

The Attention Training Technique:  
A Review of a Neurobehavioral Therapy for Emotional Disorders

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### Abstract

Wells's (1990) attention training technique (ATT) is a neurobehavioral therapy for emotional disorders that purportedly can improve upon existing treatment efforts for these disorders. Yet, ATT remains underutilized in the treatment of emotional disorders. One tenable reason for the underutilization of ATT is that researchers and clinicians alike may generally be unfamiliar with ATT and studies supporting its use. We sought to: (1) outline the setup and potential barriers to implementing ATT, (2) describe the distinctiveness of ATT from related interventions, (3) update readers on studies that have examined ATT since an earlier review, (4) discuss limitations surrounding extant ATT studies that preclude us from fully understanding the therapeutic benefits of ATT and describe how future studies can address these limitations, and (5) extend prior discussions of potential mechanisms of change underlying ATT. Our review of empirical evidence for ATT suggests that ATT could be considered a *possibly* efficacious treatment for emotional disorders, with a great need existing for future efficacy studies that evaluate ATT as a standalone intervention. We offer recommendations for future research interested in shedding further light onto the therapeutic benefits of ATT.

*Keywords:* anxiety disorders; attention training technique (ATT); depression; obsessive-compulsive disorder (OCD); posttraumatic stress disorder (PTSD); metacognitive therapy

## **The Attention Training Technique:**

### **A Review of a Neurobehavioral Therapy for Emotional Disorders**

#### **1. Statement of the Problem**

Cognitive-behavioral therapy (CBT) for emotional disorders is efficacious and is considered the gold standard interventions for these disorders (Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012). By emotional disorders, we are referring to anxiety disorders and depression (Barlow, Allen, & Choate, 2004). Unfortunately, there are considerable costs associated with disseminating CBT for emotional disorders because there are a variety of different treatments under the CBT umbrella. That is, specific treatments are often matched with specific symptom profiles (e.g., exposure and response prevention for obsessive-compulsive disorder [OCD]; interoceptive exposure for panic disorder), thus resulting in increased dissemination expenses and time spent in training in order to learn different treatment modalities for each symptom profile (Norton & Hope, 2005). The costs associated with CBT could be one reason why patients presenting with emotional disorders often do not receive this empirically supported treatment (Young, Klap, Sherbourne, & Wells, 2001). Unfortunately, even when they are broadly disseminated, empirically supported treatments are rarely implemented with fidelity (McHugh & Barlow 2010). As noted by Barlow et al. (2004), “unless these treatments become more “user-friendly” as recommended, it is unlikely that most non-research clinicians will have a sufficient understanding of, or access to, these empirically supported techniques” (pp. 208-209).

Neurobehavioral therapies may constitute a set of empirically supported techniques for emotional disorders that help address some limitations of CBT. Siegle, Ghinassi, and Thase (2007) defined neurobehavioral therapies as “interventions that address biological mechanisms believed to underlie psychological disorders” (p. 236). According to Siegle et al. (2007), a fundamental difference between neurobehavioral therapies and CBT is that neurobehavioral

therapies are developed to directly target specific biological mechanisms rather than cognitive and/or behavioral patterns commonly targeted within CBT. In other words, although brain-related changes occur following CBT for emotional disorders (e.g., Porto et al., 2009), cognitive and/or behavioral patterns, rather than biological mechanisms *per se*, are the direct targets of intervention within CBT for emotional disorders (e.g., Hofmann, Asmundson, & Beck, 2013). Siegle et al. (2007) noted that because neurobehavioral treatments are often automated, they may require less training or resources to administer, and thus, may be more easily implemented than CBT. Neurobehavioral treatments therefore have the potential to be more user-friendly than CBT and improve upon extant empirically supported treatment efforts for emotional disorders.

The purpose of this review is to further elucidate the use of the attention training technique (ATT; Wells, 1990), a neurobehavioral therapy for emotional disorders (Siegle et al., 2007). ATT is a component of metacognitive therapy (Wells, 2009), an efficacious treatment for emotional disorders (Normann, van Emmerik, & Morina, 2014), and preliminary studies highlight the possibility that ATT may be a viable standalone intervention (e.g., Papageorgiou & Wells, 2000; Wells, White, & Carter, 1997). Despite research indicating that ATT reduces symptoms of emotional disorders as a standalone intervention, ATT remains underutilized (Mohlman, 2004). One tenable reason for the underutilization of ATT is that researchers and clinicians alike may generally be unfamiliar with ATT and studies supporting its use.

Wells (2007) previously published a review describing ATT, its theoretical basis, and empirical evidence supporting its use. We sought to extend Wells's (2007) review through five aims. Our first aim is to outline the implementation of ATT by reviewing the setup and potential barriers to its implementation. Our second aim is to describe the distinctiveness of ATT from related interventions. Our third aim is to update readers on studies that have examined ATT since

Wells's (2007) earlier publication. Our fourth aim is to discuss limitations surrounding extant ATT treatment studies that preclude us from fully understanding the therapeutic benefits of ATT and to describe how future studies can address those limitations. Our fifth aim is to extend Wells's (2007) discussion of potential mechanisms of change underlying ATT by considering two putative mechanisms and then outlining which one may be more likely to satisfy the specificity requirement for determining mechanisms (Kazdin, 2009).

## **2. Theoretical Basis for ATT**

Before considering each of those aims in turn, we first provide an overview of the theoretical basis for ATT to orient readers to the underlying purpose of the intervention. ATT was developed based upon the self-regulatory executive function (S-REF) model, which also provides the theoretical basis for metacognitive therapy more broadly (Wells & Matthews, 1996; Wells, 2009). The basic premise of the S-REF model is that emotional disorders arise as the result of self-regulatory strategies that backfire and lead to greater distress. This basic premise of the S-REF model is highlighted through Wells's (2009) statement that metacognitive therapy "deals with the way that people think and it assumes the problem rests with inflexible and recurrent styles of thinking in response to negative thoughts, feelings and beliefs" (p. 3).

To further flesh out the basic premise of the S-REF model, consider Wells's (2013) example of two individuals who hold the belief that "I am worthless" with equal conviction. One individual thinks there is no value in the sustained processing of the belief and engages in an activity deemed worthwhile instead of repetitively focusing on the belief. The other individual dwells about why they are worthless, worries about the implications of their shortcomings, and either avoids engaging in a worthwhile activity altogether or engages in an activity while simultaneously processing the meaning and implications of the belief. The S-REF model holds

that the sustained processing of the belief will lead the latter individual to have the belief with greater frequency and, ultimately, experience greater distress (Wells, 2009, 2013). As such, according to the S-REF model, it is not the belief *per se* that leads to long-term emotional distress; rather long-term emotional distress is evoked by the sustained processing of the belief.

