An Uncontrolled Clinical Trial of Guided Respiration Mindfulness Therapy (GRMT) in the Treatment of Depression and Anxiety

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Abstract. Guided Respiration Mindfulness Therapy (GRMT) is a manualised intervention that synthesises a sustained focus on self-regulation of respiration, mindfulness, and relaxation. In our previous publication (IN Lalande et al. J Contemporary Psychotherapy 46(2): 107-116, 2016) we reported an evaluation of a manual-based GRMT therapist training program for the treatment of anxiety and depression. Here we report the outcomes of the manualised treatment program for depression and anxiety with clients. Forty-two participants with a primary diagnosis of depression or anxiety disorder participated in an uncontrolled clinical trial evaluating treatment response using standardised assessment and outcome measures with data collected on a session-by-session basis for between 3 and 9 sessions. For the majority of participants, treatment led to statistically and clinically significant reduction in symptoms of depression, anxiety and stress, along with reduced anxiety sensitivity and increases in overall wellbeing. Results suggested GRMT shows promise as an effective brief treatment option that does not rely on cognitive or behavioural techniques.

Introduction

Mindfulness-based therapies that utilize the formal application of meditation with a passive focus on breathing have demonstrated effective in reducing depression, anxiety and stress symptoms (for reviews, see Hofmann, Sawyer, Witt et al., 2010; Khoury, Lecomte, Fortin et al., 2013). While interventions utilizing meditation practice with self-regulation of breathing also appear effective in reducing PTSD symptoms in veterans (Seppala, Nitschke, Tudorascu et al., 2014), and show promise in the treatment of depression (Streeter, Gerbarg, Whitfield et al., 2017). Compared to meditation involving passive breathing, meditation using active, self-regulation of breathing appears to be experienced as more intense and deeper and has demonstrated significant MRI activation of limbic brain structures associate with emotion (Wang, Rao, Korczykowski et al., 2011). In fact, a recent review of neurological studies suggests adequate evidence exists for self-regulation of breathing to be considered a primary intervention for depression, anxiety and stress (Jerath, Crawford, Barnes et al., 2015).

The use of sustained self-regulation of breathing forms the basis of guided respiration mindfulness therapy (GRMT: Lalande, King et al., 2016), a recently proposed experimental clinical intervention with strong links with meditation practice. It is unique in its use of active modification of respiratory behaviour, sustained intensity, and lack of reliance on dialogue based treatment techniques. Recent empirical evaluation of a manual-based GRMT therapist training program (Lalande, King et al., 2016) demonstrated that therapists can acquire foundational treatment knowledge and competence in this approach. A qualitative component of this study found participating therapists felt their personal experience of the intervention during training was therapeutically meaningful. Additionally, therapists endorsed its clinical use, especially in the treatment of trauma and clients who have difficulty regulating emotions.

GRMT synthesises three core components that form the basis of all treatment sessions. Respiratory regulation, the first core component, involves the self-regulation of respiration aimed at removing breathing inhibition and increasing contact with somatic experience. Clients are guided in adopting a breathing pattern comparable, although generally deeper, to that of a relaxed state (Bolton, Chen, Wijdicks et al., 2004; Bradley, 2002) characterized by continuous rhythmicity, expansion of the chest, and relaxed exhalation involving release of all respiratory and peripheral musculature. Mindfulness, the second core component of GRMT, is applied as sustained concentration on somatic experience aimed at making full contact with the most salient physical sensation in any given moment, and with an orientation of acceptance. Relaxation, the third core component, involves identification and release of physical tension and cessation of all unnecessary movement, as described in classical Buddhist meditation literature (Ñāṇamoli, 1964, p.79). Relaxation plays a role in reducing arousal levels while establishing a relaxation response to provocative inner experience. Throughout sessions engagement with thoughts is discouraged. Becoming distracted with mental content will commonly be accompanied by disengagement from self-regulation of respiration. Breath-by-breath monitoring of client respiration allows the therapist to recognize disengagement or deviations from the proscribed breathing pattern and intervene with targeted instructions aimed at reengagement. Therapist facilitation focuses on guiding clients in the skilful application of the three core components in a way that manages the dynamic interplay of physiological and psychological processes and optimises engagement while minimising discomfort or cathartic expression. The intervention is implemented in an eyes-closed, lying position with hands at side and takes between 50 to 60 minutes to facilitate.

