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Decentering as a Potential Common Mechanism across Two Therapies for Generalized Anxiety Disorder

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Abstract

Objective—To examine decentering as a potential mechanism of action across two treatments for generalized anxiety disorder: an acceptance based behavioral therapy (ABBT) and applied relaxation (AR).

Method—Sixty-four individuals who completed at least half of the 16 total sessions of either ABBT or AR (65.6% female, 79.7% identified as White, average age 34.41) completed measures of decentering (Experiences Questionnaire) and of symptoms of anxiety (Depression Anxiety Stress Scale-Stress subscale) at five time points over the course of therapy and a measure of worry (Penn State Worry Questionnaire) at pre and post-treatment.

Results—Initial growth curve models showed that decentering increased significantly over therapy ($z = 7.09$) and this increase was associated with a decrease in worry symptoms (PSWQ) at post-treatment ($z = -8.51$). The rate of change did not significantly vary across treatments ($\Delta\chi^2/\Delta df = 0.16/1$, $p = 0.69$). Further, a series of bivariate latent difference score models indicated that the best fitting model was one in which decentering was a leading indicator of change in symptoms (DASS-Stress). Allowing this coupling to vary across treatments did not significantly improve the fit of the model ($\Delta\chi^2/\Delta df = 0.71/1$, $p = 0.40$).

Conclusions—In this sample, results suggest that increased decentering was associated with decreases in anxiety and that changes in decentering appear to precede changes in symptoms within both ABBT and AR, indicating that decentering may be an important common mechanism of action.

Keywords

decentering; mechanisms of action; acceptance-based treatment; applied relaxation

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Generalized Anxiety Disorder (GAD) is characterized by anxiety, tension, and chronic and persistent worry (American Psychiatric Association, 1994). According to an acceptance-based behavioral theory (see Roemer & Orsillo, 2014), GAD is maintained by: 1) a reactive, judgmental, and fused relationship with internal experiences, 2) rigid experiential avoidance, or the tendency to want to avoid or change one's experience (Hayes, Strosahl, & Wilson, 1999), and 3) a constriction in the amount and types of behaviors that one engages in. Individuals with GAD report more distress about emotional responses (Lee, Orsillo, Roemer, & Allen, 2010), more experiential avoidance (Lee et al., 2010), and less engagement in meaningful activities (Michelson, Lee, Orsillo, & Roemer, 2011) than those without a diagnosis of GAD.

One of the key components in this model of GAD is the fusion with internal experiences, or the tendency to believe or over-identify with a thought or feeling in a way that inhibits adaptive functioning (Hayes, 2004). According to Rational Frame Theory (RFT: Hayes et al. 2001), we as humans derive relations between events, words, and emotions so that our internal stimuli (e.g., thoughts, feelings, thoughts) take on the meaning of the events that they are linked to. In this way, the anxious thought is "fused" with the feelings of anxiety so that having a thought brings on the same amount of anxiety as if the anxiety-provoking situation was actually occurring. According to RFT, this fusion with internal experiences leads to more reactivity in response to internal experiences. In support of this theory, research has consistently shown that individuals with symptoms of GAD report greater negative reactivity towards their emotions (Lee et al., 2010; Mennin, Heimberg, Turk, & Fresco, 2005) and view their worrisome thoughts as more dangerous and uncontrollable (Wells & Carter, 1999) than individuals with lower levels of GAD symptomatology. According to theory, these fused responses to internal experiences then naturally lead to rigid efforts to avoid (control) these experiences, paradoxically increasing reactivity, fusions, and further attempts at experiential avoidance (Roemer & Orsillo, 2014).

If GAD is partially maintained by fusion with internal experiences and the subsequent attempts at controlling these internal experiences, then targeting this fusion should reduce symptoms of GAD. One mechanism that may target fusion is decentering, or the ability to observe thoughts and feelings as objective events in the mind rather than personally identifying with the thoughts or feelings (Safran & Segal, 1990). Decentering is closely related to the construct of cognitive defusion, which is described as a process that alters the relational responding, and thus the meaning of thoughts through a shift in context so that the connections between specific words or phrases and subsequent behavior are weakened (see Blackledge, 2007 for a through theoretical review of defusion). Decentering, with its focus on objectively observing internal experience may allow for a different perspective in which thoughts are held more loosely, raising the possibility that the thought is not truth. When internal experiences are viewed from a decentered stance, they may be less likely to trigger efforts to control, suppress or avoid.

Decentering, or the related constructs of defusion, meta-cognitive awareness (Teasdale et al., 2002), and reperceiving (Shapiro, Carlson, Astin, & Freedman, 2006), have been explicit targets of many acceptance-based behavior therapies including: Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999), Dialectic Behavior Therapy

(DBT; Linehan, 1993), and Mindfulness Based Cognitive Therapy (MBCT; Segal, Williams, & Teasdale, 2002). Similarly, decentering has been theorized to be a change agent in cognitive therapies (Beck, 1970; Heimberg & Ritter, 2008; Ingram & Hollon, 1986). In fact, decentering has been termed a change process of "ubiquitous significance in psychotherapy" across orientations (Safran & Segal, 2004). To support this theory, initial research on treatments for depression have shown that Mindfulness-based Stress Reduction (MBSR) and MBCT lead to increases in decentering (Bieling et al., 2012; Teasdale et al., 2002) and cognitive defusion is a mediator of change in ACT (Zettle et al., 2011). Similarly, cognitive behavioral therapy for depression led to more significant increases in decentering compared to those who received antidepressant medication (Fresco, Segal, Buis, & Kennedy, 2007). While there has been less research on decentering/defusion in the treatment of anxiety, a randomized clinical trial comparing ACT and CBT for anxiety disorders found defusion to be a mediator across both treatments (Arch, Wolitzky-Taylor, Eifert, & Craske, 2012) and a case series presenting three individuals diagnosed with GAD (from the current trial) showed changes in decentering following applied relaxation (Hayes-Skelton, Usmani, Lee, Roemer, & Orsillo, 2012). Taken together, this research points to the potential importance of decentering/defusion across a variety of treatment approaches for depression and anxiety, however, the role of decentering as a treatment mechanism in treatments for GAD has not been systematically examined.