The sustained processing of thoughts, threat, and emotions is representative of the cognitive attentional syndrome (CAS), a concept central of the S-REF model and metacognitive therapy (Wells, 2009, 2013). Wells (2009) stated that “the CAS consists of excessive conceptual processing in the form of worry and rumination” (p. 11), although the CAS also consists of attentional focus on threat and other self-regulatory strategies that serve to intensify and maintain distress (e.g., thought suppression). According to the S-REF model, the CAS develops as a result of metacognitive beliefs that the sustained processing of inner experiences is useful (beliefs about thinking, such as “if I worry, I will be prepared”). The excessive conceptual processing that characterizes the CAS is exacerbated by diminished attentional control, which, within the S-REF model, refers to the ability to disengage from rumination, worry, and other forms of self-focused attention using top-down attentional processes. The CAS is a central target of intervention within metacognitive therapy, with ATT being one component of metacognitive therapy developed to mitigate the CAS (Wells, 2009, 2013).

### **3. Clinical Implementation of ATT**

ATT seeks to interrupt the CAS and improve attentional control. ATT purportedly achieves these therapeutic aims through auditory monitoring exercises that are attentionally demanding enough to strengthen attentional control and through the external processing of non-self-relevant material to interrupt the excessive self-focused attention of the CAS (Wells, 2009). Psychoeducation is initially used to orient patients to the underlying rationale behind ATT,

including the unhelpful nature of the sustained processing of thoughts, threat, or emotions. It is important to emphasize that ATT is not to be used as an attempt to avoid or control thoughts, emotions, or other experiences. Instead, unwanted inner experiences are to be noticed, rather than responded to, and viewed as opportunities to improve attentional control (Wells, 2009).

Upon having an adequate understanding of the rationale behind ATT, patients are asked to practice ATT in-person with a clinician and then at home. Initial applications of ATT involved a self-generated version of ATT in which clinicians provided verbal instructions as to how patients should attend to auditory stimuli presented inside and outside the therapy room (Papageorgiou & Wells, 1998, 2000; Wells, 1990; Wells et al., 1997). Patients were asked to practice ATT at home by creating competing sounds on their own (e.g., stereo, ticking clock). An automated version of ATT has been developed and has been used in a handful of studies to date (Callinan, Johnson, & Wells, 2015; Calkins, McMorran, Siegle, & Otto, 2015; Donald, Abbott, & Smith, 2014; Fergus, Wheless, & Wright, 2014; Nassif & Wells, 2014; Siegle et al., 2007; Siegle et al., 2014). The automated version has a recorded voice that directs patients how to attend to sounds embedded within the audio recording. To use the automated version of ATT, clinicians need a device to present the recording during session and a way to distribute the recording for homework. The automated version of ATT is practical (e.g., reduces setup time) and increases standardization, although Wells (2007) speculated that practicing the same version of ATT may lead to increasingly diminished attentional demands and, consequently, attenuated therapeutic effects. This speculation, though, has yet to be examined in the extant literature.

An ATT practice session takes approximately 12 minutes and patients are instructed to attend to the presented auditory stimuli as directed. To facilitate its practice, patients can focus their gaze on a fixation point during ATT. Specific instructions given to patients when practicing

ATT are presented in detail in Wells (2009) and summarized here. In the self-generated version of ATT, patients are instructed to focus their attention on different sounds inside and outside the room where ATT is being practiced. Patients are further instructed that they will be asked to focus their attention in different ways and that it does not matter if thoughts and feelings come into their mind during ATT. The stated purpose of ATT is to practice focusing their attention no matter what they become aware of during ATT. In addition to using the above rationale when introducing the automated version of ATT, a recorded voice at the beginning of the automated version of ATT lets patients know that it is important for them to become more aware of their focus of attention and strengthen their control over it. The recorded voice further instructs patients that the goal of ATT is not to distract them from upsetting thoughts or feelings and that such unwanted experiences are, in fact, likely to occur during ATT. Patients are instructed to continue to follow the recording while allowing inner experiences to take care of themselves and that patients can view those experience as passing events in their mind and body (Wells, 2009).

In ATT, approximately five minutes are spent on selective attention; during which, patients are instructed to listen to specific sounds while disregarding others. Next, five minutes are spent on attention switching; during which, patients are instructed to rapidly switch their focus of attention between sounds. Finally, two minutes are spent on divided attention; during which, patients are instructed to focus on multiple sounds at once (Wells, 2007, 2009). For the self-generated version of ATT, the clinician and patient are responsible for creating auditory stimuli and directing how a patient should attend to the stimuli. In the automated version of ATT, the auditory stimuli are embedded within the audio recording and voice prompts provide directions as to how patients should attend to the stimuli. Auditory stimuli in the automated

version include the speaker's voice, a church bell, a ticking clock, traffic noise, birds chirping, running water, insect noises, and sounds that are naturally-occurring external to the recording.

Patients initially practice ATT during an in-person session with a clinician and, at that time, complete a pre- and post-ATT assessment of their self-focus attention on a bipolar rating scale (Wells, 2009). The goal of this assessment is to see whether patients become more externally focused following ATT, as intended. A two-point change on the rating scale (toward greater external focus of attention following ATT) is a typical amount of change for the initial practice session. A less than two point change toward greater external focus of attention should prompt discussion about difficulties and lead to an additional in-person practice of ATT. Wells (2009) outlined potential difficulties that may preclude a shift to an external focus of attention following ATT. Difficulties may include beliefs that ATT is a way to control unwanted inner experiences, beliefs that attention should be divided between ATT and rumination/worry, or beliefs that rumination/worry is especially useful. Such beliefs should be addressed before practicing ATT again, as they will likely contribute to poorer treatment outcomes (Wells, 2009).