A unique aim of GRMT is to actively establish contact with rejected somatic experience through the establishment of uninhibited breathing. Once accessed, these experiences can be integrated by applying mindfulness and relaxation. Theoretically, this aim suggests a link between inhibited breathing adopted as a defensive strategy to minimizing contact with troubling somatic experience, the presence of unintegrated psychosomatic experience, and the development and maintenance of psychopathology (i.e., depression and anxiety). Instability in respiratory patterns is suggested to play an important role in anxiety (Wilhelm, Trabert, & Roth, 2001). Inhibited breathing patterns have been shown to develop from the experience of anxiety and expectation involved in engaging with stressful environments (Fokkema, 1999), and from experiencing the environment as uncontrollable or overwhelming (Anderson & Chesney, 2002), with inhibition becoming sustained over time (Anderson, 2001). These studies suggest deviations from a relaxed healthy breathing pattern may take place as a defensive avoidance of uncomfortable bodily sensations associated with distress. The avoidance of unpleasant bodily sensations has been suggested as a mediator between anxiety sensitivity, and social anxiety (Panayiotou, Karekla, & Panayiotou, 2014). Anxiety sensitivity, characterised by the tendency to respond with fear to bodily sensations associated with anxiety (Reiss, Peterson, Gursky et al., 1986), plays a central role in

anxiety disorders (Feldner, Zvolensky, & Schmidt, 2004; Naragon-Gainey, 2010; Taylor, 1999), especially panic and post-traumatic stress disorder (Olatunji & Wolitzky-Taylor, 2009).

GRMT teaches the detached and accepting observation of somatic, emotional and cognitive experience characteristic of decentering. Decentering is one aspect of the new relationship with experience that is a defining feature of mindfulness-based approaches (Crane, Brewer, Feldman et al., 2017) and suggested mechanism of change in the treatment of depression and anxiety (Baer, 2003; Brown, Ryan, & Creswell, 2007; Shapiro, Carlson, Astin et al., 2006). An important issue in meditation practice that may impact effectiveness in treating depression and anxiety is the tendency for mind wandering, which is suggested to account for a substantial amount of an individual's time during almost any cognitive task (Smallwood & Schooler, 2013). Using a meditation task derived from mindfulness-based cognitive therapy (Segal, Williams, & Teasdale, 2002), Burg and Michalak (2011) prompted participants at irregular intervals to indicate whether they had lost contact with their breathing due to mind wandering. Their results showed increased ability to remain in contact with breathing was correlated with less rumination, while participants more fearful of bodily sensations where less able to maintain contact with their breathing. This research suggests the intensity and duration of an intervention using guided self-regulation of breathing may counter the tendency for mind wandering and rumination which is associated with depression (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008), and increase treatment effects.

The respiration and mindfulness elements of the GRMT intervention and related empirical research described above suggest it may be effective in reducing symptoms of depression and anxiety. This study provides a preliminary evaluation of the manualized GRMT intervention for the treatment of depression, anxiety and stress symptoms, and examines the relationship between depression, anxiety and stress outcomes and mindfulness, therapeutic alliance, and client self-efficacy in using the intervention.

Method

Design

A within-subject repeated measure design was used with data collected on a session-by-session basis. The study received ethics approval from the Queensland University of Technology, Office of Research Ethics and Integrity.

Participants and Procedure

Individuals responding to online noticeboards describing the study as evaluating a holistic approach to treating depression and anxiety completed a preliminary telephone-screening interview with potential participants invited to a structured clinical interview using the Mini International Neuropsychiatric Interview (M.I.N.I.; Sheehan & Lecruier, 1998). Forty-two clients (mean age of 38 (*SD* = 13.2), 55% female) meeting DSM-IV diagnostic criteria for either depression or anxiety disorder were accepted into the study. Based on primary diagnosis participants were assigned to the depression group (n = 15, 35.7%) or anxiety group (n = 27, 66.3%). In addition to meeting diagnostic criteria, participants were required to be 18 years of age or over. Exclusion criteria included presence of acute suicidality, psychosis and substance abuse, concurrently receiving other psychotherapy, and change or commencement of antidepressant/antianxiety medication within the last 6 weeks.

Specific diagnoses included major depression (*n* = 13), dysthymia (*n* = 2), post-traumatic stress disorder (*n* = 7), generalized anxiety disorder (*n* = 7), panic disorder (w/without agoraphobia) (*n* = 3), social phobia (w/without agoraphobia) (*n* = 9), and specific phobia (*n* = 1). Eighty-one per cent of participants had comorbid anxiety or depression, 14.2% entered the study taking psychiatric medication for depression (*n* = 5) or anxiety (*n* = 1) with length of time on medication ranging from 6 months to 9 years (*m* = 4.5 years), 50% screened positive for personality disorder using the standardised assessment of personality – abbreviated scale (SAPAS; Moran, Leese, Lee et al., 2003) using a cut-off of 4 or above, 43% identified themselves as in a relationship and 24.4% as unemployed.