This preliminary research in decentering/defusion in the treatment of anxiety shows that decentering may be a common mechanism of action across acceptance-based behavioral treatments, CBT, and applied relaxation (AR). In addition to the explicit focus on teaching decentering that is typically part of acceptance-based behavioral therapies, these three approaches to therapy share a number of features that implicitly foster decentering. For example, self-monitoring of thoughts or physical sensations (a component of both CBT and AR, as well as ABBT) requires individuals to develop a more objective and curious type of awareness toward their experiences. This objective and curious attention towards internal experiences may be further enhanced by the intensive early detection exercises that are part of AR. In addition to the decentering that comes through self-monitoring and intensive early cue detection practice, AR has been theorized to foster decentering by teaching clients to allow worry thoughts to pass through their minds as they shift their attention toward the physical sensations of tension and relaxation (Hayes-Skelton, Roemer, Orsillo, & Borkovec, 2013).

Common Mechanisms

As Arch and Craske (2008), Orsillo, Roemer, Block Lerner, and Tull (2004) and Kazdin (2007) note, identifying common mechanisms can help us to better understand how different interventions may yield similar outcomes and inform treatment refinement by clarifying the essential components of effective therapy. According to Kazdin (2007), for a construct to be a mechanism, defined as the process or event that is responsible for change, it must demonstrate: 1) strong association, 2) specificity, 3) consistency, 4) experimental manipulation, 5) timeline, 6) gradient, and 7) plausibility. As described above, research on decentering has focused on demonstrating a *strong association* between decentering and treatment outcome across a variety of approaches, building evidence for *consistency* or

replication of results, while the theoretical rationale presented provides evidence of *plausibility* of decentering as a change agent. The current study will test the hypothesis that decentering is a common mechanism across two effective treatments for GAD. This study will also address the question of *timeline* by examining whether changes in decentering precede changes in anxiety. According to the *timeline* criteria, a potential mechanism needs to demonstrate temporal precedence. Two processes changing together is insufficient; temporal precedence of the change in mediator prior to the change in symptoms must be established. This is strengthened further by demonstrating that the change in potential mechanism precedes the change in outcome and not the reverse. We would also add that to be a common mechanism, the construct of interest has to be a mechanism across treatment approaches. As highlighted by Kazdin, demonstrating mediation, while necessary, is insufficient to establish a potential mechanism. Given the breadth of these criteria, Kazdin underscores that no one study can cover all of the criteria and that information on mechanisms should develop from a variety of studies focusing on various elements of a mechanism.

Present Study

To test the hypothesis that decentering is a potential common mechanism of action in treatments for GAD, this study focused on data collected as part of a randomized clinical trial for GAD which compared an acceptance based behavioral therapy (ABBT) to applied relaxation (AR) (Hayes-Skelton, Roemer, & Orsillo, 2013). Within this trial, there were significant large effects for change over time across all primary outcome measures (*d*'s 1.36 to 1.61) and small, non-significant effects of treatment condition (*d*'s 0.002 to 0.24), indicating that on average client's symptoms improved over time and that these improvement rates were similar across treatments. Given that both of these treatments are efficacious, the present study sought to test whether decentering is a common mechanism of action across these two therapies. Specifically, to demonstrate the relationship between our mediator and outcome, we hypothesized that in general clients would report an increase in decentering across therapy and that this increase in decentering would be associated with a decrease in symptoms. To support temporal precedence of our proposed mediator, we hypothesized that changes in decentering would precede changes in symptoms, whereas changes in symptoms would not precede changes in decentering. Finally, in support of the theory that decentering may be a common mechanism, we hypothesized that decentering would be a leading indicator of change in anxiety across both ABBT and AR.

Methods

Participants

Participants are a subsample of 64 individuals (out of the 81 in the intent-to-treat sample) who completed at least half of the 16-sessions of a randomized clinical trial comparing Applied Relaxation (AR) to an acceptance-based behavioral therapy (ABBT) (Hayes-Skelton, Roemer, & Orsillo, 2013). All participants provided informed consent to participate in the study. Similar to the approach of other longitudinal mechanism papers (e.g., Arch, Wolitzky-Taylor, Eifert, & Craske, 2012), only participants who completed at least half of

the sessions (at least 8 of 16) are included here. To be included in the larger study and here, all participants (a) received a principal diagnosis of GAD on the ADIS-IV (DiNardo, Brown, & Barlow, 1994) with a rating of at least moderate severity (4 on a scale from 0 to 8); (b) were stable on any medications for 3 months and were willing to maintain current psychotropic medication levels and to refrain from other psychosocial treatments for anxiety or mood problems during the course of therapy; (c) were fluent in English; and (e) were 18 years or older. Participants were excluded if they had a diagnosis of comorbid bipolar disorder, a psychotic disorder, an autism-spectrum disorder, or current substance dependence.