Upon successfully practicing ATT with a clinician, patients are asked to practice ATT at home. Wells (2009) recommended that ATT be practiced twice daily at home, but went on to state that most individuals are only able to complete ATT once a day. Wells (2009) developed an ATT practice summary sheet as a way to increase compliance with ATT home practice, with the summary sheet encouraging the practice of ATT for at least four weeks at home. Common barriers to practicing ATT discussed by Wells (2009) include patients viewing rumination or worry as a preferred self-regulatory strategy. Such viewpoints can lead patients to try to focus on ruminative/worrisome thoughts in parallel while completing ATT or completing ATT as quickly as possible to then return to a self-focused state. Another potential barrier raised by Wells (2009)

is that patients may selectively practice ATT because they are using ATT as a form of avoidance or symptom management. Weekly check-in sessions are recommended as a way to assess compliance with practicing ATT and to address identified barriers (Wells, 2009).

#### **4. Distinctiveness of ATT**

ATT shares similarities with existing interventions, such as attention bias modification treatment (ABMT; e.g., Amir, Beard, Burns, & Bomyea, 2009; Amir, Weber, Beard, Bomyea, & Taylor, 2008; Eldar & Bar-Haim, 2010; MacLeod, Soong, Rutherford, & Campbell, 2007; Schmidt, Richey, Buckner, & Timpano, 2009). Although there are subtle differences across versions of ABMT, ABMT typically involves the simultaneous presentation of two stimuli on a computer screen, one threatening and the other either positive or benign. Both stimuli disappear and the location of one of the stimuli is replaced by one or two dots (referred to as a “probe”). Patients are asked to identify the probe and, in ABMT, the probe replaces the positive or benign stimulus on 80-100% of trials. After repeated trials, patients are expected to learn an association between the positive or benign stimulus and target response, thereby reducing an attentional bias for threat (see Hallion & Ruscio, 2011, for a review).

Presentation differences between ATT and ABMT include the use of auditory stimuli during ATT and pictorial or word stimuli during ABMT. Conceptual differences between ATT and ABMT have been discussed by Bar-Haim (2010), who noted that ATT fundamentally seeks to strengthen top-down attentional control abilities to facilitate disengagement from the CAS and ABMT fundamentally seeks to directly modulate an attentional bias for threat. In other words, although preliminary research suggests that aspects of the CAS may be mitigated by ABMT (e.g., worry; Amir et al., 2009), attentional bias for threat, rather than the CAS, is the intended target of intervention within ABMT (Hallion & Ruscio, 2011). Alternatively, although reduced

threat perceptions may be seen following the mitigation of the CAS, ATT was specifically developed to target the CAS and not an attentional bias for threat *per se* (Wells, 2009).

Similarities exist between ATT and forms of CBT, which is not surprising given that metacognitive therapy is a type of CBT (Hayes, Villatte, Levin, & Hildebrandt, 2011). Wells (2009) considers metacognitive therapy as a type of process-focused therapy, as metacognitive therapy seeks to change how patients respond to unwanted inner experiences. ATT is also process-focused as it seeks to reduce use of the CAS and, thus, differs from more traditional forms of CBT that are focused on the content of experiences (Fisher & Wells, 2009).

ATT overlaps with other process-focused (or “contextual”) therapies, including mindfulness-based interventions (Hayes et al., 2011). For example, ATT and mindfulness-based interventions both seek to regulate focus of attention (Bishop et al., 2004; Wells, 2009). Wells (2002) highlighted a fundamental difference between these two interventions, stating “this technique [ATT] differs from the mindfulness strategies reviewed above in that it does not require self-focused attention” (p. 96). Other researchers have similarly noted that ATT and mindfulness-based interventions are distinguishable based upon focus of attention (Shapiro, Carlson, Astin, & Freedman, 2006). Indeed, Baer et al. (2008) stated that “close observation of internal experience may be maladaptive in the general population but adaptive when it is done mindfully” (p. 331). As discussed by Fergus et al. (2014), mindfulness-based interventions seemingly aim to cultivate an adaptive form of focus of attention (i.e., focus of attention that occurs within a mindfulness-based context; Baer, 2009) and ATT seeks to reduce a maladaptive form of focus of attention (i.e., focus of attention that is perseverative and inflexibly focused on threat; Wells, 2009). Overall, ATT is firmly grounded within the S-REF model, can be practically implemented, and appears meaningfully distinct from related interventions. With that

information in mind, we now turn our focus of the review to studies examining the therapeutic benefits of ATT.

### **5. Therapeutic Benefits of ATT for Emotional Disorders**

PsychINFO and the Institute of Scientific Information were used to identify studies published online through September 2014. Combinations of the following search terms were used: anxiety, anxiety disorders, attention training, attention training technique, depression, obsessive-compulsive disorder, OCD, posttraumatic stress, posttraumatic stress disorder, PTSD, and Wells. Google Scholar was also used to identify published studies that have cited Wells (1990) or Wells (2007), two seminal publications which describe ATT. The studies included in this review were studies whose primary stated purpose was to examine ATT in relation to emotional disorders. Studies examining ATT within the context of the broader metacognitive therapy treatment package (e.g., Wells et al., 2012) or studies examining whether ATT is a useful adjunct to traditional CBT (e.g., McEvoy & Perini, 2009) were excluded from this review.

Table 1 presents summary descriptive information of the reviewed studies. Initial studies examining ATT used single-case experimental study designs (Papageorgiou & Wells, 1998, 2000; Wells, 1990; Wells et al., 1997). These studies were previously reviewed by Wells (2007). Each study established a baseline period before implementing ATT. Participants in the studies used a self-generated version of ATT and received varying dosages of the intervention. Two of the studies withdrew ATT and implemented an intervention to reverse the effects of ATT before reintroducing ATT (Wells, 1990; Wells et al., 1997). Collectively, the studies found therapeutic benefits of ATT across a broad array of symptom types and outcomes. Further, the studies found that the therapeutic benefits were maintained at follow-up assessments ranging between 3 and 12 months post-treatment (Papageorgiou & Wells, 1998, 2000; Wells, 1990; Wells et al., 1997).

Four studies since Wells's (2007) review have used brief controlled studies to examine ATT by randomly assigning participants to ATT or a control group (Callinan et al., 2015; Fergus et al., 2014; Nassif & Wells, 2014; Watson & Purdon, 2008). Using a self-generated version of ATT, Watson and Purdon (2008) examined the impact of ATT on the frequency and appraisals of a target intrusive thought during a single session. Participants were university students who reported experiencing elevated obsessive-compulsive symptoms. Participants were instructed to monitor their stream of consciousness for a 7-minute interval and to record the frequency of a target intrusive thought. Participants then rated appraisals of the thought (i.e., unpleasantness, perceived effort to dismiss, and perceived success in reducing its frequency) and were then randomly assigned to either ATT or a control (thought replacement, distraction, and no intervention). The stream of consciousness task and appraisals were then completed a second time. Watson and Purdon (2008) found that the frequency and negative appraisals of a target intrusive thought (i.e., unpleasantness, perceived effort to dismiss) decreased and the perceived ability to dismiss the thought increased following ATT. The pre- to post-ATT effect sizes were small to large in magnitude. However, Watson and Purdon (2008) found that the therapeutic effects of ATT were not significantly greater than those in the control conditions.

