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Emotional negative events do not protect against false memories in young adults with depressive–anxious personality traits

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ABSTRACT

Negatively charged events are often remembered with high accuracy and are less prone to memory distortions; however, whether this applies to individuals with high emotional involvement, it is not well understood. To explore this issue, the present study investigated whether an internalizing depressive–anxious trait affected the occurrence of inferential memory errors for emotional vs. neutral events. A recognition memory paradigm consisting of pictorial scripted material was presented to two groups of young adults: one with high scores at the depression–anxiety scales and one control group. Results showed an increased proportion of causal false memories (i.e., inferring the not seen cause of a viewed effect) in the depressive–anxious group when the encoded events were negative but not when they were neutral. Most important, when these false memories occurred, they were characterized by a recollective experience. Conversely, in control participants negative material was found to protect against memory distortions compared to neutral material. Results are discussed in light of previous research on memory distortions in individuals with emotional disturbances and highlight the possibilities offered by using a new paradigm for studying false memories.

1. Introduction

> Where we have strong emotions, we're liable to fool ourselves.
> (Carl Sagan, Cosmos – Blues for a Red Planet)

The majority of experimental studies investigating the influence of emotions on memory have shown an enhancing effect of emotional states and emotional content of the to-be-remembered material on retention accuracy (Kensinger, 2007; Kensinger & Schacter, 2006; Nielson & Powless, 2007; Storbeck & Clore, 2005). As far as false memory is concerned, evidence is mixed: on the one hand, it has been shown that false memory production is increased with emotional negative material (e.g., Dehon, Larøi, & Van der Linden, 2010). On the other hand, Mirandola, Toffalini, Grassano, Cornoldi, & Melinder (2014) found that emotional scripted material not only protects against inferential memory errors compared to neutral material, but also that when emotional false memories occur they are less likely to be associated with recollective experiences.

A number of studies have induced a specific mood (i.e., sad, happy, or more broadly negative and positive) to the participants when studying the effects of emotions on memory. These studies showed that transient states of negative mood reduce the occurrence of memory errors, whereas positive mood increases their occurrence (e.g., Bless et al., 1996; Storbeck & Clore, 2005). According to the affect-as-information hypothesis, negative mood is interpreted as a negative feedback on one's own performance, leading to more analytical and item-specific encoding (Storbeck & Clore, 2005, 2011). Conversely, positive mood would promote amplified reliance on scripted knowledge and stereotypes (Bless et al., 1996; Ruder & Bless, 2003).

However, negative mood has been found to produce the opposite effect when study material itself is valenced. For example, increases in false memories under induced negative mood were reported when using negatively charged DRM lists (Deese–Roediger–McDermott paradigm, DRM, Roediger & McDermott, 1995); further, the same mood-congruency effect was found using positive DRM lists when positive mood was induced (Ruci, Tomes, & Zelenski, 2009).

A crucial point when studying the effects of emotions on memory performance is whether the emotional condition consists of a transient state (e.g., a temporarily induced mood) or it is due to a persistent trait, mood disorder, or emotional severe problems

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(e.g., depression). Unlike the effects due to transient induced negative mood, emotional problems or persistent traits may affect memory through more specific cognitive mechanisms. In particular, depression has been shown to cause general memory impairments (Burt, Zembar, & Niederehe, 1995), overgeneralization in autobiographical memory (Van Vreeswijk & De Wilde, 2004) and deficits in working memory and cognitive control (Gotlib & Joormann, 2010; Joormann & Gotlib, 2008). Further, research suggests reduced use and loss of sensitivity of Remember judgments at recognition in individuals with depressive mood (Drakeford et al., 2010; Ramponi, Barnard, & Nimmo-Smith, 2004).

Enhanced accessibility and preferential recall of negatively charged memories in depressed individuals is a well-established result (Mathews & MacLeod, 2005; Matt, Vázquez, & Campbell, 1992). Also specific increases of mood-congruent false memories in depressed have been reported at both recognition and recall using the DRM paradigm (Howe & Malone, 2011; Joormann, Teachman, & Gotlib, 2009; Yeh & Hua, 2009), especially when material is judged as personally salient (Moritz, Voigt, Arzola, & Otte, 2008). In other studies, increases of false memories in depressed individuals even extended to positively valenced material (Moritz, Gläscher, & Brassen, 2005). Biases in cognitive processing of emotional material were found also in individuals at risk for depression but without established diagnosis, suggesting that such biases may be *trait markers* of depression (Joormann, 2010; Krompinger & Simons, 2009). For example, impaired inhibition of negative material was reported at the subclinical level (Joormann, 2004). However, with regard to memory distortions Zhu et al. (2010) found that subclinical depressive traits in general reduced the propensity to false memories in a misinformation study, whereas using emotional material Yovel and Mineka (2004) failed to find any memory bias in individuals with depressive and anxious traits.

