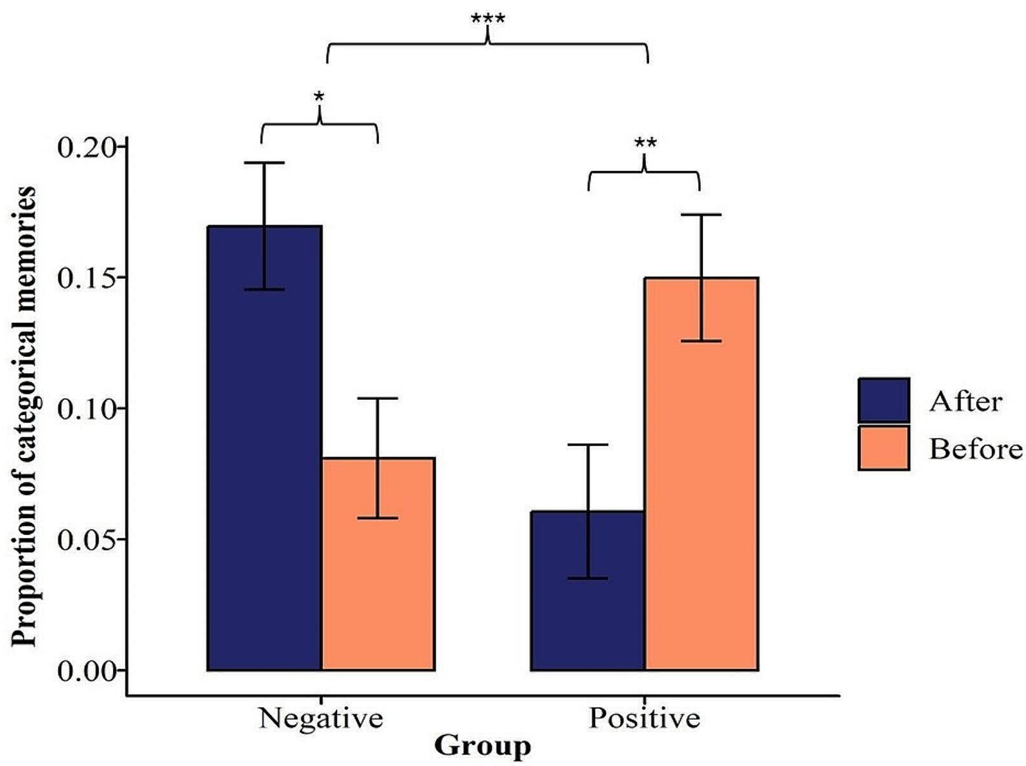

Fig. 1 Proportion of categorical memories in the autobiographical memory test (AMT) as a function of group and time. Note. Proportion of categorical memories out of all valid memories . The positive group completed a session of positive i-CBM whilst the negative group completed a session of negative i-CBM between the two time points of the autobiographical memories' measurements. Error bars represent within subject standard error

examined the link between interpretation bias and memory bias (Joormann et al., 2015; Tran et al., 2011) did not examine autobiographical specificity bias but only looked at memory valence. Therefore, the current study provides novel evidence for the effect of interpretation bias on autobiographical memory bias – an effect that is highly relevant for several different psychopathological conditions that are characterized by both negative interpretation bias and OGM. The latter suggestion requires additional research and awaits future investigations.

The current study findings also add to the growing literature supporting a link between creating mental imagery and memory specificity (Holmes et al., 2016; Williams, et al., 1996. When recalling a personal experience, conjuring up mental images of people, places, and objects associated with the event could help individuals recall the details of the experience more vividly. For example, an experimentally induced retrieval style that emphasizes specificity, has been shown to increase the ability to imagine events in a more detailed way compared to the experimentally induced retrieval style that is more general (Madore et al. 2014). However, the current study results indicated that the link between mental imagery and memory specificity might be dependent on the valence of the imagery. This can be seen by the fact that the positive i-CBM group exhibited less OGM while the negative i-CBM group exhibited increased OGM. This finding that the valence of the mental imagery can affect memory specificity can be speculatively discussed in terms of The CaRFAX model, which is the most prominent model in explaining the mechanism that underlies OGM (Williams, 2006). According to this model, to avoid unpleasant memories, some individuals avoid going down the chain of autobiographical memory to the level of specific memories. Instead, these individuals remain in the categorical level of memories. According to this explanation, OGM constitutes an emotion regulation strategy to avoid unpleasant emotions. It could be suggested that participants in both groups of the current study were encouraged to form mental imagery in the i-CBM task. However, in the positive i-CBM group, the engagement in imagery was rewarding since the situations ended positively, whilst in the negative i-CBM group it was unpleasant since the situations ended negatively. This is suggested by the stronger vividness of the imagery evident in the positive i-CBM group compared to the negative i-CBM group. Given that imagery and memory specificity are related and even show marked overlap in brain activity (e.g., Schacter et al. 2007), it could be speculated that the experience that participants had when conjuring up mental images in the i-CBM, affected their motivation to retrieve categorical autobiographical memories in the autobiographical memory test (AMT). This can be seen by the finding that participants in the negative i-CBM group had more categorical memories in the retrieval of both positive and negative memories that they shared in the AMT. Presumably, according to the CaR-FAX model, this was done to avoid the unpleasant experience they had while completing the i-CBM. In contrast, the positive i-CBM group had less categorical responses in the retrieval of both positive and negative memories on the AMT, presumably due to the pleasant experience they had while completing the i-CBM. Taken together, the current study results might strengthen the link between imagery and autobiographical memory specificity but also suggested that the effect of imagery on memory specificity is not uniform and might be contingent upon the content of the imagery.

To summarize, the current study is the first to establish a possible link between i-CBM and overgenerality of autobiographical memory. The current study results indicate that overgenerality of autobiographical memory could be manipulated using a task that does not directly target memory specificity. This novel finding is interesting and adds to the existing literature that until now, has focused solely on the effect of interpretation bias on memory valence, and not on overgenerality of memories. Since OGM is a prominent cognitive trait in depression and various other psychopathologies, these findings hold great potential for our understanding of the interconnection between the different cognitive biases that lay at the base of these psychopathologies. This potential implication awaits future studies on clinical populations.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s10608-024-10505-w.

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Data Availability (data transparency) The datasets generated and analyzed during the current study are available in the [Mendaley] repository, [https://data.mendeley.com/datasets/mth8s8s6ww/3].

Code Availability The code that was used to analyze the data of the current study is available in the [Mendaley] repository, [https://data.mendeley.com/datasets/mth8s8s6ww/3].

Declarations

Ethics Approval This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of University.

Consent to Participate Informed consent was obtained from all individual participants included in the study.

Conflict of Interest Author Daniel Mandelbaum, Author Eyal Kalanthroff, declare that they have no conflict of interest.

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