Using the automated version of ATT during a single session, Fergus et al. (2014) examined the effects of ATT on state cognitive and somatic anxiety among an unselected sample of university students. Participants rated their state anxiety and were then randomly assigned to either ATT or a control (mindfulness-based task). Fergus et al. (2014) found that ATT significantly reduced cognitive, but not somatic, anxiety from pre- to post-treatment. Fergus et al. (2014) further found that ATT and the control did not differ in the rate of symptom change from pre- to post-treatment. However, ATT caused a significantly greater reduction in self-

focused attention relative to the control. The effect sizes of changes in cognitive anxiety and self-focused attention from pre- to post-ATT were moderate in magnitude.

During a two-session controlled study, Nassif and Wells (2014) examined the effects of the automated version of ATT on intrusive thoughts related to a stressful life event among participants who were still experiencing event-related distress. Participants audio-taped a first-person narrative of their life event, listened to the narrative, and then rated the number of intrusive thoughts pertaining to the narrative that occurred during a five minute “cooling down” period. Participants were then randomly assigned to complete a session of ATT or a distraction control task. Participants in the ATT group were asked to complete ATT at home (home practice ranged from one to three sessions) and participants in the control task were not instructed to practice any task. Participants completed a second session of ATT or the control approximately two days apart from the first session. Participants listened to the audio-taped narrative again and rated the number of intrusive thoughts related to the narrative during a five minute “cooling down” period. Nassif and Wells (2014) found that the reduction in the incidence of intrusive thoughts was more than three times greater following ATT than the control. The pre- to post-ATT reduction in the frequency of intrusive thoughts was large in magnitude.

Building on the work of Nassif and Wells (2014), Callinan et al. (2015) further examined the effects of ATT on intrusive thoughts related to a stressful life event among participants who were still experiencing event-related distress. Participants audio-taped a first-person narrative of their life event, listened to the narrative, and rated the number of intrusive thoughts that occurred while listening to the narrative. Participants then were randomly assigned to complete a practice session of ATT or a control (filler task). The automated version of ATT was used in this study and participants in the ATT group were asked to complete ATT at home twice. Participants

completed a second session of ATT or the control approximately two-and-a-half days apart from the first session. At the second session, participants listened to the audio-taped narrative again and rated the number of intrusive thoughts that occurred while listening to the narrative a second time. Callinan et al. (2015) found that ATT led to significantly greater reductions in intrusive thoughts and negative affect relative to the control. Callinan et al. (2015) further found that ATT led to significantly greater self-reported attention flexibility compared to the control, as well as some evidence to suggest that ATT may facilitate disengagement from negative stimuli when attending to task-relevant stimuli on a laboratory-based task. The pre- to post-ATT effect sizes were moderate to large in magnitude.

Six randomized controlled studies, using longer durations of ATT, have been conducted since Wells's (2007) review (Calkins et al., 2015; Donald et al., 2014; Moritz, Wess, Treszl, & Jelinek, 2011; Siegle et al., 2007; Siegle et al., 2014; Weck, Neng, & Stangier, 2013). Building on the work of Papageorgiou and Wells (2000), Siegle et al. (2007) further examined the therapeutic effects of ATT in relation to depression. Participants were patients with depression who were randomly assigned to (a) the automated version of ATT and supplementary activities (e.g., working memory task) during six 35 minute intervention visits across two weeks or (b) two weeks of treatment as usual. Siegle et al. (2007) found that participants who engaged in ATT experienced significantly fewer depressive symptoms and rumination at post-treatment relative to the control group. The pre- to post-ATT changes in depression and rumination were large in magnitude.

Siegle et al. (2014) replicated the effect of ATT on depression and rumination using a subset of participants reported in their prior study (i.e., Siegle et al., 2007), while again comparing ATT to treatment as usual. Siegle et al. (2014) also found large effects for the pre- to

post-ATT changes in depression and rumination. Calkins et al. (2015) replicated and extended Siegle and colleagues' two studies using an independent sample. Calkins et al. (2015) found that the automated version of ATT and supplementary activities (e.g., working memory task) during three 30 minute intervention visits across two weeks caused participants to experience significantly fewer depressive symptoms relative to a control task. Aspects of Calkins et al.'s (2015) study that diverged from Siegle and colleagues' two studies included Calkins et al.'s (2015) use of a sample of community adults with elevated depressive symptoms, shorter ATT intervention length, and use of a computerized control condition matched for time that required participants to attend to visual stimuli. Calkins et al. (2015) found that the pre- to post-ATT changes in depression were moderate in magnitude.

Building on the work of Watson and Purdon (2008), Moritz et al. (2011) further examined the effects of ATT in relation to obsessive-compulsive symptoms using an internet sample of adults who reported being diagnosed with OCD. Moritz et al. (2011) randomly assigned participants to a self-generated version of ATT or a waitlist control group. Moritz et al. (2011) implemented ATT by e-mailing participants in that group a tutorial and encouraging them to set up and complete two ATT sessions daily for four weeks. Moritz et al. (2011) did not report providing participants with the standard ATT practice session in which the clinician instructs patients in the proper use of ATT. Results from Moritz et al. (2011) indicated that ATT did not lead to significant improvements in obsessive-compulsive symptoms, as assessed by self-report measures over the phone, relative to the control. Effect sizes for Moritz et al.'s (2011) study could not be computed because only pre- to post-treatment difference scores were reported.

Building on the work of Papageorgiou and Wells (1998), Weck et al. (2013) compared ATT to exposure therapy (the control) for treating severe health anxiety. In the ATT group,

participants completed an individual session of ATT and other intervention strategies, such as psychoeducation and behavioral exercises to manipulate self-focused attention. The participants were asked to practice ATT at home daily following the third session using a self-generated version of ATT. Weck et al. (2013) found significant reductions in health anxiety among the ATT group, although symptom reduction did not differ from the control at post-treatment. However, self-reported attention to body sensations was significantly reduced in the ATT, but not in the control, group. The pre- to post-ATT effect sizes were small in magnitude.

