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# Testing the differential effects of acceptance and attention-based psychological interventions on intrusive thoughts and worry

B. Ainsworth [a, b, *], H. Bolderston [c], M. Garner [a, d]

[a] Psychology. Faculty of Social, Human & Mathematical Sciences, University of Southampton, UK
[b] Primary Care and Population Sciences, Faculty of Medicine, University of Southampton, UK
[c] Research Centre for Behaviour Change, Department of Psychology, Bournemouth University, UK
[d] Clinical and Experimental Sciences, Faculty of Medicine, University of Southampton, UK

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ABSTRACT

*Background:* Worry is a key component of anxiety and may be an effective target for therapeutic intervention. We compared two psychological processes (attention and acceptance) on the frequency of intrusive worrying thoughts in an experimental worry task.
*Method:* 77 participants were randomised across three groups and completed either a 10 min attention or acceptance-based psychological exercise, or progressive muscle relaxation control. We subsequently measured anxiety, and the content and frequency of intrusive thoughts before and after a 'worry induction task'.
*Results:* Groups did not differ in baseline worry, anxiety or thought intrusions. Both attention and acceptance-based groups experienced fewer negative thought intrusions (post-worry) compared to the relaxation control group. The acceptance exercise had the largest effect, preventing 'worry induction'. Increases in negative intrusive thoughts predicted subjective anxiety.
*Discussion:* We provide evidence that acceptance and attention psychological exercises may reduce anxiety by reducing the negative thought intrusions that characterise worry.
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## 1. Introduction

Maladaptive cognitive and attentional biases are implicated in the etiology and maintenance of anxiety. Anxious individuals preferentially attend to threat (e.g. Mogg, Garner, & Bradley, 2007) and interpret ambiguous information in a threatening manner (e.g. Castillo & Leandro, 2010; see Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van Ijzendoorn, 2007; for a review). Individuals with anxiety also have broader deficits in attention control and executive processing, are more readily distracted and unable to focus on top-down 'goal-directed' tasks, instead devoting limited attentional resources to negative distractors (e.g. Attention Control Theory, Eysenck et al., 2007, see recent integrative review by Mogg & Bradley, 2016).

The cardinal symptom in generalized anxiety—worry—is characterised by increased frequency and uncontrollability of distracting negative thoughts about current and future threat (see Hirsch, Perman, Hayes, Eagleson, & Mathews, 2015; De Raedt et al., 2015). These recurrent thoughts comprise verbal problem-solving of perceived future threat, and may be accompanied with distressing imagery. Active worry limits processing resources required to complete tasks efficiently (Ouimet, Gawronski, & Dozois, 2009) and can persist in anxious individuals due to anxiety-related deficits in attention control, and reinforcing beliefs that worry is adaptive (Borkovec, Robinson, Pruzinsky, & DePree, 1983). Consequently, mechanisms that exacerbate and maintain worry can be considered as putative targets for therapeutic intervention in anxiety (Gaynor, 2014; Hirsch et al., 2015; Wiers, Gladwin, Hofmann, Salemink, & Ridderinkhof, 2013).

The relationship between poor attention control and negative intrusive thoughts (i.e. worry) in anxious individuals has been established - increased self-reported worry is associated with poorer performance on an attentional flanker task, likewise improved attention control (flanker performance) is associated with fewer worry-related intrusive thoughts (Fox, Dutton, Yates,

*Abbreviations:* MBCT, mindfulness-based cognitive therapy; PMR, progressive muscle relaxation; FA, focused attention; OM, open-monitoring meditation; VAS, visual analogue scales.

* Corresponding author. Psychology. Faculty of Social, Human & Mathematical Sciences, University of Southampton, UK.
*E-mail address:* ben.ainsworth@southampton.ac.uk (B. Ainsworth).

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Georgiou, & Mouchlianitis, 2015). Furthermore, experimental methods that directly reduce attentional bias to negative information (attention bias modification) can reduce negative thought intrusions following a period of active worry (Hirsch et al., 2011).

Mindfulness meditation encourages deliberate, non-judgemental attention to internal and external stimuli in the present moment (Williams & Kabat-Zinn, 2011), and offers promise as a cost-effective treatment for anxiety (Hofmann, Swyer, Witt & Oh, 2010). Mindfulness exercises typically target two processes – attention and acceptance (Bishop et al., 2006). Attention involves paying 'objective' attention to internal and external stimuli while acceptance encourages having open and receptive attention to ongoing experiences (Brown & Ryan, 2004). Recent neuropsychological perspectives of mindfulness outline a range of 'bottom-up' and volitional 'top-down' mechanisms of action that might usefully target negative thought intrusions, persistent worry and anxiety (see Holzel et al., 2011). Despite this there have been few attempts to operationalize, manipulate and compare acceptance and attention component processes, to dissociate their therapeutic effects and optimise allied treatment protocols.