Treatment

The first author and nineteen therapists (total=20) who had completed an empirically evaluated standardized training program in the manualized GRMT intervention administered treatment sessions. Treatment was manual based and therapists received treatment adherence focused supervision provided by the first author. For details of training and treatment integrity protocols see, Lalande, King, Bambling et al. (2016). Clients were offered up to a maximum of 10 sessions of treatment and were free to terminate at any time. The GRMT intervention was based on the manualized protocol developed by Lalande (2007)

and provided weekly for a duration of 90 minutes. Session structure involved an initial 15 minutes to complete outcome measures, review treatment method, and answer any questions. This was followed by 60 minutes allocated to administer the GRMT intervention as described above. Sessions concluded with 15 minutes for further integration if needed and to address any questions. Sessions were conducted across two university counselling training clinics.

Measures

All self-report data was collected at the beginning of all treatment sessions prior to administering the GRMT intervention in order to avoid any bias due to post-session positive affect.

The *Depression Anxiety Stress Scale – 21* (DASS-21; Lovibond & Lovibond, 1995) was used as the primary outcome measure and is composed of three 7-item scales that assess depression, anxiety and stress symptoms, and taken together assess overall psychological distress. It has proven reliability in adults with mood and anxiety disorders with Cronbach's α of .94, .87, and .91 respectfully for depression, anxiety, and stress subscales (Antony, Bieling, Cox et al., 1998). Total scale Cronbach's alpha in the present study was .80.

The *Anxiety Sensitivity Index* (ASI; Reiss, Peterson et al., 1986) is a frequently used self-report scale of sensitivity to anxiety. The ASI has demonstrated reliability across numerous studies, has satisfactory test-retest reliability and demonstrated criterion and construct validity (Rector, Szacun-Shimizu, & Leybman, 2006). Cronbach's alpha in the present study was .88.

The *Outcome Rating Scale* (ORS; Miller, Duncan, Brown et al., 2003) is a commonly adopted 10-point scale designed to assess general wellbeing, personal wellbeing, interpersonal wellbeing, and social functioning on a session-by-session basis. Cronbach's alpha in the present study was .93.

The *Toronto Mindfulness Scale* (TMS; Lau, Bishop, Segal et al., 2006) was used to assess change in mindfulness and is a 13-item measure with two subscales of Curiosity and Decentering. The TMS has demonstrated good internal consistency with Cronbach's alpha of .77 to .89 (Lau, Bishop et al., 2006). Cronbach's alpha in the present study was .82.

The *GRMT Self-Efficacy Scale* (GRMT-SE) is a 10-item scale developed for this study to assess changes in hypothesised intervention specific processes including: perceived level of breathing inhibition; ability to focus on, explore and accept body sensations; and confidence in ability to regulate thoughts and emotions. Items are rated on a 5-point scale ranging from rarely to almost always with items

of: 1) I find myself noticing my breathing, 2) My breathing feels free and uninhibited, 3) I tend to notice areas of my body that are tense and am able to relax them, 4) It is easy for me to just let my exhale go in a totally relaxed way, 5) I find it easy to focus on and explore the sensations in my body, 6) I find I can accept all the sensations and feelings in my body, 7) I feel confident I can regulate my thoughts and emotions, 8) I find the breathing technique easy, 9) I find myself using the breathing pattern when I am at home or work, 10) I am confident I am doing the breathing technique correctly. Cronbach's alpha in the present study was .73.

The *Working Alliance Inventory – Short Form* (WAI-SF; Tracey & Kokotovic, 1989) was used to measure the strength of the therapist-client relationship which is a known predictor of treatment outcomes. The scale has strong psychometric properties (Tracey & Kokotovic, 1989). Cronbach's alpha in the present study was .95.

Analysis

Primary data analysis was performed using SPSS v.21. Preliminary paired sample *t*-tests and Pearson's correlations were performed to explore overall relationships between variables. Effect sizes using Cohen's *d* (Cohen, 1988) pooled standard deviation were calculated to evaluate magnitude of change on variables over time. Multilevel models (e.g., Heck, Thomas, & Tabata, 2014) were used to test treatment effects over time, differences between depression and anxiety groups, and interactions between variables, with base model using, AR(1): Heterogeneous covariance structure as it provided the best fit with the data, and random intercept. Multilevel models are becoming the preferred choice for multiple data point repeated measures analysis as they use all available data without eliminating incomplete cases, provide a conservative and unbiased indication of treatment effects over time for multiple comparisons (Gelman, Hill, & Yajima, 2012), provide an indication of dose-response, and missing data appropriately. Clinical significance of symptom change on the DASS-21 was evaluated by converting raw scores into percentile ranks using the computer program developed by Crawford, Garthwaite, Lawrie et al. (2009) which were then translated into the corresponding DASS-21 classification of distress (normal, mild, moderate, severe, extremely severe) using cut-offs suggested by Lovibond and Lovibond (2005). To determine if early termination from the study reflected lack of treatment response, we partitioned participants into early (receiving 2 to 3 sessions), mid (4 to 6 sessions) and late (7 or more sessions) termination groups and examined mean overall psychological distress scores

(i.e., DASS-21 full scale) and overall wellbeing scores (i.e., ORS).

