Supplementary materials for:

Randomized clinical trial of cognitive behavioral therapy (CBT) versus acceptance and commitment therapy (ACT) for mixed anxiety disorders

METHODS

Acceptance and Commitment Therapy (ACT). Experiential exercises were used throughout treatment and tailored to client needs; experiential exercises with metaphors usually utilized the "bus" metaphor, the "anxiety monster" metaphor, "stuck in a hole" metaphor, and "taking your mind for a walk" among others, and the "willingness thermometer" and other strategies were used throughout treatment as a strategy to enhance behavioral willingness (see Hayes et al., 1999). Exercises such as exploring how to get "unstuck" from Chinese finger traps and eyes-closed acceptance of anxiety meditations were used to cultivate an acceptance stance towards anxiety-related thoughts and feelings. Deeply held personal values were explored via experiential exercises such as taking a values inventory and writing an ideal epitaph and contrasting it with the epitaph that might be written if the P continued living life in service of eliminating anxiety. In the final session (Session 12), clients made a personal commitment to continue pursuing a valued and workable life, and brainstormed about how to work skillfully with potential obstacles and barriers.

Primary Outcomes

For anxiety specific outcomes, we selected the Penn State Worry Questionnaire (Meyer et al., 1990) to assess worry, the Anxiety Sensitivity Index (Peterson & Reiss, 1992; Reiss et al., 1986) to assess fear (of anxiety and fear-related sensations), and the Main Target Phobia Scale (anxiety-related behavioral avoidance rating) from the Fear Questionnaire (Marks & Mathews, 1979) to assess behavioral avoidance. For broader outcomes, we employed the Quality of Life Inventory (Frisch, 1994) and the 16-item Acceptance and Action Questionnaire (Bond & Bunce, 2000; Hayes et al., 2004).

Additional psychometrics on these measures is as follows: The *Anxiety Sensitivity Index* has good internal consistency (α =.82 to .91) and stable test-retest reliability over a three-year period (r = .71) (Maller & Reiss, 1992). The The *Penn State Worry Questionnaire* demonstrates good internal consistency and test-retest reliability (r = .74 to .93 across 2-10 week periods) (Molina & Borkovec,

1994). The *Quality of Life Inventory* has good test-retest reliability (at 2-week intervals r = .73), reasonable internal consistency (α = .79), as well as good convergent, discriminant, and treatment validity. The 9 and 16-item versions of the *Acceptance and Action Questionnaire* evidence high correlation (r = .89) (Hayes et al., 2004). The 16-item version has shown reasonable to strong internal consistency, with αs ranging from.74 (Twohig et al., 2010), .84 (Roemer et al., 2008) to .91 (Bond & Bunce, 2000) in previous intervention studies. Further, the AAQ-16 evidences good convergent and discriminant validity (see Bond & Bunce, 2003).

Treatment Credibility

In addition to two items taken directly from Borkovec and Nau's questionnaire (e.g. confidence in recommending the treatment to a friend, how helpful with other problems), additional questions included: "How helpful does this type of treatment seem to you for people with anxiety?", "How much do you believe this treatment approach will help you?", "How much do you believe this therapist will help you?", and "How much do you believe this treatment will help you lead the life you want to live?"

Treatment Adherence and Therapist competence

Tapes were randomly selected such that they included two sessions from each P, one session each from the first and second half of treatment. Compromised sound quality for some sessions, however, limited the number of rated sessions to 1 for a subset of Ps.

The cognitive therapy subscale did not include behavioral items such as behavioral exposure, because these were included in both ACT and CBT. Employing behavioral exposure techniques (in session or via homework assignments) was included on the behavioral adherence subscale. However, *framing* exposure in terms of challenging beliefs or reducing anxiety was included on the cognitive therapy scale, whereas *framing* exposure as an opportunity to practice mindfulness, acceptance, or valued action was included on the ACT scale.

Statistical analyses

Chi-square tests (for categorical variables) and one-way ANOVAs (for continuous variables) assessed pre-treatment differences between groups. Also, one-way ANOVAs assessed group differences in the number of completed treatment sessions, therapist competence, and treatment integrity scales. Additional psychotherapy and medication use was assessed using logistic regression and chi-square analyses.

To test between group differences at Post and 12m FU, we recoded the HLM/ HMLM outcomes data such that the 0 intercept equaled post-treatment (time coding -1, 0, 1, 2) or 12m FU (time coding -3, -2, -1, 0); group differences at the intercept thus represented group differences at post or 12m FU. For the ITT sample analyses, we included pre-treatment scores on Level 1. To accurately model the curvilinear nature of change from pre-treatment to follow up, we added quadratic and cubic time variables on Level 1 in the ITT analyses, keeping significant higher order terms in the final models. For the Completer analyses, to reduce the need for higher order terms, we covaried pre-treatment scores on Level 2. (We could not use this approach for the ITT analyses because it excluded Ps who did not have at least one Post or FU data point.) Thus, Level 1 for Completers represented Post, 6m FU, and 12m FU (coded 0, 1, 2 for post-treatment between-group comparisons; -2, -1, 0 for 12m FU comparisons). With the exception of the QOLI outcomes, which required a Level 1 quadratic term, only linear terms were significant (and kept) on Level 1 in Completer models.