Sixty-four individuals (65.6% female) receive either ABBT (*n*=31) or AR (*n*=33). The average age of clients was 34.41 (*SD*=12.14) years old. Fifty-one clients (79.7%) identified as White, 4 (6.3%) as Latino(a), 4 (6.3%) as Asian, 3 (4.7%) as Black, and 1 (1.6%) as Asian and White. Client's Clinician Severity Rating (CSR) on the ADIS-IV interview at pre-treatment was 5.48 (*SD*=0.59) and it was 2.86 (*SD*=1.48) at post-treatment.

Measures

Process Measures—*Depression Anxiety Stress Scale–21-item version* (DASS; Lovibond & Lovibond, 1995) is a self-report scale with separate, reliable, and valid scales for depression, anxiety, and stress (Antony, Bieling, Cox, Enns, & Swinson, 1998). Higher scores indicate more anxiety symptoms. For the current study, we used the 7-item Stress subscale, which assesses general anxiety and tension, as it has been shown to discriminate between clients with GAD and those with panic disorder, social phobia, and specific phobia (Brown, Chorpita, Korotitsch, & Barlow, 1997). Sample items include: "I found it hard to wind down." and "I felt that I was using a lot of nervous energy." The subscales have demonstrated good internal consistency and construct validity (Antony, Bieling, et al., 1998) and have been shown to be sensitive to change across hospitalization for clients with a primary diagnosis of depression (Page, Hooke, & Morrison, 2007). Similarly, we have found the DASS-Stress to be sensitive to change across ABBT for GAD (Hayes-Skelton, Roemer, & Orsillo, 2013; Roemer, Orsillo, & Salters-Pedneault, 2008). The DASS was assessed at pre-treatment, sessions 4, 8, and 12, and at post-treatment (internal consistencies in the current sample from .80 to .88). Scores were doubled to be comparable to the 42-item version.

Experiences Questionnaire—Decentering Subscale (EQ-Decentering; Fresco et al., 2007) The EQ is a 20 item self-report measure that assesses decentering and rumination. We used the Decentering subscale (11 items) for the purposes of the current study. This 5-point Likert-type scale ranges from *never* to *all the time*. Sample items include: "I can separate myself from my thoughts and feelings" and "I can observe unpleasant feelings without being drawn into them." Higher scores indicate more decentering. The Decentering subscale has demonstrated good internal consistency in both nonclinical and clinical samples with alpha coefficients of .83 and .84, respectively (Fresco, Moore, et al., 2007; Fresco, Segal, et al., 2007). While the EQ has been associated with anxiety and depression (*r*'s from −.21 to −.49 in Fresco, Moore, et al., 2007 and Hayes-Skelton & Graham, 2012), none of the items on the EQ explicitly address anxiety or anxiety specific processes such as worry or anxious arousal.

The EQ was assessed at pre-treatment, sessions 4, 8, and 12, and at post-treatment (internal consistencies in the current sample from .86 to .94).

Outcome Measure—*Penn State Worry Questionnaire* (PSWQ – Meyer et al., 1990). The PSWQ is a 16-item self-report measure of trait levels of worry, which has demonstrated high internal consistency and test-retest reliability (Molina & Borkovec, 1994) and been found to discriminate GAD from other anxiety disorders (Brown, Antony, & Barlow, 1992). For the current study, the residualized gain score of the post-treatment PSWQ regressed on the pre-treatment PSWQ was used as an outcome measure. Because of the high correlations across outcome measures at post-treatment (*r*'s > .5), we chose to use a continuous outcome variable over our clinician severity ratings and diagnostic status because of the restricted range in responses in these variables. In this sample, the internal consistencies were .77 at pre and .90 at post.

Procedures

All study procedures were approved by the [removed for blinding] University Internal Review Boards as well as by a Data Safety and Monitoring Board. Clients were randomized to receive 16 sessions of either ABBT or AR. Sessions were administered individually. The first four sessions of each treatment were 90 minutes in length. The remaining sessions were 60 minutes. Sessions 1 to 14 were held weekly and sessions 15 to 16 were tapered to every other week. Clients were asked to complete the DASS and the EQ at pre-treatment and post-treatment and at sessions 4, 8, and 12; the PSWQ was completed at pre- and post-treatment. Results from the larger study indicate that there were significant large effects for change over time (*d*'s 1.36 to 1.61) and small, non-significant effects of treatment condition (*d*'s 0.002 to 0.24) on all primary outcome measures (Hayes-Skelton, Roemer, & Orsillo, 2013).

Acceptance-based behavioral therapy: Acceptance-based behavioral therapy (ABBT; Orsillo & Roemer, 2011; Roemer & Orsillo, 2009) focuses on altering problematic relationships with one's internal experiences and decreasing experiential avoidance and increasing engagement in valued actions. Each session begins with a mindfulness exercise and a review of between session assignments, followed by the session-specific content, and ends with the assignment of between-session activities. The first phase (roughly Sessions 1–7) includes a psychoeducation component in which clients are introduced to an acceptance-based behavioral model of anxiety. In this phase, clients are also introduced to mindfulness practices. Clients learn to identify and articulate their values across various life domains in this phase. In the second phase, clients begin to apply the mindfulness and acceptance skills developed in the first phase of therapy and begin to engage in client-identified valued actions. The final two sessions focus on reviewing the changes that the client has made, and considering helpful strategies, and discussing strategies to maintain gains.