RESULTS

Mean (SD) scores for all measures at three time points for depression and anxiety diagnostic groups are reported in Tables 1 and 2.
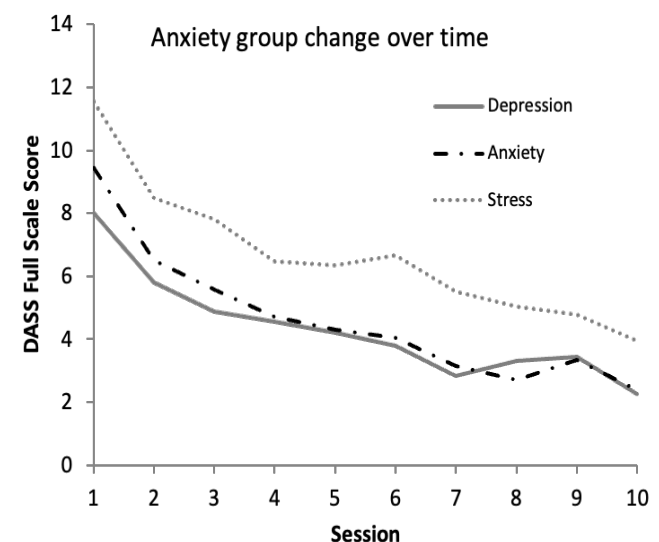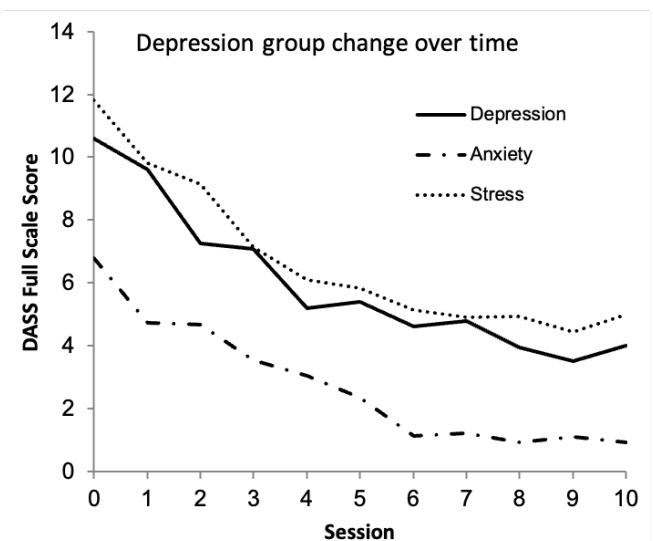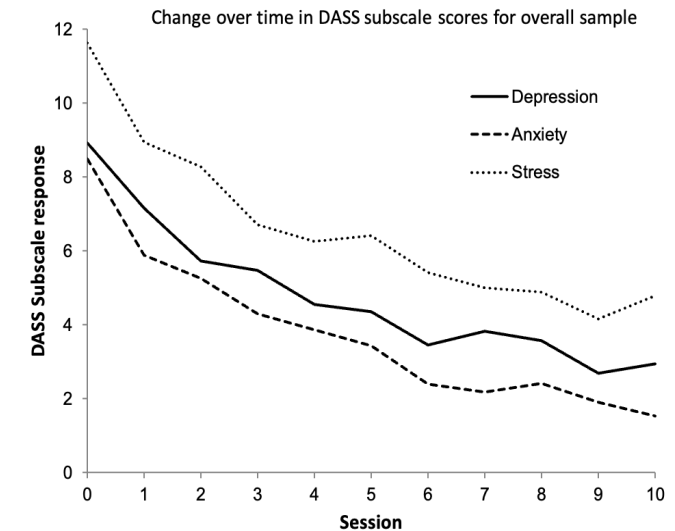
Early Termination

Mean baseline overall psychological distress score for the overall sample (N = 42) was 29.07 (SD = 9.32), and was comparable to the 6 (14.3%) early terminators (dropping out prior to session 4) who had a mean baseline overall psychological distress score of 29.50 (SD = 6.44), that had reduced to 11.50 (SD = 4.55) after session 2. By comparison, mid-study terminators (n = 9, 21.4%) had a mean baseline overall psychological distress score of 25.44 (SD = 8.54) that reduced more slowly to 16.67 (SD = 7.96) after session 2, and 10.00 (SD = 6.81) after session 5. For late terminators (64.3%, n = 27), a baseline mean of 30.19 (SD = 10.03) reduce to 21.89 (SD = 10.47) after session 2, 17.07 (SD = 6.85) after session 5, and 11.81 (SD 7.24) after session 7. Change in mean wellbeing scores (i.e., Outcome Rating Scale) for early terminators increased from 3.66 (SD = 1.92) at baseline to 5.81 (SD = 1.96) after session 2, which was comparable to late terminators with a baseline mean of 3.80 (SD = 1.86) that increased more slowly to 5.94 (SD = 2.02) after session 7.