Building on the work of Wells et al. (1997), Donald et al. (2014) evaluated the benefits of ATT comparing randomly assigned participants in a six-week treatment of ATT or cognitive therapy (the control) among patients with social anxiety disorder. Donald et al. (2014) presented ATT in a group format for between 1.5-2 hours each session along with other intervention strategies, including additional attention tasks and a body scan exercise. Participants were provided with an automated version of ATT to practice as homework, although the researchers did not report specific instructions for the frequency of ATT homework practice. Donald et al. (2014) found that ATT and the control both significantly reduced social anxiety and fear of negative evaluation from pre- to post-treatment, with there being no significant differences in the reduction of these outcomes between groups. However, ATT produced a significantly greater reduction in self-reported self-focused attention relative to the control. Symptom improvement was maintained at a three-month follow-up, with no differences reported between the two treatments. The pre- to post-ATT effect sizes for changes in social anxiety, self-focused attention, and fear of negative evaluation were moderate to large in magnitude.

## **6. Evaluation of Extant ATT Studies**

In evaluating extant treatments studies for ATT, we primarily draw from Chambless and Hollon's (1998) scheme for determining the efficacy of psychological interventions. As noted by Chambless and Hollon (1998), "treatment efficacy must be demonstrated in controlled research in which it is reasonable to conclude that benefits observed are due to the effects of the treatment and not to chance confounding factors" (p. 7). There are only four peer-reviewed studies, to our knowledge, comparing multiple sessions of ATT to an established treatment for emotional disorders, including cognitive therapy (Donald et al., 2014), exposure therapy (Weck et al., 2013), and treatment as usual (Siegle et al., 2007; Siegle et al., 2014). A central limitation of these studies is that ATT was combined with other therapeutic techniques, including other attentional tasks (Donald et al., 2014), behavioral exercises (Weck et al., 2013), or supplementary activities (Siegle et al., 2007; Siegle et al., 2014). As noted by Wells (2007), "the use of multicomponent packages incorporating ATT means that any specific effect of ATT cannot be isolated" (p. 136). Unfortunately, we are unable to disentangle the effects of ATT from other therapeutic techniques in those three studies. It is recommended that future studies evaluate ATT as a true standalone intervention in randomized controlled studies.

Another limitation of peer-reviewed treatment studies is the wide variability in the number of ATT sessions, ranging from a single session (Fergus et al., 2014; Watson & Purdon, 2008) to 10 weekly sessions and home practice twice daily (Papageorgiou & Wells, 1998). Because of the variability in sessions, the optimal dosage of ATT remains unknown (Nassif & Wells, 2014). As noted, Wells (2009) created a summary sheet designed to track the practice of ATT over a four week period and recommended that ATT be practiced twice daily at home, but went on to state that most individuals are only able to complete ATT once a day. To aid in identifying the optimal dosage of ATT, as well as to ensure that individuals are receiving similar

amounts of ATT across studies, we first suggest adherence to Wells's (2009) guidelines in future research (i.e., ATT for four weeks with one daily practice session at home). Second, to determine the proper dose for maximum therapeutic gain, it will be important to use a between-groups design in which participants in each group receive a different dose of ATT.

Another critique of existing ATT studies is the variability in how ATT was presented. One study used a group format (Donald et al., 2014), while the rest used an individual session format. Moritz et al. (2011) provided individuals with an ATT tutorial and required individuals to implement ATT on their own without an introductory session, such that individuals were required to create different auditory stimuli at specific times to target selective attention, switching, and divided attention. Other studies provided individuals with an in-person instructional session and then sent participants home with ATT in automated form to practice (Callinan et al., 2015; Donald et al., 2014; Nassif & Wells, 2014). An important component of treatment evaluation is the ability for researchers to know, and thus replicate, the specific components of a given treatment (Chambless & Hollon, 1998). Use of the automated version of ATT would help researchers know exactly how ATT was implemented in a particular study and help ensure ATT is being implemented in a uniform way across studies.

It is likely that use of the automated version of ATT would increase the feasibility of examining ATT in larger treatment-efficacy studies, as well as increase the feasibility that ATT can be applied on a larger scale should research support its use more broadly. The portability and cost-effectiveness of an automated intervention targeting higher-order processes may be especially transformative in areas where mental health staff and other resources are limited. In addition, although it remains to be empirically tested, it is likely that treatment compliance will be higher when using the automated version of ATT rather than requiring individuals to

implement ATT on their own without structure or routine guidance. As discussed, concerns have been raised about practice effects when using an automated version of ATT by Wells (2007), such that practicing the same version of ATT may lead to increasingly diminished attentional demands, and consequently, reduced treatment effects. However, to our knowledge, possible practice effects using the automated version of ATT remains unexplored. If practice effects are found, it is recommended that an automated version of ATT be augmented with competing sounds to increase mental capacity demands (e.g., radio; Wells, 2009).

## **7. Current Status of ATT**

Despite the limitations of existing treatment studies, the available literature supports the use, and further study, of ATT in relation to emotional disorders. Evidence suggests that ATT is at least equivalent to, and in some cases superior to, established treatments for certain emotional disorders (Donald et al., 2014; Siegle et al., 2007; Siegle et al., 2014; Weck et al., 2013). In addition, ATT has been shown to be superior to control tasks in other studies (Callinan et al., 2015; Calkins et al., 2015; Nassif & Wells, 2014). Although the noted control tasks (i.e., a visual attention task, distraction task, and filler task) likely served as better comparisons than a wait-list control in those studies, comparison of ATT with empirically supported interventions for emotional disorders in randomized controlled studies would be of great benefit for determining the utility of ATT for treating emotional disorders.

Importantly, studies showing that ATT did not differ from a control condition across all outcomes had notable limitations, including use of a single-session and nonclinical participants (Watson & Purdon, 2008), as well as questionable treatment implementation (i.e., failure to provide participants with the standard ATT introductory session in which the clinician instructs patients in the proper use of ATT; Moritz et al., 2011). To date, the single-case experimental

studies completed by Wells and colleagues (Papageorgiou & Wells, 1998; Wells, 1990; Wells et al., 1997) provide the strongest empirical support for ATT for treating emotional disorders.

Because ATT has proved beneficial to at least three participants in single-case experimental studies by a single research group, ATT appears best considered a *possibly* efficacious treatment (following Chambless & Hollon, 1998).

