



Attentional bias in older adults: Effects of generalized anxiety disorder and cognitive behavior therapy[☆]



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ABSTRACT

Attentional biases are known to play a contributing, and perhaps even causal role in the etiology of anxiety and other negative affective states. The prevalence of anxiety disorders in the older cohort is growing, and there are both theoretical and empirical reasons to suspect that age-related factors could moderate attentional bias effects in the context of late-life anxiety. The current study included one of the most widely-used measures of attentional bias, the dot-probe task (Mathews & MacLeod, 1985). Participants were older adults who were either nonanxious or diagnosed with generalized anxiety disorder. The patient subsample also completed cognitive behavior therapy (CBT) or an equivalent wait list condition, after which the dot probe was administered a second time. Results showed that clinical anxiety had no particular importance for the deployment of attention, casting doubt on the universality of biased attention in older anxiety patients. Although there were no maladaptive biases detected toward either threat or depression words at pretreatment, there was nevertheless a marginally significant differential reduction in bias toward threat words following CBT. This reduction did not occur among those in the wait list condition. Implications are discussed.

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1. Introduction

Attentional biases are known to play a contributing, and perhaps even causal role in the etiology of anxiety and other negative affective states (MacLeod et al., 1986; Mogg et al., 1992). The prevalence of anxiety disorders in the older cohort is growing (Blazer, 2003; Schutzer & Graves, 2004), thus investigations of attentional biases from a lifespan perspective are sorely needed. Selective attention toward negative information (or 'attentional bias') was first described decades ago as a critical maintaining factor in Beck's cognitive models of anxiety and depression (e.g., Beck, Emery, & Greenberg, 1985). Contemporary cognitive behavioral models of anxiety and depression propose that attentional bias is not merely a by-product of emotional distress, but actively contributes to the development and maintenance of disorders by promoting hyperawareness of negative information and

reinforcing maladaptive beliefs, such as the belief that the world is full of dangers. Research employing methodologies drawn from the field of cognitive science (e.g., reaction time and eyetracking measures of attention) has confirmed that theorized attentional biases are observable in both pediatric and adult samples (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van IJzendoorn, 2007). Yet in older adults, a group with a significant and growing prevalence of anxiety disorders, attentional bias has been little studied, leaving questions pertaining to the nature and clinical significance of attentional bias in this age group largely unanswered.

There are both theoretical and empirical reasons to suspect that age-related factors could moderate attentional bias effects in the context of late-life anxiety. Aging is broadly characterized by changes in attentional control and related neural networks (e.g., changes to prefrontal cortex [PFC]), as well as changes in emotional information processing (Braver & West, 2008; Raz, 2000; West, 1996). In cognitive aging studies where anxiety is not specifically assessed, a substantial literature shows that older adults tend to favor positive stimuli across a range of experimental paradigms, a phenomenon known as the positivity bias (e.g., Mather and Carstensen, 2003). Older adults may also preferentially attend to neutral stimuli over negative, the mirror opposite of the attentional biases seen in anxious younger adults (Mather and Carstensen, 2003). However, another study found that older adults' ability to

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detect a discrepant threat face in an array (Mather and Knight, 2006), an evolutionarily relevant skill, did not differ from that of younger adults.

These findings suggest that the positivity effect is not the result of a loss of evolutionarily preserved, bottom-up attentional features such as orienting toward threat, but may instead be driven by top-down cognitive factors such as preferences and goals. Socioemotional Selectivity Theory (Carstensen, Isaacowitz, & Charles, 1999) provides a parsimonious explanation for this set of findings. The theory proposes that as individuals age and time left in life is perceived as limited, goals shift from a focus on long-term outcomes to a focus on short-term outcomes, such as maintaining a pleasant mood in the here-and-now. The positivity effect literature provides empirical evidence consistent with the predictions of this theory.

Yet, in spite of these age-related changes in emotional information processing, findings to date suggest that the positivity effect may not apply equally to all older adults, but can be moderated, and perhaps entirely eradicated, by individual differences in emotion-related variables such as anxiety. The small number of studies to date suggest that anxious older adults, like anxious younger adults and children, show an attentional bias toward negative or threatening information. However, a wide range of procedural variables appears to impact whether or not the phenomenon is observed. For instance, Fox and Knight (2005) reported that both elevated trait anxiety and experimentally manipulated state anxiety increased attentional bias toward threatening words in older adults, but the effects were different depending on the specific paradigm used to assess attention to threat. In a more recent study (Lee & Knight, 2009), older adults high on trait anxiety showed a bias toward negative words presented for 1500 ms (allowing for conscious awareness of stimuli), while older adults with moderate trait anxiety showed a bias toward sad faces presented for 50 ms, followed immediately by a masking stimulus to preclude conscious awareness of the stimulus. Additional stimulus and presentation formats (e.g., masked and unmasked emotional pictures, masked negative words) did not elicit a threat bias in anxious older adults. Brown, White, Doan, and de Bruin (2011) reported that older adults with self-reported fear of falling exhibited a specific difficulty disengaging attention from fall-related words.