Primary Outcomes: Depression, Anxiety, Stress

For the overall sample, multilevel model analysis showed a significant interaction between number of sessions and symptoms of overall psychological distress (full scale DASS-21). Linear, $F(1, 61) = 50.79$, $p < .001$, and quadratic, $F(1, 40) = 17.35$, $p < .001$, trends described the pattern of change indicating and initial fast change which then plateaued. This pattern was maintained across the DASS-21 subscales that showed significant linear and quadratic trends respectively for depression, $F(1, 86) = 18.42$, $p < .001$; $F(1, 70) = 4.78$, $p = .03$, anxiety, $F(1, 85) = 38.98$, $p < .001$; $F(1, 79) = 15.78$, $p < .001$, and stress, $F(1, 131) = 15.69$, $p < .001$; $F(1, 168) = 7.64$, $p = .006$.

Mixed model analyses of diagnostic groups showed that while not significantly different in level of overall psychological distress, $\beta = .412$, $t(27.35) = .23$, $p = .81$, compared to the anxiety group, the depression group had significantly higher DASS-21 depression scores, $\beta = 1.92$, $t(37.06) = 2.09$, $p = .043$,

and lower anxiety scores although not significant, $\beta = -1.53$, $t(31.74) = -1.85$, $p = .073$. This was consistent with diagnostic groupings. There was no group difference in level of stress. The effect size (Cohen's d) associated with depression group change in mean DASS-21 Depression scores from baseline was 0.72 after 3 sessions, 1.41 after 6 sessions, and 1.49 after 9

Change over time in DASS subscale scores for overall sample

Depression group change over time


Anxiety group change over time

sessions. For the anxiety group, the effect size for mean DASS-21 Anxiety scores was 1.05 after 3 sessions, 1.72 after 6 sessions, and 1.82 after 9 sessions, suggesting treatment had a stronger effect on anxiety compared to depression.

Clinical Significance

Results for the depression diagnostic group showed clinically significant reductions in depression symptoms and overall psychological distress (e.g. movement from elevated to normal levels) for 73.3% of clients. Results for the anxiety diagnostic group showed 70.3% of clients experienced a clinically significant reduction in anxiety symptoms while 77.7% moved from an elevated level of overall psychological distress to the normal range.

Secondary Outcomes

Anxiety sensitivity. Analysis of the overall sample showed that at baseline ASI scores were strongly correlated with DASS-21 Anxiety scores, $r(42) = .52$, $p < .001$, and moderately correlated with stress scores, $r(42) = .34$, $p = .02$, but not with depression scores. Multilevel models showed sessions led to a highly significant reduction in anxiety sensitivity over time, $F(1, 70) = 47.21$, $p < .001$. While the depression diagnostic group had a lower level of

Anxiety Sensitivity Index response by primary diagnosis
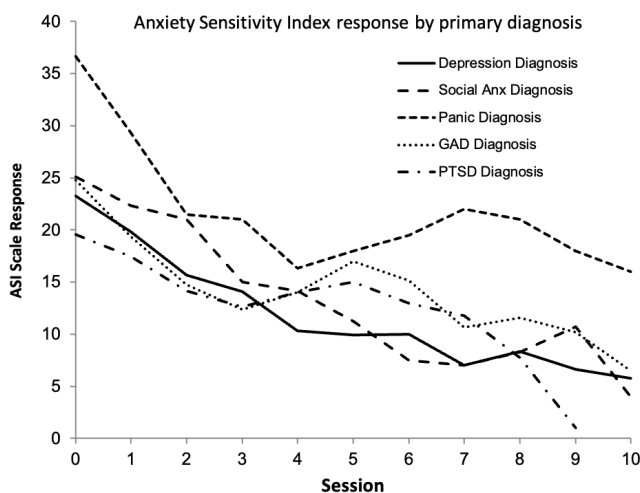
anxiety sensitivity, this was not significantly different to the anxiety diagnostic group, $\beta = -2.65$, $t(35.20) = -1.08$, $p = .28$, nor was the slope of anxiety sensitivity decline, $\beta = -.31$, $t(26.29) = -.861$, $p = .39$. The effect size associated with depression group change in mean ASI scores from baseline ranged from $d = 0.86$ after 3 sessions, to $d = 1.70$ after 9 sessions, and for the anxiety group from, $d = 0.95$ after 3 sessions, to $d = 1.40$ after 9 sessions.