Although disorder-specific ATT treatment studies are warranted for further evaluation, there is growing interest in the use of transdiagnostic protocols for emotional disorders (Barlow et al., 2004; McHugh, Murray, & Barlow, 2009). Broadly speaking, transdiagnostic protocols seek to target core processes shared by a group of disorders rather than targeting disorder-specific processes. Because ATT is part of a transdiagnostic treatment package (Wells, 2009) and has been shown to reduce symptoms of several emotional disorders, use of a transdiagnostic approach when examining the therapeutic effects of ATT may be particularly important. For example, researchers may examine the ability of ATT to reduce clinician severity ratings on diagnostic interviews, as well as self-reported symptoms and constructs of general distress which have been posited to broadly underlie emotional disorders (e.g., negative affect), among patients who have principal diagnoses that span across emotional disorders (e.g., following Ellard, Fairholme, Boisseau, Farchione, & Barlow, 2010; Farchione et al., 2012).

It is important to note that emotional disorders are often comorbid (Brown, Campbell, Lehman, Grisham, & Mancill, 2001). To the degree to which ATT targets core processes shared by anxiety and depression, use of ATT may simultaneously reduce the severity of co-occurring emotional disorders. Such a possibility would be consistent with prior assertions that transdiagnostic protocols “may offer a solution to the ubiquitous challenge of comorbidity while simultaneously overcoming some of the barriers to the dissemination and implementation of

effective psychological treatments by reducing the number of protocols that are applicable to only a single diagnosis” (Barlow, Bullis, Comer, & Ametaj, 2013, p. 12). Given that, as reviewed, extant studies support the use of ATT in reducing anxiety and depressive symptoms alike, it is possible that ATT may target processes shared by emotional disorders.

### **8. Candidate Mechanisms of Change for ATT**

Along with the importance of establishing that a treatment works, it is also important to understand why a treatment works (Kazdin, 2007). Elucidating mechanisms of change in relation to psychological interventions is an understudied area of research and the limited scope of existing research examining change mechanisms for ATT is no exception. When studying change mechanisms, it is important to first articulate putative mechanisms based upon the underlying theoretical rationale for a given treatment (Nock, 2007). Wells (2007) described putative change mechanisms for ATT based upon the S-REF model and we expand upon those descriptions by considering studies indicating that ATT may lead to changes in each putative mechanism, which in turn, leads to reductions in symptoms of emotional disorders. Showing an association between an intervention and a proposed mechanism is an initial requirement in understanding whether a variable may in fact serve as a change mechanism (Kazdin, 2009).

As discussed, the S-REF model (Wells & Matthews, 1996) provides the theoretical basis for ATT. Of the four central concepts of the S-REF model, the CAS and attentional control are especially relevant to ATT (Wells, 2013). As reviewed, the CAS is marked by repetitive forms of self-focused attention, particularly in the form of rumination and worry (Wells, 2009). At least two existing studies support changes in self-focused attention as being important for symptom reduction following ATT. Wells et al. (1997) found that the introduction of a self-focus intervention (i.e., focusing on internal body sensations) reversed the therapeutic effects of ATT

for treating social anxiety and further found that the later reintroduction of ATT once again led to symptom reduction. Fergus et al. (2014) found that ATT led to significantly greater reductions in self-reported self-focused attention relative to a control task and that reduced self-focused attention following ATT was related to a reduction in state anxiety following ATT.

A limitation of these prior studies is that focus of attention was broadly manipulated or assessed rather than being assessed as the cardinal forms of self-focused attention that characterize the CAS, specifically rumination and worry (Wells, 2009). The S-REF model proposes that rumination and worry serve to maintain and exacerbate emotional distress (Wells & Matthews, 1996). Consistent with this proposal, research indicates that rumination and worry prospectively predict anxiety (Calmes & Roberts, 2007) and that longitudinal associations between certain emotional disorders are, at least partially, mediated by changes in rumination and worry (Drost, van der Does, van Hemert, Pennix, & Spinhoven, 2014). Reductions in self-focused attention in response to ATT, as found in previous research, may indicate a reduced use of the CAS, which might account for the therapeutic effects of ATT. Papageorgiou and Wells (2000) found that ATT was associated with reduced rumination in their single-case experimental study among individuals with depression. Siegle et al. (2007) found that ATT coupled with other intervention strategies, including supportive group psychotherapy, significantly reduced rumination in a randomized controlled study among individuals with depression. Future research could extend these prior findings by using ATT as a standalone intervention and examining changes in both rumination and worry in a randomized controlled study.

According to Wells (2007), attentional control, another putative mechanism for ATT, may be diminished by the perseverative forms of self-focused attention that characterize the CAS (e.g., rumination, worry). By attentional control, we refer to the use of top-down or goal-driven,

executive attentional processes used to regulate bottom-up or stimulus-driven, emotional responses (Derryberry & Reed, 2002). Consistent with Wells's (2007) conceptualization, attentional control theory (Eysenck, Derakshan, Santos, & Calvo, 2007) posits that the high level of worry that accompanies most forms of anxiety pathology impairs top-down attentional control systems by consuming cognitive resources that would otherwise be allocated for attentional control processes. Specifically, Eysenck et al. (2007) proposed that worry impairs the inhibiting and shifting functions of attentional control.

Empirical evidence offers support for this assertion by showing that anxiety does in fact impair attentional control processes of inhibiting dominant, or more automatic, responses and shifting back and forth between multiple task demands (Graydon & Eysenck, 1989; Lavie, Hirst, de Fockert, & Viding, 2004). Inhibition is an important component of selective attention because it allows one to disengage from goal-irrelevant information, even when such information has a prepotent stimulus value. Attentional shifting is important as well because once one has disengaged from goal-irrelevant information, attentional shifting abilities allow one to reengage attention on goal-relevant information. In the case of emotional disorders, the inability to inhibit goal-irrelevant information/processes (e.g., rumination, worry) and shift attention toward goal-relevant information/processes purportedly contributes to the maintenance and exacerbation of emotional distress (Wells, 2009, 2013).

