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Selective intentional forgetting in adolescents with social anxiety disorder

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ABSTRACT

Anxiety in young adults has recently been linked to reduced capacities to inhibit the processing of non-affective perceptual distractors. However, no previous research has addressed the relationship between social anxiety disorder (SAD) and the ability to intentionally inhibit no longer relevant memories. In an experimental study with adolescents diagnosed with SAD and matched nonclinical controls, a selective directed forgetting procedure was used to assess the extent to which anxious individuals showed lower memory impairment for to-be-forgotten information than their non-anxious counterparts. The results revealed that while the nonclinical sample group demonstrated the ability to selectively forget when instructed, the anxious adolescents demonstrated good memory for to-be-forgotten material and therefore failed to forget. Interestingly, more severe SAD symptomatology inversely predicted a degree of forgetting. We conclude that the main difference between socially anxious and non-anxious participants is specifically related to the ability to intentionally forget and could reflect cognitive functioning that is associated with vulnerability to anxiety. Impairment of the ability to make unwanted memories less retrievable could prompt some individuals to initiate or maintain anxiety disorders. Future psychological treatments could benefit from including modules on memory control training.

1. Introduction

Over the last 25 years, research on anxiety has focused on characterizing its underlying cognitive functioning (MacLeod et al., 1986; Cloitre and Liebowitz, 1991; Beck and Clark, 1997; Bishop, 2009; Pacheco-Unguetti et al., 2010). Thus, influencing theories on anxiety such as those by Eysenck (1992) or Beck and Clark (1997) stress the presence of hyper-vigilance and cognitive biases in anxiety disorders. In this respect, some studies comparing people with anxiety disorders and control individuals suggest that anxiety entails attentional and memory biases for threat-related stimuli. Thus, for example, it has been shown that patients with generalized anxiety disorder have greater difficulty than control participants in disengaging attention from task-irrelevant information related to threat (Williams et al., 1996). Hence, it is not surprising that a leading theoretical stance states that anxiety is characterized by a hyper-vigilant threat-detection system (Mathews et al., 1997).

More recently, anxiety has been related to reduced executive control capacity (Airaksinen et al., 2005; Bishop, 2009; Pacheco-Unguetti et al., 2010). Executive (or cognitive) control refers to a variety of goal-oriented processes that regulate thought, action and emotion. Thus, for example, it has been proposed that executive control processes play a key role in overcoming conflicts[1] that occur during information processing (Botvinick et al., 2001). Evidence of the link between anxiety and executive control comes from studies wherein anxious people tend to show deficits across a variety of non-affective tasks that demand high levels of cognitive control (Fox, 1993; Bishop, 2009; Pacheco-Unguetti et al., 2010). For example, in a neuroimaging study, Bishop (2009) found that high-trait-anxiety individuals showed reduced recruitment of the control mechanisms in charge of inhibiting distracting information that competes for processing resources. In a similar vein, Pacheco-Unguetti et al. (2010) studied the efficiency of executive control processes in high-trait-anxiety and low-trait-anxiety individuals. By using an experimental procedure thought to draw on cognitive control (Callejas et al., 2004), the authors obtained measures of the amount of

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[1] For example, overriding a well-learned response in favor of a less dominant one or preventing non-relevant competing memories from hindering retrieval of relevant target memories would require executive control processes.

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interference experienced by participants while stimulation conflicting with targets was presented. It was assumed that more interference from distracting information stems from less efficient executive control mechanisms. Pacheco-Unguetti et al. showed that high-trait-anxiety individuals found it more difficult to control interference from distractors than their low-trait-anxiety counterparts. Interestingly, no such deficit in executive control was found when a high-state-anxiety group was compared with a low-state-anxiety group in the same task. Taken together, results by Bishop and Pacheco-Unguetti et al. suggest that trait anxiety entails an impoverished capacity to exert control over distracting information (i.e., by inhibiting it). Maybe more importantly, as this deficit was observed when the processing of non-affective information was required, it could be thought of as a general characteristic of trait anxiety rather than as a threat-based cognitive bias.

Executive control is also involved in controlling memory (Conway et al., 2000; Braver and Cohen, 2001; Anderson, 2003; Román et al., 2009; Anderson and Huddleston, 2011). Specifically, it has been put forward that updating memory contents may require an inhibitory mechanism in charge of rendering non-relevant memories less accessible (Bjork, 1998; Anderson, 2005). Results in experiments using the list method-directed forgetting[2] (LM-DF) procedure, for example, might be interpreted in terms of inhibitory executive control (Conway et al., 2000; Anderson, 2005). In a standard LM-DF experiment, participants are presented with a first list of items to study. Immediately after being presented with List 1, half of the participants are instructed to forget the whole list (forget group), whereas the remaining participants are told to continue remembering List 1 (remember group). After being provided with a second list for study, both groups perform a recall test that usually involves both studied lists. The typical DF effect is a lower recall for List 1 items in the forget group relative to the remember group. From an inhibitory framework, this memory impairment might reflect the after-effect of an inhibitory control mechanism that acts on List 1. Specifically, it has been suggested that the instruction to forget in the presence of two sets of information induces a temporary state of inhibition that makes to-be-forgotten items less retrievable in a subsequent recall test (Bjork, 1998; Pastötter and Bäuml, 2010).