Overall wellbeing. Multilevel models using the overall sample showed overall wellbeing (i.e., Outcome Rating Scale) significantly increased over sessions, $F(1, 107) = 25.47$, $p < .001$. Reductions in both DASS-21 Depression scores, $\beta = -.15$, $t(262.88) = -8.03$, $p < .001$, and Stress scores, $\beta = -.07$, $t(246.66) = -3.09$, $p = .002$, significantly predicted higher overall wellbeing scores, while DASS-21 Anxiety and Anxiety Sensitivity Index scores did not. Comparing overall wellbeing in individual diagnostic groups showed they did not significantly differ in the slope of change, $\beta = .09$, $t(41.70) = -1.08$, $p = .28$, or its level, $\beta = -.79$, $t(45.03) = -1.18$, $p = .24$. The effect size associated with depression group change in mean overall wellbeing scores from baseline ranged from $d = 0.98$ after 3 sessions, to $d = 1.34$ after 9 sessions, and for the anxiety group from, $d = 0.55$ after 3 sessions, to $d = 0.80$ after 9 sessions.

Mindfulness. For the overall sample, scores on the full Toronto Mindfulness Scale and subscales of curiosity and decentering were not correlated (Pearson's r) with DASS-21 scores or its subscales of depression, anxiety, and stress at baseline or any other combination of time points. Multilevel model analyses did however show decentering subscale scores significantly increased over sessions, $F = (1, 182) = 4.62$, $p = .03$, and predicted reductions in DASS-21 Depression, $\beta = -.25$, $t(239.61) = -4.55$, $p < .001$, and stress scores, $\beta = -.12$, $t(223.23) = -2.45$, $p = .015$, but not Anxiety scores, with no significant difference between depression and anxiety groups. TMS Curiosity scores did not significantly change over sessions.

Working Alliance. For the overall sample working alliance (WAI-SF) was not significantly correlated (Pearson's r) with DASS-21 full-scale scores for any combination of measurement interval. However, multilevel analyses of working alliance subscales found task agreement significantly increased over sessions, $F(1, 82) = 8.82$, $p = .004$, as did goal agreement, $F(1, 87) = 5.00$, $p = .02$, but there was no significant change in bond.

Additionally, exploring alliance differences in diagnostic groups found that compared to the anxiety group, the depression group had a significantly lower level of bond, $\beta = -04$, $t(54.47) = -2.26$, $p = 02$, and task agreement, $\beta = -.05$, $t(58.88) = -2.59$, $p = .01$, however, there was no significant group difference in level of agreement on goals. For the depression group agreement on goals significantly predict reduction in stress, $\beta = -.89$, $t(38.06) = -2.07$, $p = .04$, while for the anxiety group, agreement on goals significantly predicted reduction in anxiety, $\beta = -1.29$, $t(134.79) = -2.56$, $p = .01$.

GRMT Self-Efficacy. Self-efficacy in applying GRMT increased significantly over treatment, $F(1, 90) = 20.42$, $p < .001$, with no significant difference between depression and anxiety group on either level or slope of change. Self-efficacy significantly predicted reduction in overall psychological distress, $\beta = -.59$, $t(-177.31) = -7.50$, $p < .001$, and reductions in DASS-21 subscales of Depression, $\beta = -.23$, $t(195.24) = -5.93$, $p < .001$, Anxiety, $\beta = -.22$, $t(241.03) = -7.38$, $p < .001$, and Stress, $b = -.20$, $t(214.20) = -5.94$, $p < .001$. With the exception of item 1, all GRMT-SE scale items demonstrated a highly significant increase over the course of sessions ($p \leq .006$).

DISCUSSION

This trial provides preliminary evidence that guided respiration mindfulness therapy is effective in reducing symptoms of depression, anxiety and stress, along with anxiety sensitivity. Results demonstrated statistically significant, and for the majority of participants, clinically significant treatment effects for depression, anxiety and stress symptoms with changes associated with large effect sizes. The strong result for the Outcome Rating Scale, which has shown a strong positive correlation with the OQ45 indicating that it can provide valid information about functional change (Campbell & Hemsley, 2010), suggests this intervention goes beyond symptom reduction to a more generalized impact on perceived wellbeing.