Applied relaxation: Applied relaxation (AR) was adapted for the larger study (Hayes-Skelton, Roemer, & Orsillo, 2011) from Bernstein, Borkovec, and Hazlett- Stevens, 2000 and Öst, 1992. AR focuses on developing relaxation skills primarily through diaphragmatic breathing and progressive muscle relaxation (PMR; moving from 16 muscle groups gradually to a rapid relaxation that can be applied in daily life); identifying early signs of

anxiety; and applying a brief relaxation exercise in response to early signs of anxiety. Each therapy session began with a diaphragmatic breathing or brief relaxation exercise, followed by a review of between-session assignments, and ended with the assignment of between-session activities. The first half of therapy focused on building relaxation skills and developing an awareness of client-specific early signs of anxiety. The second half of therapy focused on applying relaxation to early signs of anxiety both in session and between sessions. In the last three sessions, relapse prevention and strategies for maintaining gains were discussed.

Therapists, Adherence, and Competency: Therapists were post-doctoral fellows (n = 3) or advanced doctoral students (n = 8), supervised by the study authors. The initial therapists and the supervisors were trained by Dr. Tom Borkovec in Applied Relaxation and Dr. Zindel Segal in mindfulness therapies. Subsequent cohorts were trained by the supervisors.

A total of 198 (ABBT = 96; AR = 102) sessions were rated for adherence to the respective protocols. The adherence checklists listed allowed and forbidden strategies specific to each treatment that were each rated for the frequency/depth [0 (not at all) to 2 (addressed in detail)] with which each allowed strategy was addressed and the skill [0 (poorly) to 2 (skillfully)] with which it was addressed, as well as the presence or absence of any forbidden strategies. In the ABBT condition, the allowed components were rated as being addressed in detail [means from 1.67 (SD=0.66) to 1.96 (SD=0.20)] and executed skillfully [means from 1.85 (SD=0.36) to 1.98 (SD=0.14)]. Only one session had a forbidden strategy (use of relaxation as a form of anxiety control). Similarly, in the AR condition, the allowed components were typically rated as being addressed in detail [means from 1.89 (SD=0.37) to 1.96 (SD=0.20)] and executed skillfully [means from 1.91 (SD=0.29) to 1.97 (SD=0.17)]. No AR sessions had a forbidden strategy.

Additionally, 35 AR sessions were rated by Dr. Tom Borkovec for therapist competency. For each session, skills were rated from 0 (poor) to 3 (excellent). The average score across skills was 2.38 (SD = 0.69) with 168 of the 187 ratings (89.8%) being good or excellent, 17 (9.1%) being acceptable, and 2 (1.1%) being poor. For additional methodological details of the study, please see Hayes-Skelton, Roemer, and Orsillo (2013).

Data Analysis

All data were analyzed in Mplus Version 6.12 (Muthén & Muthén, 2010) using full maximum likelihood (ML) estimation procedures. Data were missing for less than 2% of cases at any time point. To test the first hypothesis that clients would experience an increase in decentering and a decrease in general anxiety symptoms, unconditional linear growth curves were fit to the decentering (EQ) and general anxiety (DASS-Stress) symptoms that were measures at five time points over the course of therapy. These analyses provide an estimate of the initial status, or estimated score at pre-treatment, and the slope, or average rate of change across each time point. To test the hypothesis the rate of change in decentering would predict symptom change, the PSWQ residualized gain score was added to these unconditional models. The residualized gain score provides an estimate of the post-treatment PSWQ score accounting for the variance due to the pre-treatment PSWQ score. To

assess whether the rate of change in decentering was similar across treatments, chi-square difference tests for nested model comparisons (Satorra & Bentler, 2001) were used to compare models where the slope of decentering was allowed to vary by treatment to a model where this slope was set to be invariant across treatments. The chi-square difference between these two nested models provides information regarding whether or not allowing the parameter of interest to vary significantly adds to the model fit.

Next, to test the hypothesis that changes in decentering would precede changes in symptoms, while changes in symptoms would not precede changes in decentering, a bivariate latent difference score model (LDS: Ferrer & McArdle, 2003) was fit to the data to model both the linear change in the EQ and the DASS-Stress simultaneously and also the component of change that is attributable to the other variable. These LDS procedures combine latent growth modeling with cross-lagged regression analyses and factor analysis models of change and latent difference scores (McArdle & Nesselroade, 1994). These models account for the latent changes on a variable over time. These latent change scores are based on the score at the initial state plus all latent changes that have accumulated up to that point. In a bivariate model, in addition to the accumulated change on the variable of interest, previous scores of a second variable are also included. In other words, at each occasion a latent variable is modeled that represents change in the true score of each variable ($\Delta x_{(t)}$ and $\Delta y_{(t)}$), where EQ is represented by the x's and DASS-Stress by the y's as a function of time (t). Each of these latent variables are a function of three components: 1) the linear slope or average rate of change in the given variable, α; 2) the previous score of the variable of interest, β; and 3) the score of the other variable at the previous time point, γ, which is typically referred to as the coupling parameter. It is this coupling parameter that represents the influence of one variable on change in the second variable. See Figure 1 for a diagram of a bivariate latent difference score model that includes couplings from both variable x to variable y and from y to x.

Within the LDS framework, nested models can be compared to determine the extent to which various parameters significantly impact the overall fit of the model. In this study, four models were compared: a model with couplings from both decentering to symptoms and from symptoms to decentering, a model with the coupling only from decentering to symptoms, a model with the coupling only from symptoms to decentering, and a model with neither coupling. Models were compared using the chi-square difference tests for nested model comparisons (Satorra & Bentler, 2001). Additionally, standard structural equation modeling fit statistics were also examined, including: the Root-Mean-Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI), and the Tucker-Lewis Index (TLI). A model is considered to have good fit when the RMSEA is below .06, and the CFI and TLI are above .95 (Hu & Bentler, 1999).