For reliable change indices, we employed the Jacobson & Truax (1991) reliable change index in which reliable change = (post-treatment score – pre-treatment score)/ the standard error of the difference, using the conservative cutoff value of > 1.96 in the direction of improvement. We employed Maassen's (2004) recommended computation for Jacbonson and Truax's 'standard error of the difference' denominator value, which equals the square root of ((variance of measure at pre-treatment + variance of measure at post-treatment)*(1-measure reliability)). We employed the average Cronbach alpha (across pre and post-treatment) as our reliability measure except in the case

of single-item outcomes (e.g., CSR and FQ1), for which alpha could not be computed. For CSR, we substituted the inter-rater reliability ICC value (.65, see *Results*) and for FQ1, we substituted the test-retest reliability (.93) reported by Marks and Mathews (1979). Due to the range of principal disorders and corresponding variety in treatment targets, we aimed for reliable change on 2 of 4 anxiety-specific outcome measures (see Table 6).

For the high end state functioning index, we employed nonclinical norms from the following sources: ASI (Peterson & Reiss, 1993) and PSWQ (Molina & Borkovec, 1994). Because Fear Questionnaire main target phobia scale nonclinical norms were unavailable, we used the Gillis et al. (1995) nonclinical norms for the FQ total scale and divided their mean and SD by the number of the items in the scale to derive a nonclinical mean and SD appropriate for the main target phobia item.

RESULTS

Use of Additional Psychotherapy and Medication. At Post, any additional psychotherapy (new or continued) was reported by 14% of ACT and 9% of CBT Ps , $p > .48$, and new psychotherapy (based on a subsample of $n = 39$ for which we had Pre data) was reported by 5% of ACT and 16% of CBT, $p > .26$. At 6m FU, new psychotherapy was reported by 26% of ACT and 11% of CBT Ps, $p > .12$ and dropping psychotherapy (of Ps in psychotherapy at Post) numbers were too small to compute (e.g. 1 *n* per cell). At 12m FU, any additional psychotherapy was reported by 33% of ACT Ps and 20% of CBT, $p > .28$, and new psychotherapy was reported by 14% of ACT and 13% of CBT Ps, $p > .88$; dropping psychotherapy (of Ps in psychotherapy at Post) numbers were too small to compare groups (e.g. 1 *n* per cell).

At Post, any medication (new or continued) was reported by 43% of ACT and 41% of CBT, $p > .85$, and new medication use was reported by 8% of ACT and 4% of CBT Ps, $p > .44$. At 6m FU, any medication (new or continued) was reported by 37% of ACT and 31% of CBT Ps, $p > .58$, new medication use was reported by 8% of ACT and 6% of CBT Ps, $p > .73$, and dropped medication use

(among the n = 30 Ps taking medication at Post with complete data at 6mFU) was reported by 27% of ACT and 21% of CBT Ps, $p > .69$. At 12m FU, any medication (new or continued) was reported by 43% of ACT and 36% of CBT Ps, $p > .59$, new medication use was reported by 10% each of ACT and CBT Ps, $p > .98$, and there were too few Ps using medication at 6mFU (with complete data at 12mFU) to compare groups on dropped medication. .

Covarying pre- and post-treatment CSRs, total number of previous mental health utilizations prior to study entry, and use of additional (non-study) psychotherapy during study treatment, Group remained a significant predictor of 6m FU additional psychotherapy, Exp (B) = 4.07 (95% CI 1.02 to 16.19), $p = .047$. To explore the possibility that Ps who remained clinically severe at post-treatment (defined as a CSR of 4+ at post-treatment) were simply more likely to seek additional treatment in ACT versus CBT, we reran the logistic regression among Ps with a CSR of 4+ at post-treatment (n = 25). Group approached significance as a predictor of additional psychotherapy use at 6m FU, p = .07, Exp (B) = 8.36 (95% CI .81 to 85.95), with severe ACT Ps somewhat more likely to seek additional psychotherapy than severe CBT Ps. No other predictors were significant (all ps > .12).

Therapist Competence. As an example of results from the analysis without CBT-only and ACT-only therapists (sample n = 75), group differences on linear CSR effect sizes from pre-post were d = .41, post-6m FU d = .42, and 6m -12m FU d = .43, all favoring ACT, which are comparable to the full sample findings reported in Table 3.

Discussion

Our findings somewhat contradict the popular belief that CBT is preferable for primary symptom reduction and ACT is preferable for improving quality of life. In fact, we found the opposite was true: during follow up, CBT was superior in improving quality of life and ACT was superior in improving the severity of the principal anxiety disorder among completers (as assessed by the Quality of Life Index and clinician severity ratings from the ADIS-IV, respectively). These findings are consistent with previous studies showing that ACT is highly efficacious at reducing

principal anxiety disorder severity among both GAD (Roemer & Orsillo, 2007; Roemer et al., 2008) and OCD (Twohig et al., 2010) patient samples. As predicted, ACT was superior at improving psychological flexibility, with group differences emerging over the follow-up period once again. The most closely related randomized clinical trial that compared ACT and cognitive therapy on this variable targeted undiagnosed anxious and depressed outpatients (Forman et al., 2007). The results showed a lack of group differences on Pre to Post changes in psychological flexibility (similar to the present study) but did not assess group differences during follow up.

That CBT was superior at improving quality of life suggests that CBT's narrower focus on symptoms (and lack of explicit focus on values, as in ACT) did not preclude significant impact on broader life quality. Our quality of life measure focused on perceived quality of life rather than on values-driven behavior, as specifically targeted by ACT. Future studies should compare ACT and CBT on change in perceived quality of life versus valued behavior to determine the magnitude and relationship between these two outcomes within each therapy. Further, we need to replicate the current findings and investigate the relationship between anxiety-focused outcomes (such as diagnostic severity) and broader outcomes (such as quality of life) between and within each therapy more generally. Finally, in the present study, differences between ACT and CBT emerged only during the follow up period, emphasizing the need to compare groups beyond post-treatment.

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