Participants were able to learn to apply GRMT (i.e., GMRT-SE scale) and self-efficacy in doing so strongly predicted improvement in symptoms. This result provides some support for the proposition that guided self-regulation of respiration aimed at removing breathing inhibition, and the accepting engagement with somatic experience, are effective in reducing depression and anxiety symptoms. The self-efficacy results are consistent with the finding that task and goal agreement aspects of the working alliance increased over sessions and that goal agreement predicted reductions in both depression and anxiety. GRMT is a highly experiential intervention composed of a clearly defined and unchanging methodology which clients engage with repeatedly from session to session. Because of this consistency client mastery of the technical aspects of the intervention and familiarity with the experiential dynamics of the therapeutic process can be expected to increase relatively quickly over time. When clients perceive themselves as developing increased competence in their use of the intervention, and their engagement with the intervention as meaningfully linked to their goal of symptom reduction as positive

treatment outcomes are experienced, both task and goal agreement are likely to be strengthened. The early change in mean overall psychological distress and overall wellbeing for participants terminating early suggests those participants may have experienced a rapid positive response to treatment with satisfying outcomes comparable to later terminators. We are not aware of any adverse reactions to treatment.

The results for mindfulness as measured on the TMS were confined to increased capacity for decentering which predicted reductions in depression. While this result is encouraging it is weaker than expected, especially as there was significant change on GRMT-SE scale items suggesting increased somatic awareness and self-regulation. The lack of change in TMS Curiosity scores may reflect scale properties and a more somatically focused scale may produce a different result.

This study had a number of strengths, including use of a structured diagnostic interview, depression and anxiety specific outcome measures with good psychometric properties, and session-by-session data collection. Multiple therapists, using a manualized intervention, with checks for therapist competence and adherence, delivered treatment. Recruiting a community sample and lenient exclusion criteria suggests the client sample can be considered comparable to clients seeking treatment for depression and anxiety.

The interpretation of results must consider that there was no control or active comparison condition. The lack of follow-up means it is unknown if treatment effects are maintained over time. Also, further work is needed to establish the reliability of the GRMT-SE measure. Participants recruited into this study may have had an interest in holistic approaches to depression and anxiety creating the possibility of biased self-selection. It is therefore unknown if GRMT would be as effective in other populations.

In summary, the results of this study provide strong preliminary support for the use of guided respiration mindfulness therapy as a brief intervention for symptoms of depression, anxiety and stress, and increasing sense of wellbeing. The strength of the results also encourages further theoretical and empirical exploration and development of the GRMT treatment model as a high priority.

Conflict of interest: The authors declare that they have no conflict of interest.

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study.

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REFERENCES

Anderson, D. E. (2001). Respiratory psychophysiology in hypertension research. *Behavior Modification, 25*, 606-620.

Anderson, D. E., & Chesney, M. A. (2002). Gender-specific association of perceived stress and inhibited breathing pattern. *International Journal of Behavioral Medicine, 9*, 216-227.

Antony, M. M., Bieling, P. J., Cox, B. J., Enns, M. W., & Swinson, R. P. (1998). Psychometric properties of the 42-item and 21-item versions of the depression anxiety stress scales in clinical groups and a community sample. *Psychological Assessment, 10*, 176-181.

Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice, 10*(2), 125-143.

Bolton, C. F., Chen, R., Wijdicks, E., & Zifko, U. A. (2004). *Neurology of breathing*. Philadelphia: Butterworth Heinemann.

Bradley, D. (2002). Patterns of breathing dysfunction in hyperventilation syndrome and breathing pattern disorders. In L. Chaitow, D. Bradley & C. Gilbert (Eds.), *Multidisciplinary approaches to breathing pattern disorders*. London: Churchill Livingstone.

Brown, K., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological Inquiry, 18*(4), 211-237.

Burg, J. M., & Michalak, J. (2011). The healthy quality of mindful breathing: Associations with rumination and depression. *Cognitive Therapy and Research, 35*(2), 179-185. doi: 10.1007/s10608-010-9343-x

Campbell, A., & Hemsley, S. (2010). Outcome rating scale and session rating scale in psychological practice: Clinical utility of ultra-brief measures. *Clinical Psychology, 13*(1), 1-9.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2 ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Crane, R. S., Brewer, J., Feldman, C., Kabat-Zinn, J., Santorelli, S., Williams, J., & Kuyken, W. (2017). What defines mindfulness-based programs? The warp and the weft. *Psychological Medicine, 47*, 990-999. doi: 10.1177/0004867414525841

Crawford, J., Garthwaite, P., Lawrie, C., Henry, J., MacDonald, M., Sutherland, J., & Sinha, P. (2009). A convenient method of obtaining percentile norms and accompanying interval estimates for self-report mood scales (DASS, DASS-21, HADS, PANAS, and sAD). *British Journal of Clinical Psychology, 48*, 163-180.

Feldner, M. T., Zvolensky, M. J., & Schmidt, N. B. (2004). Prevention of anxiety psychopathology: A critical review of the empirical literature. *Clinical Psychology: Science and Practice, 11*(4), 405-424.