As a final step, a model where the coupling pattern of the best fitting model is allowed to vary across treatments was compared to a model where all parameters are invariant across treatments in order to test the hypothesis that decentering as a leading indicator of anxiety is consistent across ABBT and AR. As above, these models were compared using the chi-square difference tests for nested model comparisons.

Results

Prior to running the growth models, we first examined the means and correlations across the EQ and DASS-Stress variables (see Table 1). As can be seen in Table 1, with the exception of correlations with DASS-Stress at pre-treatment to sessions 12 and post-treatment, there were moderate to large correlations among the same variable over time (e.g., EQ at sessions 4 and 8). Additionally, with the exception of session 8, there were moderate to strong correlations across variables at the same time points (e.g., EQ and DASS at session 4) and with EQ at time t and DASS at time t+1 (e.g. EQ at pre and DASS at session 4).

Modeling Changes in Decentering and Anxiety during Treatment

As a first step, the individual trajectories of decentering and anxiety were examined by fitting separate growth curves. As shown in Table 2, on average, clients began treatment with an average EQ-decentering score of 29.35 which increased significantly by an average of 1.58 points every four sessions ending treatment at approximately 35.67. In comparison, clients' DASS-Stress scores were 22.35 on average at the beginning of treatment. DASS-Stress scores then decreased significantly by 2.63 points every four sessions, ending treatment at approximately 11.83. To test the association between decentering and outcome, post-treatment worry scores were added to the decentering model by regressing the residualized gain score for PSWQ on the intercept and slope of the individual growth models. As can be seen in Table 2, increasing decentering scores were strongly associated ($r = -.74$) with lower worry scores. As expected, change in DASS-Stress was also significantly related to change in worry as measured by the PSWQ residualized gain score ($r = .76$).

In order to examine difference in trajectories across treatments, chi-square difference tests for nested model comparisons (Satorra & Bentler, 2001) were used to compare models where results were allowed to vary by treatment (AR vs. ABBT) compared to treatment invariance models. The first of these models compared an unconditional model where the slope mean and variance of the EQ was allowed to vary across treatments to the treatment invariant model. The treatment invariant model for linear change in EQ [χ^2 (34) = 67.89] was not significantly different than the same model allowing the slope and variance of linear to change to vary across treatments [χ^2 (32) = 67.35; $\Delta\chi^2/\Delta df$ = 0. 54/2, p = .76] indicating that treatment is not a significant factor in the EQ rate of change.

Similarly, to test whether the effect of rate of change in decentering on treatment response varied across treatment, a second pair of nested models was run with the rate of change on the EQ predicting the PSWQ residualized gain score for a treatment invariant model and a model where treatment was allowed to vary. As hypothesized, the treatment invariant model for the relationship between rate of change on the EQ and the PSWQ residualized gain score [χ^2 (42) = 75.48] was not significantly different than the same model allowing this relationship to outcome to vary across treatments [χ^2 (41) = 75.32; $\Delta\chi^2/\Delta df$ = 0.16/1, p = . 69] indicating that treatment is not a significant factor in the relationship between the EQ rate of change and our outcome measure.[1]

Bivariate Latent Difference Score Model

Given that decentering increased significantly over treatment and this increase was strongly related to improved outcome, the next step was to examine the relationship between change in decentering and change in general anxiety symptoms. Because there were no significant differences in the slope of decentering across both treatments or in the relationship to outcome, treatment groups were combined in the following analyses. To examine the associations between changes in decentering and changes in symptoms, a series of bivariate latent difference score models were fit to the observed data to test the hypothesis that decentering was a leading indicator of change in anxiety. The model fit of four nested models were compared (see Table 3) to examine the relative fit of the various coupling patterns: the bidirectional change model where decentering is a leading indicator of change in anxiety and anxiety is a leading indicator of decentering (Model 1), a unidirectional model with decentering as a leading indicator of change in anxiety to test our hypothesis that change in decentering precedes changes in anxiety (Model 2), an opposing unidirectional model with anxiety as a leading indicator of change in decentering (Model 3), and a model without the leading indicator relationships between variables (Model 4).

The full bidirectional change model (Model 1), which included couplings from decentering to general anxiety symptoms and from general anxiety symptoms to decentering, fit the data well. Next, a more parsimonious model with only the coupling from decentering to anxiety (Model 2) was compared to Model 1 to test our hypothesis that decentering would be a leading indicator of change in symptoms. The non-significant chi-square difference test ($p = .15$) indicates that the more parsimonious Model 2 was an equivalent fitting model to the full Model, indicating that the coupling from anxiety to decentering does not significantly add to the model and can be dropped leaving the couplings from decentering to symptoms. Model 3 tested the opposite coupling, the model with only the coupling from anxiety leading to decentering. Comparing this model to Model 1, the chi-square difference test was significant ($p = .04$), indicating that removing the coupling of decentering leading to anxiety did significantly degrade the model fit and therefore this coupling should be retained, providing additional evidence of decentering as a leading indicator of change in anxiety. Finally, the model with no couplings (Model 4) was compared to Model 1 (the base model). As expected, the significant chi-square difference test ($p = .01$) indicated that removing both couplings significantly degraded the model fit from the base model. Similarly, Model 4 also provided a significant degradation in fit compared to Model 2 ($\Delta\chi^2/\Delta df = 6.87/1$, $p = .01$). Taken together, Model 2, with couplings from decentering to general anxiety symptoms, was retained as the best fitting, most parsimonious model (see Table 4 for parameter estimates for this model), indicating that decentering is a leading indicator of change in general anxiety symptoms, while general anxiety symptoms are not a leading indicator of change in decentering.

