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Reduced autobiographical memory specificity relates to weak resistance to proactive interference

Jorien Smets [a,b,*], Ineke Wessel [c], Filip Raes [a]

[a] Faculty of Psychology and Educational Sciences, University of Leuven, Belgium
[b] Department of Applied Psychology, Thomas More University College, Belgium
[c] Department of Clinical Psychology and Experimental Psychopathology, University of Groningen, The Netherlands

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ABSTRACT

Background and objectives: Reduced autobiographical memory specificity (rAMS), experiencing intrusive memories, and rumination appear to be risk factors for depression and depressive relapse. The aim of the current study was to investigate whether a weak resistance to proactive interference (PI) might underlie this trio of cognitive risk factors. Resistance to PI refers to being able to ignore cognitive distracters that were previously relevant but became irrelevant for current task goals.
Method: Students ($N = 65$) and depressed patients ($N = 37$) completed tasks measuring resistance to PI and AMS, and completed questionnaires on intrusive memories and rumination.
Results: In both samples, weaker resistance to PI was associated with rAMS. There was no evidence for a relationship between resistance to PI and intrusive memories or rumination.
Limitations: As we did not assess other measures of executive functioning, we cannot conclude whether the observed relationship between rumination and PI is due to unique qualities of PI.
Conclusions: Difficulties to deliberately recall specific, rather than general or categoric autobiographical memories appear to be related to more general problems with the inhibition of interference of mental distracters. The results are in line with the executive control account of rAMS.
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1. Introduction

Depression is a highly prevalent psychological disorder with considerable relapse rates (see Richards, 2011, for a review). Knowledge about its risk factors is important with regard to early detection and prevention. Research has already pointed to some potential cognitive risk factors. To start with, depressed patients have difficulties to *intentionally* recall specific memories, that is, memories of a specific event that occurred at a specific day and did not last longer than 24 h (Williams, 2006; Williams & Broadbent, 1986). This memory phenomenon is called *reduced autobiographical memory specificity* (rAMS) or *overgeneral memory*. Memory specificity is usually assessed with the Autobiographical Memory Test (AMT; Williams & Broadbent, 1986). In the AMT, participants are asked to recall specific memories in response to words (e.g., sad, brave, lonely, pride). Depressed patients tend to recall general or categoric memories such as "Whenever I get bad news" rather than specific memories such as "When my mother told me that my grandfather died". Studies indicate that rAMS does not typically improve when patients are in remission (e.g., Mackinger, Pachinger, Leibetseder, & Fartacek, 2000; although see Wessel, Meeren, Peeters, Arntz, & Merckelbach, 2001). Moreover, rAMS negatively influences the course of depression in that it predicts higher prospective levels of depression, even when controlled for baseline symptomatology (e.g., Brittlebank, Scott, Williams, & Ferrier, 1993; Peeters, Wessel, Merckelbach, & Boon-Vermeeren, 2002; Raes et al., 2006; see Sumner, Griffith, & Mineka, 2010, for a meta-analysis). Researchers in this area agree that rAMS reflects a trait marker rather than an epiphenomenon of depression and as such may increase one's vulnerability for developing depression and depressive relapse.

A second potential cognitive risk factor for depression is the occurrence of intrusive memories. *Intrusive memories* are spontaneous, repetitive, disturbing memories of negative autobiographical events. There is evidence that depressed patients experience more intrusive memories than controls (e.g., Patel et al., 2007). Moreover, longitudinal studies yielded evidence that such memories are predictive of prospective depressive symptoms, even after

* Corresponding author. Faculty of Psychology and Educational Sciences, University of Leuven, Tiensestraat 102, Box 3712, 3000 Leuven, Belgium. Tel.: +32 16 326053.
E-mail addresses: jorien.smets@gmail.com, jorien.smets@ppw.kuleuven.be (J. Smets).

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controlling for baseline symptoms (e.g., Brewin, Reynolds, & Tata, 1999; Newby & Moulds, 2011).

The final depression risk factor under consideration in this study is *rumination*, which refers to abstract, repetitive thinking about the meanings, causes, and consequences of current feelings or past experiences. People suffering from depression tend to ruminate more (Nolen-Hoeksema, 2004). Furthermore, depressed patients who ruminate more about their negative affect suffer from longer and more severe depressive episodes (see Lyubomirsky & Tkach, 2004, and Nolen-Hoeksema, 2004, and Watkins, 2008 for reviews). Not only depressive rumination, but also rumination about intrusive memories is related to depressive symptoms (e.g., Ehring, Frank, & Ehlers, 2008; Starr & Moulds, 2006; Williams & Moulds, 2007a, 2007b).

Taken together, rAMS, intrusive memories, and rumination each may put one at risk for depression or depressive relapse. Interestingly, there is evidence for the interrelatedness of these three variables as well. For example, research has shown that rAMS and intrusive memories often co-occur (e.g., Brewin, Watson, McCarthy, Hyman, & Dayson, 1998; Stokes, Dritschel, & Bekerian, 2004). Furthermore, experimentally induced rumination maintains rAMS, whereas control inductions (often a concrete, non-ruminative thinking style or distraction) increase AMS (e.g., Raes, Watkins, Williams, & Hermans, 2008; Watkins & Teasdale, 2001, 2004). Likewise, experimentally induced rumination leads to more intrusive memories than control conditions (e.g., Guastella & Moulds, 2007; Watkins, 2004).