Fokkema, D. S. (1999). The psychobiology of strained breathing and its cardiovascular implications: A functional system review. *Psychophysiology, 36*, 164-175.

Gelman, A., Hill, J., & Yajima, M. (2012). Why we (usually) don't have to worry about multiple comparisons. *Journal of Research on Educational Effectiveness, 5*(2), 189-211.

Heck, R. H., Thomas, S. L., & Tabata, L. N. (2014). *Multilevel and longitudinal modeling with IBM SPSS* (2nd ed.). New York: Routledge.

Lalande, L. (2007). *Guided respiration mindfulness therapy for depression and anxiety: Treatment manual for individual therapy*: Unpublished therapy treatment manual.

Lalande, L., King, R., Bambling, M., & Schweitzer, R. (2016). Guided respiration mindfulness therapy: Development and evaluation of a brief therapist training program. *Journal of Contemporary Psychotherapy, 46*(2), 107-116. doi: DOI 10.1007/s10879-015-9320-5

Lau, M., Bishop, S. R., Segal, Z. V., Buis, T., Anderson, D. E., Carlson, L., . . . Carmody, J. (2006). The Toronto mindfulness scale: development and validation. *Journal of Clinical Psychology, 62*, 1445-1467.

Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: comparison of the depression anxiety stress scales (DASS) with the beck depression and anxiety inventories. *Behaviour Research and Therapy, 33*(3), 335-343.

Lovibond, S. H., & Lovibond, P. F. (2005). Manual for the depression anxiety stress scales (2 ed.). Sydney: Psychology Foundation.

Miller, S. D., Duncan, B. L., Brown, J., Sparks, J. A., & Claud, D. A. (2003). The outcome rating scale: a preliminary study of the reliability, validity, and feasibility of a brief visual analog measure. *Journal of Brief Therapy, 2*, 91-100.

Moran, P., Leese, M., Lee, T., Walters, P., Thornicroft, G., & Mann, A. (2003). Standardised assessment of personality - abbreviated scale (SAPAS): preliminary validation of a brief screen for personality disorder. *British Journal of Psychiatry, 183*, 228-232.

Ñāṇamoli, Bhikkhu. (1964). *Mindfulness of breathing (ānāpānasati); Buddhist texts from the Pali canon and extracts from the Pali commentaries* (B. Ñāṇamoli, Trans. 2 ed.). Kandy, Ceylon: Buddhist Publication Society.

Naragon-Gainey, K. (2010). Meta-analysis of the relations of anxiety sensitivity to the depressive and anxiety disorders. *Psychological Bulletin, 136*(1), 128-150.

Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking rumination. *Perspectives on Psychological Science, 3*(5), 400-424.

Olatunji, B. O., & Wolitzky-Taylor, K. B. (2009). Anxiety sensitivity and the anxiety disorders: A meta-analytic review and synthesis. *Psychological Bulletin, 135*(6), 974-999.

Panayiotou, G., Karekla, M., & Panayiotou, M. (2014). Direct and indirect predictors of social anxiety: The role of anxiety sensitivity, behavioral inhibition, experiential avoidance and self-consciousness. *Comprehensive Psychiatry, 55*, 1875-1882.

Rector, N. A., Szacun-Shimizu, K., & Leybman, M. (2006). Anxiety sensitivity within the anxiety disorders: Disorder-specific sensitivities and depression comorbidity. *Behaviour Research and Therapy, 9*, 17-26.

Reiss, S., Peterson, R. A., Gursky, D. M., & McNally, R. J. (1986). Anxiety sensitivity, anxiety frequency and the prediction of fearfulness. *Behaviour Research and Therapy, 24*, 1-8.

Segal, Z. V., Williams, J. M., & Teasdale, J. D. (2002). *Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse*. New York, NY: The Guilford Press.

Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology, 62*(3), 373-386.

Sheehan, D., & Lecruier, Y. (1998). *M.I.N.I. International Neuropsychiatric Interview: English version 5.0.,* (59, 20).

Smallwood, J., & Schooler, J. W. (2013). The restless mind. *Psychology of Consciousness: Theory, Research, and Practice, 1*(5), 130-149.

Taylor, S. (Ed.). (1999). *Anxiety sensitivity: Theory, research, and treatment of the fear of anxiety*. Mahwah, NJ: Erlbaum.

Tracey, T. J., & Kokotovic, A. M. (1989). Factor structure of the working alliance inventory. *Psychological Assessment, 1*(3), 207-210.

Wilhelm, F. H., Trabert, W., & Roth, W. T. (2001). Physiologic instability in panic disorder and generalized anxiety disorder. *Biological Psychiarty, 49*, 596-605.