Consistent with the S-REF model, the extant literature suggests attentional control may be a transdiagnostic protective factor against the development of maladaptive psychological outcomes, even among individuals with outcome-specific vulnerabilities. For example, laboratory-based empirical research has shown that attentional control protects (a) those with public-speaking anxiety from diminished speech performance (Jones, Fazio, & Vasey, 2012), (b)

those who have negative emotion regulation expectancies from ceasing goal-directed behavior when distressed (Bardeen, Tull, Dixon-Gordon, Stevens, & Gratz, 2015), and (c) those with high trait anxiety from experiencing fear in response to a CO<sub>2</sub> challenge (Richey, Keough, & Schmidt, 2012). Moreover, in support of the temporal requirement for identifying change mechanisms, longitudinal research has shown that self-reported attentional control, measured prior to trauma, can be used as a regulatory mechanism to protect one from developing posttraumatic stress symptomatology following a traumatic event (Bardeen, Fergus, & Orcutt, 2015).

Showing further consistency with the S-REF model, research has found that stronger self-reported attentional control attenuates the association between the CAS and symptoms of emotional disorders (Fergus, Bardeen, & Orcutt, 2012). Importantly, as reviewed, preliminary results indicate that ATT may improve attentional control, with Callinan et al. (2015) finding that ATT increased self-reported attentional flexibility and improved disengagement from negative stimuli when attending to task-relevant stimuli on a laboratory-based task. A strength of Callinan et al.'s (2015) study was the assessment of both self-reported and performance-based attentional control, as some researchers opine that self-report measures of attentional control assess metacognitive beliefs rather than attentional control *per se* (Spada, Georgiou, & Wells 2010). However, Callinan et al.'s (2015) performance-based data provided more equivocal findings relative to the self-report data. Of note, Groves et al. (2015) found that metacognitive therapy, which included ATT, led to greater improvements in some performance-based indicators of executive functioning and attention at post-treatment relative to CBT among participants with depression. The effects of ATT cannot be isolated from the other metacognitive techniques in Groves et al.'s (2015) study, but those data further add to the possibility that ATT may contribute

to changes in attentional control. Such preliminary findings warrant replication and extension in the service of shedding further light onto the possibility that ATT increases one's ability to flexibly control their attention, shifting from internal to external information as necessary.

Because the efficacy of neurobehavioral treatments is considered dependent on changes in aspects of brain functioning, it is also important to consider potential biological mechanisms underlying ATT (Siegle et al., 2007). As described by Eysenck et al. (2007), evidence suggests that the cognitive processes associated with attentional control are primarily housed within the prefrontal cortex (e.g., Matthews, Yiend, & Lawrence, 2004). Siegle et al. (2007) further noted that improved functioning in dorsolateral prefrontal (DLPFC) functioning may lead to greater inhibition of limbic regions associated with emotional reactivity, such as the amygdala.

Consistent with this hypothesis, Siegle et al. (2007) provided preliminary evidence that ATT was associated with (a) increased prefrontal activity during the most difficult trials of a digit sorting task and (b) decreased amygdala activity on a personal relevance rating task for negative words from pre- to post-intervention. However, caution is warranted regarding inferences that can be made regarding these findings as they relate to ATT due to the limitations noted above (i.e., a sample diagnosed with unipolar depression, ATT was combined with other intervention strategies). Future studies should extend Siegle et al.'s (2007) findings by examining alterations in brain activity resulting from the use of ATT, as a standalone intervention, for treating individuals with emotional disorders.

Finding an association between ATT and putative mechanisms represents one requirement when investigating treatment mechanisms (Kazdin, 2009). Kazdin (2009) outlined other requirements, including showing that mechanisms relate to therapeutic change and demonstrating that changes in mechanisms occur prior to symptom improvement. In examining

links between ATT, putative mechanisms, and therapeutic outcomes, attention should be paid to the specificity requirement for demonstrating a mechanism. In regards to specificity, Kazdin (2007) noted that “we would not want multiple mediators to account for the change, but rather show a more specific connection” (p. 5).

Following from Wells (2007, 2013), we focused our discussion on the CAS and attentional control as two possible mechanisms. Although speculative, the effects of reducing the CAS on symptom improvement following ATT may be accounted for by improved attentional control. Our reasoning is based largely upon Hirsch and Mathews’s (2012) cognitive model of pathological worry, which suggests that attentional control can inhibit stimulus-driven threat representations from entering into conscious awareness. If such threat representations do enter into conscious awareness, Hirsch and Mathews (2012) suggest that increased attentional control can be used to disengage and shift attentional focus from worry toward goal-directed behavior. Coupled with preliminary findings that improved attentional control may diminish the impact of the CAS on symptoms of emotional disorders (Fergus et al., 2012) and that ATT may improve attentional flexibility (Callinan et al., 2015), attentional control may be a specific change mechanism for ATT. Our speculation is not meant to suggest that future studies should only consider attentional control as a potential mechanism. Rather, as noted by Kazdin (2009), assessing two or more potential mechanisms in a given study is beneficial because of cost-efficiency and the ability to simultaneously examine whether one potential mechanism makes a greater contribution to therapeutic outcomes. Across multiple studies, one factor may emerge as the strongest candidate for being a change mechanism.

## **9. Conclusions**

In sum, ATT may be a neurobehavioral therapy that helps address limitations of current empirically supported treatment efforts for emotional disorders. The effect sizes of the reviewed studies suggest that ATT is generally related to a moderate to large change in outcome variables; however, many of those studies combined ATT with supplementary activities and, thus, it is not possible to isolate effects specific to ATT in many extant studies. Despite studies supports its use, caution is warranted in implementing ATT as a standalone intervention in clinical practice at this time. There is great need for additional efficacy research on ATT, as it was designed as a component of a broader treatment package and existing studies examining ATT as a standalone intervention have notable limitations. Future research is needed to elucidate whether ATT operates best within a treatment package or as a standalone intervention. Researchers have raised the possibility that negatively-valenced repetitive thought, including rumination and worry, may contribute to poorer treatment responses to traditional CBT for emotional disorders (Mennin & Fresco, 2013). Based on that possibility, ATT may be a useful adjunct to such interventions. Alternatively, preliminary findings that ATT does not potentiate greater change on outcomes when used as an adjunct to group CBT (McEvoy & Perini, 2009) raise the possibility that ATT may exert its greatest impact when coupled with techniques within metacognitive therapy.

A series of recommendations for examining the tenability of ATT as a standalone intervention in future research was provided, which included identifying the optimal dosage of ATT, its therapeutic benefits as a true standalone intervention in randomized controlled studies, and whether using the automated version of ATT in fact improves its feasibility or leads to practice effects. The CAS and attentional control are two candidate mechanisms underlying ATT and additional research is needed to further examine how these putative mechanisms relate to symptom reduction following ATT. Although considered a neurobehavioral therapy, there is a

general lack of existing studies examining biological mechanisms underlying ATT. Future research examining whether ATT alters brain regions associated with attentional control appears particularly promising.