[1]As would be expected from the results of the outcome study, the treatment invariant model for linear change in DASS-Stress [χ^2 (34) = 71.44] was not significantly different than the model allowing the slope to vary across treatments [χ^2 (32) = 71.02; $\Delta\chi^2/\Delta df$ = 0.42/2, $p = .52$] indicating that treatment is not a significant factor in the DASS-Stress rate of change. The treatment invariant model for the relationship between rate of change on the DASS and the PSWQ residualized gain score [χ^2 (42) = 79.47] was also not significantly different than the same model allowing this relationship to outcome to vary across treatments [χ^2 (41) = 78.33; $\Delta\chi^2/\Delta df$ = 1.14/1, $p = .28$] indicating that treatment is not a significant factor in the relationship between the DASS-Stress rate of change and our outcome.

Examining the Bivariate Latent Difference Score Model comparing ABBT and AR

Finally, to examine whether the pattern of decentering as a leading indicator of general anxiety symptoms is consistent across ABBT and AR, chi-square difference tests for nested model comparisons were used to compare models where the strength of the coupling from EQ to DASS varied across treatment. In support of our hypothesis, the treatment invariant model [χ^2 (100) = 317.45] was not significantly different than the same model allowing the coupling from EQ to DASS to vary across treatments [χ^2 (99) = 316.74; $\Delta\chi^2/\Delta df$ = 0.71/1, p = .40] indicating that treatment is not a significant factor in this relationship between decentering and general anxiety symptoms.

Discussion

Having a stronger understanding of the mechanisms underlying treatments will enable the development and delivery of more effective and efficient therapies (Kraemer, Wilson, Fairburn, & Agras, 2002). One hypothesized treatment mechanism is decentering. Decentering has been theorized to be a mechanism in both acceptance and mindfulness based therapies and in cognitive behavioral therapies (e.g. Hayes et al., 1999; Heimberg & Ritter, 2008; Ingram & Hollon, 1986; Roemer & Orsillo, 2003) and empirical research has shown that decentering increases across therapy (e.g., Teasdale et al., 2002). However, to be considered a mechanism of action, the temporal relationship showing that changes in decentering precede symptom change needs to be established. Additionally, if decentering is a common mechanism, then this pattern should be consistent across therapies. Therefore, the current study sought to build further support for decentering as a common mechanism of action in treatments of GAD by examining data collected as part of a randomized clinical trial which compared an acceptance based behavioral therapy (ABBT) to applied relaxation (AR). Specifically, this study examined the longitudinal changes in decentering and generalized anxiety symptoms across treatment. As hypothesized, clients reported an increase in decentering across treatment and this increase in decentering was associated with a decrease in general anxiety symptoms by post-treatment. Adding further support for the consistency of this proposed mechanism, this finding is similar to reported findings on the role of decentering in treatment studies focusing on Mindfulness-Based Stress Reduction and Mindfulness-Based Cognitive Therapy (Bieling et al., 2012; Carmody, Baer, Lykins & Oldendzki, 2009; Teasdale et al., 2002) and Acceptance and Commitment Therapy (Zettle et al., 2011).

Beyond showing that decentering changed over treatment, results indicate that changes in decentering were leading indicators of change in symptoms of generalized anxiety. In other words, changes in decentering were related to future changes in symptoms. To further support the directionality of this change, the reverse pattern, that changes in symptoms were leading indicators of changes in decentering, did not significantly impact the model. This finding that changes in decentering lead to future changes in symptoms, but not the reverse provides support for the temporal precedence of decentering as a mechanism of action. To our knowledge, this is the first study on decentering to meet Kazdin's *timeline* criteria. While this study is limited by the use of self-report measures, the fact that direction of change was supported in one, but not both, directions also partially alleviates concern that

change was purely due to a response bias in which clients in treatment report global changes when they feel that they are improving.

If decentering is a common mechanism of action, then the role of decentering should be consistent across treatment approaches. As hypothesized, allowing either the slope of decentering or the relationship between decentering and symptoms to vary across treatments did not significantly alter the fit of the models. This indicates that treatment was not a significant factor in these two parameters, providing evidence that decentering is changing similarly across ABBT and AR. This finding is consistent with the cases (from a small subset of this sample) presented in Hayes-Skelton and colleagues (2012) suggesting that decentering increases across AR. The repeated practice of noticing early cues of anxiety may promote decentering in a similar manner to how it is hypothesized the mindfulness promotes decentering in ABBT. However as is described in more detail below, more research is needed to specifically isolate the components of these two treatments that specifically promote decentering. Additionally, research using larger sample sizes is needed in order to determine whether the more explicit focus on decentering in ABBT than AR leads to more decentering or whether the amount of decentering change is consistent across these two 16-week treatments regardless of the differences in techniques. Similarly, research is needed that can begin to isolate which techniques or processes most effectively or efficiently lead to decentering. While finding similar results across these two treatments provides support for decentering as a common mechanism, these two treatments are both behavioral treatments for GAD and they both have a number of common techniques, including self-monitoring and repeated practice of a mindfulness or relaxation response. Other effective treatments may not promote decentering. For example, when MBCT was compared to antidepressant medication for depression, only patients receiving MBCT showed changes in decentering across the maintenance phase (Bieling et al., 2012). Future research should also examine decentering across treatments that have fewer overlapping features. Similarly, while other studies have focused on changes in decentering in treatments targeting depression (i.e., Bieling et al., 2012; Teasdale et al., 2002), all clients in this study were selected because they had a primary diagnosis of generalized anxiety disorder. Therefore, the extent that these findings can be applied to other symptom profiles remains uncertain.

