



## Prospective mental imagery in patients with major depressive disorder or anxiety disorders

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### ABSTRACT

Prospective negative cognitions are suggested to play an important role in maintaining anxiety disorders and major depressive disorder (MDD). However, little is known about positive prospective mental imagery. This study investigated differences in prospective mental imagery among 27 patients with anxiety disorders, 24 patients with MDD, and 32 control participants. Measures of both deliberately generated and intrusive imagery were completed. Results indicated that both patients with anxiety disorders and those with MDD provided poorer vividness ratings for deliberately generated prospective positive scenarios compared to the control group. Patients with anxiety disorders showed a greater ability to vividly generate imagery for prospective negative scenarios than both patients with MDD and control participants. Finally, both clinical groups reported greater levels of intrusive prospective imagery of personally-relevant events as compared to the control group. The current findings underline the necessity to target prospective positive mental imagery in treating MDD and anxiety disorders.

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### 1. Introduction

An extensive body of research has demonstrated support for cognitive theories indicating that cognitions can play a significant role in the development and maintenance of major depressive disorder (MDD) and anxiety disorders (Craske et al., 2009; Gotlib & Joormann, 2010). Cognitions are conceptualized as taking the form of verbal thoughts or mental images (Beck, 1976) although the focus has traditionally been on verbal thoughts. In both depression and anxiety, faulty cognitive processes include difficulties in shifting attention from negative material and biases in memory, although there may be some differences between the two clinical syndromes with regard to these cognitive processes (Craske et al., 2009; Gotlib & Joormann, 2010).

Cognitive biases as seen in depression and anxiety are likely to not only affect the processing of current and past experiences, but also the processing of prospective-oriented material, i.e., cognitions relating to the future. There is accumulating evidence that the same neural pathways are activated when imagining the future as when remembering the past (Byrne, Becker, & Burgess, 2007; Schacter, Addis, & Buckner, 2007). According to the concept of the

“prospective brain” (Schacter et al., 2007), our ability to imagine and predict potential future events is based on stored information in our memory. In line with this model and given the fact that depression is associated with biases in the processing of both positive and negative memories (Gotlib & Joormann, 2010), one would expect depression to be associated with a bias in the processing of both positive and negative prospective-oriented material. Research on possible memory biases in anxiety has yielded mixed findings (Craske et al., 2009), thus prohibiting clear predictions with regard to prospective-oriented information processing in this disorder.

With regard to prospective positive and negative cognitions in depression and anxiety, MacLeod, Tata, Kentish, and Jacobsen (1997) have hypothesized that prospective cognitions may follow the same pattern as positive and negative affect as postulated by the tripartite model (Clark & Watson, 1991). The tripartite model proposes that negative affect is shared by both depression and anxiety, whereas absence of positive affect is specific to depression. In this model, positive affect is seen as a dimension of pleasurable engagement, level of energy and concentration, whereas negative affect is thought of as a dimension of unpleasurable engagement and subjective distress. These dimensions are theorized to include broad affective, cognitive, and motivational characteristics (Clark & Watson, 1991). MacLeod and Byrne (1996) and MacLeod et al. (1997) argue that affect is directly related to cognition and that positive and negative future-related cognitions may best be perceived as two separate dimensions of experience, differentially associated with depression and anxiety. Consequently, as depression is

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associated with increased negative affect and reduced positive affect it is also expected to be related to increased negative expectancies and decreased positive expectancies. In contrast, anxiety should only be associated with increased negative expectancies through the high negative affect component.

Research into prospective mental imagery has taken two main approaches. The first is the examination of the *deliberate* (as opposed to involuntary) generation of specific prospective images in response to set cues such as short sentences in the laboratory. MacLeod, Rose, and Williams (1993) used an adaptation of the Autobiographical Memory Task (typically used to study overgeneral past memory in depression) where participants are required to generate as many positive and negative future events as possible. In this adapted fluency measure of future thinking, participants are presented specific time periods in the future and asked to generate experiences they are looking forward to and not looking forward to, for example, next year or in five years time. Time periods are presented verbally, one at a time, and participants are given a time limit of one minute to generate and say aloud as many responses as they can. The items generated by participants are written down by the researcher. An example of a deliberately generated positive future event reported by participants might be “taking a vacation,” whereas an example of a negative future event might be “getting a disease.” Although deliberately generated in the laboratory, these same events may also be experienced as involuntary future images. Number of responses generated per condition (i.e., future positive experiences vs. future negative experiences) counts as the outcome measure. Macleod et al. (1993) have found this fluency measure of future thinking to be effective in eliciting personally relevant responses. In a study with suicidal patients and nondepressed controls, Williams et al. (1996) reported that deficits in being able to recall specific past memories were associated with deficits in generating specific future images. MacLeod and Byrne (1996) further found that both anxious and anxious-depressed participants showed greater anticipation of negative experiences that might happen to them in the future than the control group using this task. Furthermore, as expected, only anxious-depressed participants showed lower anticipation of positive future-directed experiences. In a study investigating clinical depression and anxiety, MacLeod et al. (1997) found that participants with depression generated less positive prospective experiences than control participants. However, contrary to their expectations and contrary to the tripartite model, participants with anxiety (i.e., not those with depression) generated a greater number of prospective negative experiences compared to controls.