Given that reduced autobiographical memory specificity, intrusive memories, and rumination are interrelated and that each may be a risk factor for depression, uncovering any shared mechanism seems to be of importance. One candidate for such a common factor may be resistance to proactive interference (PI). Resistance to PI is, like resistance to distracter interference and prepotent response inhibition, an inhibition-related function (Friedman & Miyake, 2004). Whereas prepotent response inhibition refers to the ability to inhibit dominant responses, resistance to distracter interference and resistance to PI are components of cognitive inhibition. Cognitive inhibition is the executive control capacity to supersede mental content, with executive control referring to the set of cognitive processes that are responsible for the planning, initiation, sequencing, and monitoring of complex goal-directed behaviour in the face of distracting information (Dalgleish et al., 2007, p. 25). Note that cognitive inhibition seems to be impaired in depression (see Joormann & D'Avanzato, 2010, and Joormann, Yoon, & Zetsche, 2007, for overviews). Resistance to PI refers to the ability to ignore previously relevant but currently irrelevant, internal distractors, such as thoughts or memories. It seems unrelated to resistance to distracter interference and prepotent response inhibition (Friedman & Miyake, 2004). Both from a theoretical as from an empirical view, it seems that weak resistance to PI may underlie rAMS, intrusive memories, and rumination.

First, the executive control account of rAMS suggests that lowered executive functions, of which cognitive inhibition is a component, play a role in its etiology (Williams, 2006; also see Dalgleish et al., 2007). For example, irrelevant autobiographical knowledge should be ignored. This account was based on the Self-Memory System model (Conway & Pleydell-Pearce, 2000), an influential memory model. According to this Self-Memory System model, autobiographical memory consists of hierarchical layers of knowledge. The top layer would contain life time periods. Event-specific, experience-near knowledge would be represented in the bottom layer. General events would be in between. The idea is that there would be constant patterns of activation within this hierarchical autobiographical memory base. When a pattern matches current goals, one can consciously experience a memory (Conway & Pleydell-Pearce, 2000). These patterns of activation can be generated in two ways. Conway and colleagues distinguish generative, voluntary, top-down memory retrieval on the one hand and direct, spontaneous, bottom-up memory retrieval on the other hand (Conway, 2005; Conway, Meares, & Standard, 2004; Conway & Pleydell-Pearce, 2000). The successful retrieval of a specific memory in response to an abstract AMT cue is assumed to be a product of an effortful top-down process. When confronted with a cue, intermediate representations will be activated, that is, memories referring to a summary of events such as "whenever people ignore me" (Conway, 2005). Activation then spreads through the autobiographical knowledge base to the bottom of the hierarchy, where more specific information is stored. Thus, general, categoric memories are relevant at first, but should be dismissed in the further search for a (more) specific, concrete memory. In this sense, responding with categoric memories in the AMT might be regarded as an instance of weak resistance to PI.

Second, ruminative thoughts, which are *by definition* difficult to disengage from (Koster, De Lissnyder, Derakhshan, & De Raedt, 2011), and intrusive memories may also be seen as instances of goal-irrelevant cognitions that should be ignored when engaging in task-relevant behaviour. Weak resistance to PI implies more difficulties to ignore such goal-irrelevant cognitions, and thus involuntary ruminations and intrusive memories would be more likely to surface.

Interestingly, there is some empirical evidence that cognitive inhibition, of which resistance to PI is a component (Friedman & Miyake, 2004), is related to rAMS (Raes, Verstraeten, Bijttebier, Vasey, & Dalgleish, 2010). More specifically, Raes et al. (2010) found that cognitive inhibition mediated the relationship between depressed mood and rAMS in children. Furthermore, there is some evidence that resistance to PI may underlie intrusive memories and rumination. Laboratory studies have demonstrated that weaker resistance to PI predicts intrusive memories (e.g., Verwoerd, Wessel, de Jong, Nieuwenhuis, & Huntjens, 2011; Wessel, Overwijk, Verwoerd, & de Vrieze, 2008). That is, participants with a poorer pre-stressor ability to resist PI reported more intrusive memories of a trauma film 24 h (Wessel et al., 2008) and in the week (Verwoerd et al., 2011) after the presentation of the film. Likewise, there is evidence that rumination is associated with an impairment in cognitive inhibition (e.g., De Lissnyder, Derakshan, De Raedt, & Koster, 2011; Joormann, 2006; Joormann & Gotlib, 2008, 2010; Whitmer & Banich, 2007). In addition, weaker resistance to PI seems to exacerbate the impact of rumination on negative affect (Pe et al., 2012).

Tasks of executive functions often tap more than one executive (sub)function (Friedman & Miyake, 2004, p. 102). Thus it seems that most studies in the literature on memory phenomena in depression focused on cognitive inhibition in general, rather than on one of its subfactors. The current study examined the associations of resistance to PI, one form of cognitive inhibition, with rAMS, intrusive memories, and rumination, three known risk factors for depression. To this end, we collected data in a non-clinical group as well as in a group of clinically depressed individuals. We hypothesized that weaker resistance to PI would be associated with rAMS, with more intrusive memories, and with higher levels of rumination (on depression and on intrusive memories).

2. Material and methods

2.1. Participants

2.1.1. Sample 1

Participants were 65 first-year psychology students (51 women) from the University of Leuven, who took part in the study in return

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