Returning to Kazdin's (2007) criteria for a mechanism, this study demonstrates: a *strong association* and *gradient* relationship between decentering and general anxiety symptoms, a *timeline* in which changes in decentering precede symptom change, and lends support to the *consistency* of research and *plausibility* of decentering as a mechanism; however, further replication of these findings is needed, particularly given the smaller sample size and the fact that all of the clients in this study were diagnosed with the same disorder. As Kazdin mentions, no single study can address all of the criteria. Therefore, future research is need that explicitly addresses the *specificity*, *experimental manipulation*, and *gradient* components. For example, decentering is only one of many hypothesized mechanisms of change in treatments for anxiety (e.g., increased psychological flexibility, reduced physical tension, decreased experiential avoidance). Previous research demonstrated that changes in acceptance of internal experiences and engagement in valued action predict responder status

over and above changes in worry for clients receiving ABBT for GAD (Hayes, Orsillo, & Roemer, 2010). Specific research is needed that examines whether changes in decentering predict outcome above and beyond these other hypothesized mechanisms. Given that decentering increases even in some treatments that do not explicitly target it (Hayes-Skelton, et al. 2012), it may be difficult, if not impossible, to design a study where individuals are randomized to a treatment that does not lead to decentering. However, it may be possible to compare a treatment that explicitly emphasizes and promotes decentering to one that does not explicitly or implicitly promote decentering (e.g. one that does not include strategies such as monitoring that are believe to enhance decentering). This kind of dismantling study would address Kazdin's *gradient* criteria if the decentering saturated treatment leads to more change than the one that does not target decentering. Additionally, analogue studies isolating decentering may be more effective in establishing the *experimental manipulation* criterion. Finally, future research is needed to examine whether decentering functions similarly across individuals from a diverse range of individuals as the samples in most previous research on decentering have been largely White, heterosexual, able bodied, and middle class.

Overall, these finding support the theory that decentering is a mechanism across two treatments, one that explicitly targets decentering and one that does not. The finding that decentering was a leading indicator of change across treatments, particularly a treatment that does not explicitly address decentering, points to the potential value of promoting decentering throughout treatments for GAD. For example, therapists can use decentered language such as labeling thoughts as thoughts to help promote decentering in clients regardless of the therapy approach being used. This research also highlights the importance of collecting frequent assessments of potential mechanisms so that the change processes can be more fully examined. Without designing studies to assess potential mechanisms frequently, it would not be possible to examine the time course of change in a potential mechanism.

As has been highlighted by a number of authors (e.g., Hayes, Hope, & Hayes, 2007; Hunsley & Rumstein-McKean, 1999; Kazdin, 2007; Kraemer et al., 2002; Nock, 2007), identifying and understanding mechanisms of change will lead to improvements in our current treatments. As highlighted by these authors and others, identifying common mechanisms of change will help to consolidate the proliferation of specific treatment manuals that lead to similar outcomes by highlighting the commonalities among the approaches. Related, targeting these specific mechanisms within treatment is likely to increase the efficiency and efficacy of treatment since more session time will be spent on treatment elements directly leading to change and less essential elements could be dropped or reduced. Finally, the focus on treatment mechanisms will likely foster dissemination as clinicians could focus on the underlying mechanisms and then adapt the specific approaches and techniques to better match specific clients and contexts as opposed to having a separate treatment package for each client presentation.

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Public Health Significance Statement

Findings indicate that changes in the ability to more objectively view thoughts and emotions precedes changes in anxiety for individuals receiving these two treatments for generalized anxiety disorder. Directly targeting this ability may help to increase the efficiency and effectiveness of treatments for generalized anxiety disorder.

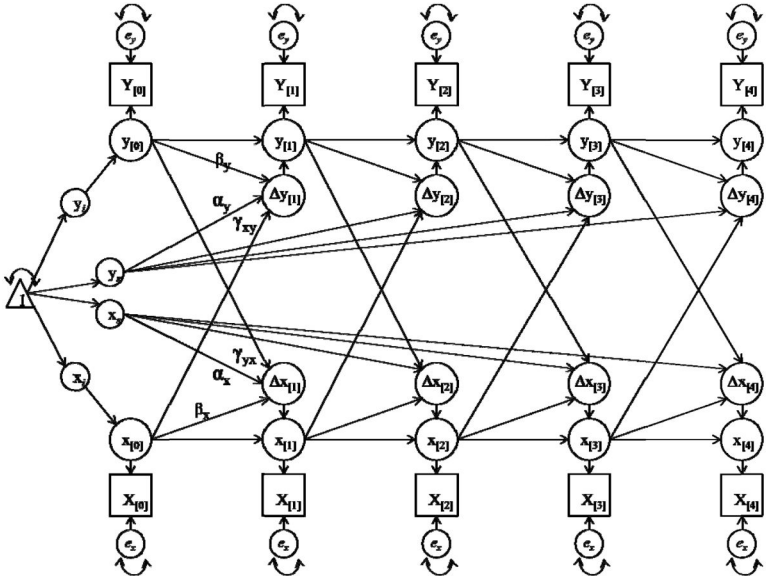

Figure 1.