An alternative to the assessment of fluency has been to assess the vividness of imagery for prospective events generated in response to a set list. Using the Prospective Imagery Task (based on MacLeod & Byrne, 1996), Stöber (2000) investigated the vividness of prospective positive and negative mental imagery in non-clinical anxiety and depression. Examples from this set list are “you will do well on your course” for a positive prospective event or “you will be a victim of a crime” for a negative prospective event. In this study by Stöber, only depression (and not anxiety) showed a unique relationship with impoverished vividness of positive prospective events. Furthermore, only anxiety (and not depressed mood) was correlated with enhanced imagery for negative prospective events. Using the same measurement of the vividness of prospective events in a study with non-clinical participants with high or low levels of dysphoria (depressed mood), Holmes, Geddes, Colom, and Goodwin (2008) reported that high levels of dysphoria were associated with lower vividness of positive (but not negative) prospective images. These findings are also contrary to predictions based on the tripartite model or the model of the prospective brain. Taken together, predictions based on the tripartite model (Clark & Watson, 1991) and the model of the “prospective brain” (Schacter et al., 2007) have

not entirely been able to explain the association between prospective imagery and depression and anxiety. In accordance with these two models, MDD has indeed been associated with lower vividness of positive prospective events (Holmes, Lang, Moulds, & Steele, 2008; MacLeod & Byrne, 1996; MacLeod et al., 1997; Stöber, 2000). Further, several studies have reported that anxiety is associated with a higher vividness of negative prospective images (MacLeod & Byrne, 1996; MacLeod et al., 1997; Stöber, 2000). However, contrary to predictions based on the models, several studies have reported that MDD is not related to higher vividness of negative prospective images (Holmes, Lang, et al., 2008; MacLeod et al., 1997; Stöber, 2000).

The second approach has been to explore *intrusive* involuntary prospective imagery for real-world events, i.e., images of the future which come to mind unbidden rather than those generated in response to set cues in the laboratory as in the studies discussed above. The Impact of Future Events Scale (IFES; Deeprose & Holmes, 2010) was designed to measure the impact of “pre-experiencing” in the form of intrusive prospective, personally-relevant imagery, assessed through a series of self-report questions. A positive correlation between current depressive symptomatology and IFES Total Score has been observed in a non-clinical sample, with a mild-dysphoric group showing significantly higher Total IFES scores than a non-dysphoric group (Deeprose & Holmes, 2010). Total IFES score has also been associated with risk for bipolar disorder in a non-clinical sample (Deeprose, Malik, & Holmes, 2011). These results raise the possibility that intrusive prospective imagery may be of relevance in depression as well as anxiety.

A growing body of recent research has documented the association between imagery and mental disorders (Brewin, Gregory, Lipton, & Burgess, 2010; Hirsch & Holmes, 2007; Holmes & Hackmann, 2004; Holmes & Mathews, 2010). Mental imagery has been shown to evoke greater emotional responses than language-based representations (Holmes, Lang, & Shah, 2009; Holmes & Mathews, 2010; Holmes, Mathews, Mackintosh, & Dagleish, 2008). Furthermore, research suggests that prospective imagery affects future behavior. Libby, Shaeffer, Eibach, and Slemmer (2007) as well as Vasquez and Buehler (2007) have demonstrated that people are more motivated to accomplish future behavior and also to actually conduct the behavior in question if they imagine its successful completion from a third-person perspective rather than a first-person perspective. Holmes, Crane, Fennell, and Williams (2007) have shown that simulation of future events using imagery may be particularly concerning from a clinical perspective if the action is negative, such as in the case of “suicidal flashforwards” imagery (Crane, Shah, Barnhofer, & Holmes, in press).

The aim of the current study was to explore the relationship between positive and negative prospective mental imagery in patients with MDD and patients with anxiety disorders in comparison to healthy participants using established paradigms from experimental psychopathology research. First, we assessed vividness for *deliberately* generated mental images in response to a set list of prospective positive and negative events using the Prospective Imagery Task (Holmes, Lang, et al., 2008; Stöber, 2000). Ratings were also obtained for arousal as well as the estimated likelihood that each event would occur in the future. Second, we investigated the impact of *intrusive*, prospective imagery of personally-relevant real-world events among patients with MDD and anxiety and in comparison to healthy participants using the IFES (Deeprose & Holmes, 2010).

In accordance with findings reported above (Holmes, Lang, et al., 2008; MacLeod & Byrne, 1996; MacLeod et al., 1997; Stöber, 2000), we predicted that for deliberately generated images, only participants with MDD (i.e., and not those with anxiety disorders) would report lower vividness of positive prospective images as compared to healthy participants. Furthermore, we predicted that only

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