Recent laboratory studies suggest that mindfulness exercises that target attention and open-monitoring can improve attention control (Ainsworth, Eddershaw, Meron, Baldwin, & Garner, 2013; Zeidan, Johnson, Diamond, David, & Goolkasian, 2010; Jha, Krompinger & Baime, 2007), emotion regulation (Burton, Schmertz, Price, Masuda & Anderson, 2013) and reduce experimentally induced anxiety (e.g. subjective anxiety during carbon-dioxide challenge, Ainsworth et al., 2015). Mindfulness meditation has been shown to reduce self-reported worry in non-clinical high worriers (Delgado-Pastor et al., 2015), in patients undergoing a mindfulness-based cognitive therapy (MBCT) for relapse prevention of recurrent depression (Ietsugu et al., 2015), and in individuals with generalized anxiety disorder (GAD) taking part in an internet delivered acceptance-based therapy (Dahlin, Ryberg, Vernmark & Annas, 2016). Similarly, there is evidence that mindfulness-based interventions can increase measures of acceptance (Schroevers & Brandsma, 2010).

However, the growing popularity of mindfulness meditation raises the question of whether mindfulness might usefully target unwanted thought intrusions and worries in the wider non-clinical population. The existing literature further suggests that acceptance and attention training may have differential effects on such processes. Evidence that experiential avoidance (unwillingness to experience negative thoughts and emotions) is associated with problematic worry (Buhr & Dugas, 2009; Roemer, Salters, Raffa, & Orsillo, 2005) supports positive effects of interventions specifically designed to increase acceptance of anxiety and worry (e.g. Roemer & Orsillo, 2007). This contrasts with the mixed therapeutic effects of interventions that target discrete attentional biases e.g. threat avoidance attention training (see review in Mogg & Bradley, 2016).

We compared two psychological processes that feature in contemporary mindfulness-based interventions, attention and acceptance, on the frequency of intrusive worrying thoughts in an experimental worry task. We measured the frequency and valence of thought intrusions using an established measure of thought intrusions developed by Ruscio and Borkovec (2004) and adapted by Hirsch, Hayes, and Mathews (2009). This task has been widely used to examine thought intrusions and worry in non-clinical groups (Krebs, Hirsch, & Mathews, 2010), individuals with elevated worry, and generalized anxiety disorder (Hayes, Hirsch, Krebs, & Mathews, 2010; Hirsch et al., 2009) and associated conditions (i.e. insomnia symptoms, Baker, Baldwin, & Garner, 2015). The thought intrusions task measures the occurrence of resting level, spontaneously occurring thoughts which distract from the current task. It further measures the pervasiveness of thought intrusions following a period of active worry on a topic chosen by the participant. This paradigm overcomes limitations associated with self-report questionnaires that ask participants to retrospectively report the frequency with which they worry about a pre-determined set of topics chosen by researchers, and that might be confounded by recall bias.

Our study compared the effects of attention and acceptance-based practices vs. progressive muscle relaxation (PMR)—an active control condition—on negative thought intrusions before and after a worry-induction (see Hirsch et al., 2009). We predicted that acceptance and attention exercises (compared to PMR control) would reduce negative thought intrusions and subjective anxiety after worry induction. Further, we predicted that the acceptance exercise would be superior to the attention exercise by encouraging broader acceptance of private thought/emotions and reducing experiential avoidance that may otherwise sustain worry. Finally, following cognitive models of worry we examined whether reduced negative thought intrusions would be associated with reduced anxiety.

## 2. Method

### 2.1. Participants

An unselected sample of 77 volunteers (56 female/21 male; $M_{age}$ = 20.8, $SD_{age}$ = 3.2) were recruited from local adverts on a university campus and surrounding area, and randomly allocated to one of two mindfulness groups (focused attention: FA, or open-monitoring acceptance, OM) or an active control (progressive muscle relaxation: PMR). Sample size was calculated a priori to detect effects similar to those observed in previous studies that have used this self-referential worry task (e.g. Hayes et al., 2010: between-group difference on negative thought intrusions at post-test, $f^2$ = 0.43). Informed consent was received from all participants before taking part in the study. Participants received course-credits or £6 money in return for participation. Participants were from a range of ethnicities: 70% British, 11% other white, 5% Chinese, 4% other Asian, 4% Indian, 3% African, 3% other. Participants rated their prior experience of mindfulness, on a scale ranging from 1 (I have never heard of mindfulness) to 6 (I regularly practice mindfulness). Current practitioners (score = 6) were removed (n = 4). Final analysis consisted of 73 participants: acceptance-based (N = 23, $M_{age}$ = 21.1, $SD_{age}$ = 3.6, 16 female), attention-based (N = 26, $M_{age}$ = 20.6, $SD_{age}$ = 2.3, 20 female), PMR (N = 24, $M_{age}$ = 20.3, $SD_{age}$ = 3.5, 18 female). Groups did not differ on age, gender, nor measures of dispositional mood, baseline state mood or mindfulness, see Table 1.

### 2.2. Measures

#### 2.2.1. Self-report measures

Participants completed established self-report measures of trait anxiety (Spielberger State-Trait Anxiety Inventory; Spielberger, Gorusch, Lushene, Vagg, & Jacobs, 1983), attention control (Attention Control Scale, comprising measures of dispositional/trait abilities to focus attention, limit distraction and volitionally/flexibly shift attention; $\alpha$ = 0.75; Derryberry & Reed, 2002), mindfulness (Philadelphia Mindfulness Scale; comprising items that measure dispotional/trait present-centred awareness/attention and acceptance; $\alpha$ = 0.72; Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008) and worry (Penn-State Worry Questionnaire; Meyer, Miller, Metzger, & Borkovec, 1990).

#### 2.2.2. Self-report anxiety ratings

Visual analogue ratings (VAS scales) quantified the extent that

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