A bivariate latent difference score model including couplings in both directions. $Y_{[t]}$ and $X_{[t]}$ = observed scores at time *t*. $y_{[t]}$ and $x_{[t]}$ = latent true scores at time *t*. $\Delta y_{[t]}$ and $\Delta x_{[t]}$ = latent change scores at *t*. y_i and x_i = initial scores. y_s and x_s = slopes. Triangle = constant. α = slope parameter (=1). β = autoproportional parameter. γ = coupling parameter.

Table 1

Correlations and Descriptive Statistics for the EQ-Decentering and DASS-Stress Scores across Treatment

Variable	EQ-pre	EQ-4	EQ-8	EQ-12	EQ-post	DASS-pre	DASS-4	DASS-8	DASS-12	DASS-post
EQ-pre	--									
EQ-4	.74**	--								
EQ-8	.56**	.67**	--							
EQ-12	.44**	.61**	.82**	--						
EQ-post	.48**	.66**	.76**	.80**	--					
DASS-pre	−.31*	−.21	−.10	−.01	.02	--				
DASS-4	−.33**	−.44**	−.36**	−.29*	−.32*	.28*	--			
DASS-8	−.08	−.28*	−.25	−.28*	−.17	.29*	.49**	--		
DASS-12	−.25*	−.37**	−.54**	−.55**	−.48**	.08	.47**	.62**	--	
DASS-post	−.20	−.26*	−.38**	−.46**	−.50**	.00	.36**	.50**	.59**	--
M	29.71	30.50	32.49	34.41	35.76	24.56	17.38	16.16	14.61	12.61
SD	6.11	5.60	6.18	6.82	7.73	7.94	8.17	8.74	7.40	8.42

Note. EQ = decentering subscale of the Experiences Questionnaire. DASS = the stress subscale of the Depression, Anxiety, and Stress Scale. –pre = score at pre-treatment. -4 = score at session 4. -8 = score at session 8. -12 = score at session 12. –post = score at post-treatment.

* p<.05;

** p<.01

Table 2

Individual Growth Curves for Decentering and Anxiety

	Unconditional Growth Parameters			PSWQ regressed on Intercept/Slope		
	Est. (SE)[a]	***Z***	***p***	**Est. (SE)[b]**	***Z***	***p***
EQ-Decentering						
Intercept	29.35 (0.68)	--	--	−.21 (.12)	−1.80	.07
Slope	1.58 (0.22)	7.09	<.001	−.74 (.09)	−8.51	<.001
DASS-Stress						
Intercept	22.35 (0.89)	--	--	.18 (.18)	0.96	.34
Slope	−2.63 (0.33)	−7.91	<.001	.76 (.14)	5.62	<.001

Note. EQ = Experiences Questionnaire; DASS = Depression, Anxiety, and Stress Scale; PSWQ = residualized gain score of PSWQ post regressed on pre; Intercept = estimate score at pre-treatment; Slope = unit change over four therapy sessions; Est. = Parameter Estimate; SE = Standard Error; Z = Standardized Z-score. Z > 1.96 is significant at p < .05; Z > 2.58 is significant at p < .01.

[a] Unstandardized estimates reported;

[b] Standardized estimates reported.

Table 3

Chi-Square Difference and Fit Statistics for Alternative Bivariate Latent Difference Score Models

Index	Both Couplings	EQ to DASS Only	DASS to EQ Only	No Coupling
χ^2/df	52.39/44	54.48/45	56.78/45	61.35/46
p	.18	.16	.11	.06
$\Delta\chi^2/\Delta$df	--	2.09/1	4.39/1	8.96/2
p		.15	.04	.01
RMSEA	.06	.06	.06	.07
CI	.00 – .10	.00 – .11	.00 – .11	.00 – .12
CFI	.98	.97	.97	.96
TLI	.98	.97	.97	.96
Overall fit significantly degraded?	--	No	Yes	Yes

Note. EQ = decentering subscale of the Experiences Questionnaire. DASS = the stress subscale of the Depression, Anxiety, and Stress Scale. RMSEA = root-mean-square error of approximation; CI = confidence interval of the RMSEA; CFI = comparative fit index; TLI = Tucker Lewis index.

Table 4

Parameter Estimates for the Best-Fitting Model with Couplings from Decentering to General Anxiety Symptoms

Parameter	EQ-Decentering Estimate (*p*)	DASS-Stress Estimate (*p*)
Loading α	1.0	1.0
Proportion β	0.02 (.87)	−0.99 (<.001)
Coupling γ (decentering→)	--	−0.82 (.01)
Correlations		
ρ_{is}	−.14 (.65)	.20 (.34)
$\rho_{yi,xi}$ $\rho_{yi,xs}$	−.46 (.007)	.30 (.18)
$\rho_{ys,xi}$ $\rho_{ys,xs}$	.45 (.04)	−.10 (.62)

Note. EQ-Decentering = decentering subscale of the Experiences Questionnaire. DASS-Stress = the stress subscale of the Depression, Anxiety, and Stress Scale. $\rho_{yi,xi}$ = EQ intercept with DASS intercepts; $\rho_{yi,xs}$ = EQ intercept with DASS slope; $\rho_{ys,xi}$ = EQ slope with DASS intercept; $\rho_{ys,xs}$ = EQ slope with DASS slope.