Mood-congruent memory distortions in depression may be due to cognitive biases implying difficulty disengaging from negative material. Indeed, it has been found that depressed individuals focus their attention for longer time on negative material and are more activated by it (Joormann, 2004; Krompinger & Simons, 2009). As a consequence, a high activation of presented material could also have an influence on the memorability of non-presented but related negative material, either by strengthening associated traces (as hypothesized by the associative-activation theory; Roediger, Balota, & Watson, 2001) or by making gist-related information more accessible (as hypothesized by the fuzzy-trace theory; Brainerd & Reyna, 2005). If mood congruent memory effects even extend to false memories, we may expect that depressed individuals would end up entangling in rumination about increasingly distorted or unreal negative events. Such a phenomenon is of clinical relevance since it would exacerbate a vicious circle of biased memory and negative thoughts in depression (Joormann et al., 2009).

In the present study, we investigated whether a trait characterized by persistent internalizing depressive–anxious symptoms produced an increase of inferential false memories related to emotional material, by using stimuli depicting everyday events. Such research would help to understand the underlying mechanisms of false memory formation in depressive and anxious states. Further, the present study has important implications for eyewitness memory, since eyewitnesses are typically asked to remember events that are emotionally charged and their pre-existent emotional states may affect the reliability of their reports.

We used an adapted version of the paradigm developed by Hannigan and Reinitz (2001), which consists of pictorial scripted material representing highly ecological daily life routines (also named "scripts") and allows to study two types of inferential memory errors: gap-filling errors (i.e., falsely recognizing script-consistent distractor pictures) and causal errors (i.e., falsely recognizing a picture representing a cause whose consequence had been shown). This paradigm was then adapted in order to include emotional material; specifically, two alternative consequences were embedded within each script: one emotional and one neutral (Mirandola, Toffalini, et al., 2014; Mirandola, Losito, Ghetti, & Cornoldi, 2014). The paradigm offers the possibility to examine whether emotional memory distortions in individuals with and without emotional problems arise from inferences made about like-real-life events and to distinguish between causal errors related with the emotional consequence and gap-filling errors related with the script. For example, if a script represents a bike accident with a boy being seriously injured by a car, individuals with emotional problems may more vividly elaborate the single point that is crucial to understand the event (i.e., the idea that the boy was about to cross the road) thus resulting in increased causal errors compared to control participants, and/or they may ruminate longer about all the antecedents (e.g., re-think of what the boy was doing) resulting in increased gap-filling errors. Mirandola, Toffalini, et al. (2014) also suggested to distinguish between a vivid recollective experience associated with recognition and a less specific familiarity experience. Thus, we assessed the subjective awareness associated with false memories endorsement by using an adapted form of the Remember-Know paradigm developed by Tulving (1985).

To examine these issues, we tested a group of young adults with depressive–anxious trait and a control group. First, we predicted that the protective role of emotional material should not be present in the depressive–anxious group and, especially in the case of causal false alarms related with the negative consequence, increased inferential memory error rate should occur. Furthermore, we predicted an enhanced tendency to associate Remember judgements to emotional false memories – compared to neutral – in participants with depressive–anxious trait, but not in the control group.

2. Method

2.1. Participants

Through screening based on the Q-Pad Questionnaire in different high schools in Northern Italy we formed two groups: "depressive-anxious" group (n = 30, Mean age = 18.38 years, SD = 1.19, 22 females), which included participants with scores above the cut-off in the anxiety-depression scales of the Questionnaire, and a control group (30 adolescents, Mean age = 18.29 years, SD = 1.21, 22 females), which included participants with scores around average (i.e., the 50th percentile) in all the Q-Pad scales expressing malaise.

Participants provided informed consent and volunteered in the study. Parental permission was collected through a consent form for participants under 18 years of age.

2.2. Materials

2.2.1. The Q-Pad

The Q-Pad (Questionario per la valutazione della psicopatologia in adolescenza – Questionnaire for the assessment of psychopathology in adolescence; Sica, Chiri, Favilli, & Marchetti, 2011) is a broad-spectrum questionnaire that has been developed to assess psychopathological traits in a range of typical dimensions of adolescent malaise. It comprises 81 items split into nine scales (body dissatisfaction, anxiety, depression, substance abuse, interpersonal conflicts, family problems, uncertainty about the future, psychosocial risk, self-esteem and well-being). Responses are given on a