ATT is cost-effective, user-friendly, and, based upon the current literature, appears best considered a *possibly* efficacious treatment for emotional disorders. Because ATT may target processes that cut across related disorders, the viability of ATT as a standalone intervention is important to study in future efficacy studies because ATT has the potential to reduce the number of protocols that are needed to treat cases in which individuals present with co-occurring emotional disorders. Targeted examinations of ATT examining gaps in the literature outlined in this review can lead us to better understand, improve, and refine ATT, which, ultimately, may advance treatment dissemination, delivery, and outcome efforts for individuals suffering from emotional disorders.

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Table 1

*Summary descriptive information of reviewed ATT studies.*

Study	Control group	Sample	N	Length	Practice	Type	Measure(s)	ATT effect	Outcome
Wells (1990)	N	Panic disorder	1	11 weeks total	Daily	S	Daily diary, STAI	-	Reduction in panic attacks and anxiety
Wells et al. (1997)	N	Panic disorder	2	Variable	Twice daily	S	Daily diary, BAI, point-interval scale	-	Reduction in panic attacks, anxiety, beliefs
Wells et al. (1997)	N	Social anxiety disorder	1	4 weeks total	Twice daily	S	BAI, point-interval scale	-	Reduction in anxiety and beliefs
Papageorgiou & Wells (1998)	N	Severe health anxiety	3	Variable	Twice daily	S	BAI, SSAS, VAS	-	Reduction in anxiety, appraisals, reassurance seeking
Papageorgiou & Wells (2000)	N	Depression	4	Variable	Twice daily	S	BDI, BAI, ATQ, RRS, PSCS, MCQ	-	Reduction in depression, anxiety, negative thoughts, rumination, metacognitive beliefs
Watson & Purdon (2008)	Y	Elevated obsessive-compulsive symptoms	25	1 session	One time	S	VAS Unpleasantness Attempts to dismiss Perceived success Thought frequency	0.47 0.40 1.15 0.55	No difference from control in appraisals or frequency of intrusive thought
Fergus et al. (2014)	Y	Unselected	38	1 session	One time	A	STICSA Cognitive Somatic Bipolar SFA item	0.63 0.31 0.56	No difference from control in anxiety; significantly greater reduction in self-focused attention compared to control
Nassif & Wells (2014)	Y	Stressful life event	21	2 sessions	One to three times	A	Thought frequency	1.12	Significantly greater reduction in the incidence of intrusive thoughts compared to control

Study	Control group	Sample	N	Length	Practice	Type	Measure(s)	ATT effect	Outcome(s)
Callinan et al. (2015)	Y	Traumatic life event	29	2 sessions	At least twice	A	Thought frequency PANAS-NA DMQ	0.98 1.05 0.62	Significantly greater reduction in frequency of intrusive thoughts and negative affect compared to control; significantly greater improvement in attentional flexibility compared to control
Siegle et al. (2007)	Y	Depression	15	2 weeks	Six times	A	BDI-II RRS	1.28 1.26	Significantly greater reduction in depression and rumination compared to control
Siegle et al. (2014)	Y	Depressed	23	2 weeks	Six times	A	BDI-II RRS	1.19 1.42	Significantly greater reduction in depression and rumination compared to control
Calkins et al. (2015)	Y	Elevated depressive symptoms	24	2 weeks	Three times	A	BDI-II	0.73	Significantly greater reduction in depression compared to control
Moritz et al. (2011)	Y	Self-reported OCD	23	4 weeks	Twice daily	S	Y-BOCS-SR, OCI-R	-	No difference from control in obsessive-compulsive symptoms
Weck et al. (2013)	Y	Severe health anxiety	18	1 week	Daily	S	VAS Patient Therapist MIHT-Perceptual	0.40 0.42 0.36	No difference from control in health anxiety; significantly greater reduction in attention to body sensations compared to control

Study	Control group	Sample	<i>N</i>	Length	Practice	Type	Measure(s)	ATT effect	Outcome(s)
Donald et al. (2014)	Y	Social anxiety disorder	14	6 weeks	Not reported	A	SPAI DASS-21-Depression SFAS BFNE-S	0.71 0.07 1.16 0.72	No difference from control in social anxiety or depression; significantly greater reduction in self-focused attention and fear of negative evaluation compared to control

*Note.* Control group (N = no, Y = yes); *N* = sample size in ATT group; Type (S = self-generated, A = automated); ATT effect = Cohen's *d* from pre-ATT to post-ATT. Measures: STAI = State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970); BAI = Beck Anxiety Inventory (Beck, Epstein, Brown, & Steer, 1988); SSAS = Somatosensory Amplification Scale (Barsky, Wyshak, & Klerman, 1990); VAS = Visual Analogue Scale; BDI = Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961); Automatic Thoughts Questionnaire (ATQ; Hollon & Kendall, 1980); RRS = Ruminative Responses Scale (Nolen-Hoeksema & Morrow, 1991); PSCS = Private Self-Consciousness Scale (Fenigstein, Scheier, & Buss, 1975); MCQ = Metacognitions Questionnaire (Cartwright-Hatton & Wells, 1997); STICSA = State-Trait Inventory for Cognitive and Somatic Anxiety (Ree, French, MacLeod, & Locke, 2008); BDI-II = Beck Depression Inventory-II (Beck, Steer, & Brown, 1996); Y-BOCS-SR = Yale-Brown Obsessive Compulsive Scale-Self-Report (Steketee, Frost, & Bogart, 1996); OCI-R = Obsessive-Compulsive Inventory-Revised (Foa et al., 2002); MIHT = Multidimensional Inventory of Hypochondriacal Traits (Longley, Watson, & Noyes, 2005); SPAI = Social Phobia and Anxiety Inventory (Turner, Beidel, Dancu, & Stanley, 1989); SFAS = Self-Focused Attention Scale (Bögels, Alberts, & de Jong, 1996); BFNE-S = Brief Fear of Negative Evaluation-Straightforward Items (Leary, 1983; Rodebaugh et al., 2004); DASS-21 = Depression Anxiety Stress Scales-21 item version (Lovibond & Lovibond, 1995); PANAS-NA = Positive and Negative Affect Schedule-Negative Affect (Watson, Clark, & Tellegen, 1988); DMQ = Detached Mindfulness Questionnaire (Nassif & Wells, 2007).