Price, Siegle, and Mohlman (2012) reported a bias toward general threat-related words in older adults with high levels of self-reported worry that was present in a more difficult task but not in a simpler task version. In the only study to assess attentional bias in a clinically anxious late-life sample, attentional bias toward threat- and depression-related words was found in late-life GAD patients, in conjunction with neural activation differences (prefrontal cortex decreases and amygdalar increases) assessed by functional Magnetic Resonance Imaging (fMRI; Price, Eldreth, & Mohlman, 2011). Collectively, these studies suggest that, in opposition to the positivity effect found in unselected older adult samples, anxious older adults may exhibit biases toward negative stimuli, but findings are easily influenced by experimental parameters including stimulus duration, stimulus modality, specific stimulus content, and attentional task paradigm.

If attentional bias toward negative information does indeed characterize late-life anxiety, a clinically relevant question is whether such biases are resolved following treatment. In younger adults, a number of studies suggest that cognitive behavior therapy (CBT) for anxiety, which explicitly targets cognitive biases including exaggerated attention toward threat, can remediate attentional bias, producing decreases in observed attentional bias from pre- to post-treatment (Tobon, Ouimet, & Dozois, 2011). A recent study found that such changes in attentional bias occur rapidly and may mediate downstream improvements in anxiety (Reinecke, Waldenmaier, Cooper, & Harmer, 2013). In a sample of panic disorder patients, a single session of exposure therapy was

sufficient to decrease attentional bias toward fearful faces one-day post-treatment. Attentional biases at this early post-treatment time-point predicted subsequent decreases in agoraphobic avoidance four weeks later. Interestingly, anxiolytic medication has also been shown to exert acute effects on attentional bias which appear after just seven days of administration in healthy volunteers (Murphy, Yiend, Lester, Cowen, & Harmer, 2009), preceding the typical timecourse of symptom improvement in clinical samples.

Finally, a direct approach to attentional bias modification—computerized attention re-training, in which attention is trained away from threat and toward neutral stimuli through repeated practice—has recently been tested as a treatment for anxiety, and shows initial promise in reducing anxiety symptoms in clinically anxious samples of younger adults (Hakamata et al., 2010). Collectively, these findings suggest that change in attentional bias may represent a final common pathway to symptom relief across multiple treatments. However, in contrast to these findings, a study in anxious youth found that attentional bias toward threat was not fully remediated by CBT (Waters, Wharton, Zimmer-Gembeck, & Craske, 2008), suggesting age effects may be important to consider. No previous study has examined the effects of any treatment for late-life anxiety on attentional bias, leaving numerous questions regarding whether this mechanism of symptom relief is applicable to an older age group characterized by age-normative deficits in attentional control.

The current study employed one of the most widely-used measures of attentional bias, the dot-probe task (Mathews & MacLeod, 1985). In this task, emotional and neutral stimulus pairs are presented, followed by a probe replacing one of the two stimuli. Increased response latencies to dots in the previous location of the neutral stimulus (termed 'incongruent trials') are frequently interpreted as an index of selective attention toward the emotional stimulus, suggesting that visual attention was oriented toward the emotional stimulus location at the time the dot appeared. The dot-probe task has previously elicited both positivity effect findings in unselected older adults (Mather and Carstensen, 2003) and biases toward threat-related stimuli in anxious older adults (Fox & Knight, 2005; Lee & Knight, 2009). We expanded on this literature by testing biases toward threat (e.g., 'accident,' 'incurable'), depression (e.g., 'misery,' 'sadness'), and positive words (e.g., 'celebration,' 'smile') in older GAD patients compared to age-matched nonanxious controls. We also assessed effects of psychotherapy on biases by comparing late-life GAD participants before and after either an 8-week course of CBT or an equivalent wait period.

Hypotheses were formulated from the literature demonstrating attentional biases toward negative words in younger GAD patients (e.g., MacLeod et al., 1986), the deleterious effects of aging on the attentional system (e.g., West, 1996), and the positivity effect found among healthy older adults (e.g., Mather and Carstensen, 2005) in which positive information is overattended to, and neutral or negative cues are neglected or ignored. It was predicted that GAD patients would show greater attentional bias than controls when responding to cues that followed the threat related word in threat-neutral word pairs. Due to the symptom overlap between GAD and depression (e.g., trouble concentrating, fatigue, insomnia), we expected a secondary bias toward depression words in the GAD group but not in controls.

On the other hand, controls were expected to show greater attentional bias than GAD patients when responding to cues that followed the positive word in positive-neutral word pairs. A bias away from the negative word in negative-neutral word pairs was expected in this group, given that nonanxious older adults have been known to focus away from negative material.

We also predicted that the subset of GAD patients who completed cognitive behavior therapy (CBT) would show attenuated biases to negative words at posttreatment as compared to those

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