A better understanding of memory control capacities in anxiety disorders may be relevant given that some theoretical models (more or less implicitly) highlight the role of memory retrieval in anxiety. Thus, for example, in a cognitive model of social phobia (Clark and Wells, 1995; Wells and Matthews, 1996), individuals engage in anticipatory processing concerning past social situations (which necessarily requires episodic retrieval) before coming across a new social event. Hence, LM-DF procedures could serve as marker tasks to assess memory control abilities in anxious people. However, little work has focused on examining the effect of an instruction to forget in people with anxiety disorders. An exception to this is a study by Power et al. (2000) aimed at exploring the ability of clinically depressed, clinically anxious and control individuals to intentionally forget. Unfortunately, the results of this study do not allow us to learn anything about the memory control capacities of anxious people since DF was not even observed in the control group. Hence, the present study aimed to examine the relationship between trait anxiety and memory control by using an LM-DF procedure. Specifically, we utilized a recently introduced variant of this experimental procedure we thought to be more suitable for exploring individual differences in memory control (Delaney et al., 2009). The rationale behind our choice lies on the fact that this new procedure requires participants to selectively forget part of List 1 (rather than forget the whole set of studied items) so that it can draw on higher executive control demands. To the best of our knowledge, there is no previous research addressing the link between selective directed forgetting and a particular anxiety disorder. Besides, while research on the relationship between anxiety and cognition has focused on young adults, studies on this relationship in children and adolescents are sparse (Mesa et al., 2011). To fill this gap, the present study focuses on a sample of clinically diagnosed adolescents with social anxiety disorder (SAD) as part of a broader clinical project. SAD is a disabling disorder characterized by a fear of negative evaluation in social situations, has a lifetime prevalence that usually ranges between 2% and 9% in adolescents (Vasa et al., 2007; Orgiles et al., 2008), and is associated with significant social and academic impairments (Silverman and Albano, 1996).

To summarize, we aimed to test the hypothesis that clinically anxious adolescents are less able to selectively forget outdated non-affective memories than non-anxious adolescents. If a structural general-domain deficit in executive processes characterized trait anxiety, one would expect people with anxiety disorders to be less efficient at exerting control over out-of-date memories, even if these episodic memories were not affective in nature.

2. Method

2.1. Participants

Two hundred adolescents (mean age = 15.16, S.D. = 1.38) originally participated in the study. Seventy-five of them met diagnostic criteria for SAD and 125 were nonclinical controls. Fifteen clinically diagnosed participants and 21 controls were, however, removed from analyses because either their post-experimental questionnaire revealed that they made no effort at all to comply with the instructions or it became evident from their performance that no attempt to learn material was made. Thus, the final sample for this study was composed of 60 adolescents with SAD and 104 nonclinical controls (see Table 1 for details). The inclusion criteria were as follows: (1) primary diagnosis of social anxiety disorder as diagnosed by the Anxiety Disorders Interview Schedule for the DSM-IV, Child and Parent Version (La Greca and Lopez, 1998); (2) ages between 10 and 17 years; and (3) written informed consent by adolescent and parents. Exclusion criteria were (1) current suicidal intent or risk and (2) a positive diagnosis of mental retardation, psychosis, or other psychiatric conditions that would limit the ability to understand the assessment procedures.

2.2. Measures

The Anxiety Disorders Interview Schedule for DSM-IV: Child Version (ADIS-IV-C) was conducted by PhD students in clinical psychology trained to diagnose social phobia in adolescents. This semi-structured interview assesses current and lifetime child psychopathology according to DSM-IV criteria. The social phobia

Table 1
Demographic information and symptom measures by diagnostic group.

	Clinical social anxiety	Nonclinical control	*t*	*p*
N	60	104		
% Female	63	56		
Age	15.03 (1.43)	15.29 (1.34)	1.15	0.25
CDI	24.81 (3.08)	25.02 (2.67)	0.43	0.67
SAS-A	56.69 (11.14)	49.06 (10.24)	4.28	< 0.01

CDI, Children's Depression Inventory.
SAS-A, Social Anxiety Scale for Adolescents.

[2] A related procedure is the so-called item method-directed forgetting paradigm. In this variant subjects view a series of items each immediately followed by an instruction to remember or to forget the item. After all of the items have been presented, participants' memory is tested. Typically this item-by-item instruction manipulation also leads to memory impairment for items cued to forget. Unlike list method-directed forgetting, however, the item method-directed forgetting effect is thought to reflect differential encoding for items cued to forget and remember, and it will no longer be considered here.