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Patient Motivational Language as a Predictor of Symptom Change, Hazard of Clinically Significant Response, and Time to Response in Psychotherapy for Generalized Anxiety Disorder

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A Thesis Presented

By

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ABSTRACT

PATIENT MOTIVATIONAL LANGUAGE AS A PREDICTOR OF SYMPTOM CHANGE, HAZARD OF CLINICALLY SIGNIFICANT RESPONSE, AND TIME TO RESPONSE IN PSYCHOTHERAPY FOR GENERALIZED ANXIETY DISORDER

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Change-talk (CT), or self-arguments for change, has been associated with favorable patient outcomes, while counter change-talk (CCT), or self-arguments against change, has been associated with poorer outcomes. Most studies on change language have focused on the prediction of distal posttreatment outcomes, while the prediction of more proximal outcomes has remained largely untested. Addressing this gap, we examined early treatment CT and CCT as predictors of worry change trajectories, "hazard" of clinically significant response, and time to response (i.e., outcome efficiency) in CBT and CBT integrated with MI (MI-CBT) for generalized anxiety disorder (GAD). We also explored whether treatment type moderated these associations. Data derived from a randomized controlled trial comparing CBT (n = 43) and MI-CBT (n = 42) for GAD. Independent observers reliably coded CT/CCT during session 1. Patients rated their worry after every session. Multilevel modeling revealed that, across both treatments, more CT associated with lower midtreatment worry level (p = .03), whereas more CCT associated with a slower rate of worry reduction at midtreatment (p = .04). However, treatment moderated the associations between CT and both midtreatment worry level (p =

.004) and rate of change (p = .03). In CBT, patients with higher vs. lower CT had less worry and a faster rate of worry reduction; in MI-CBT, CT was unrelated to midtreatment worry level and the rate of worry change. Treatment did not moderate the CCT-worry relations. Survival analyses revealed that, across both treatments, more CT associated with a greater hazard of response (p = .004) and approached a faster time to response (p = .05), and more CCT associated with a lower hazard of response (p = .002) and approached a slower time to response (p = .06). Patient motivational language predicts proximal outcomes, and may be useful in differential treatment selection.

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CHAPTER 1

INTRODUCTION

Generalized anxiety disorder (GAD) is a commonly-occurring condition, with a 12-month prevalence of 2.9% for adults (American Psychiatric Association, 2013). GAD is also highly comorbid with other psychological problems; in a large stratified sample (N = 8,098) across 172 countries, 90.4% of participants who met criteria for GAD also reported a lifetime history of another mental disorder (Wittchen, Zhao, Kessler, & Eaton, 1994). Moreover, GAD is debilitating, with sufferers experiencing substantial impairment across the domains of education, career development, economic productivity, and social relationships (Mendlowicz & Stein, 2002; Wittchen, Carter, Pfister, Montgomery, & Kessler, 2000). Thus, the need for effective GAD treatments is well-established.

The most prominent psychosocial treatment for this condition is cognitive-behavioral therapy (CBT), which has proven somewhat effective in reducing the hallmark GAD symptom of pathological worry (Covin, Ouimet, Seeds, & Dozois, 2008). Yet, overall, CBT for GAD response rates remain somewhat sobering. Across two meta-analyses, less than 50% of patients achieved clinically significant improvement by treatment termination (Hunot, Churchill, Teixeira & Silve de Lima, 2007; Westen & Morrison, 2001). Thus, there remains clear room for refinement, even for the current "gold-standard" intervention.

Specific to CBT for GAD, some have posited that one patient-level characteristic that may inhibit treatment response is low motivation for change (Arkowitz & Westra, 2004; Engle & Arkowitz, 2006; Westra, 2004, 2012). This low motivation may, in part,

be related to the nature of the pathology, as people with GAD typically possess some ambivalence about relinquishing their worry (Borkovec & Roemer, 1995). On the one hand, these individuals may be driven to reduce the disability that results from excessive and uncontrollable worry; on the other hand, such worry can be seen as an adaptive mechanism of readiness and control (Borkovec, 1994; Newman, Llera, Erickson, Przeworski, & Castonguay, 2013). Thus, the reliable assessment of patient motivation may provide important information for effectively treating persons with GAD.

However, measuring motivation has proven challenging. Self-report measures have been historically unreliable predictors of clinical outcomes in CBT for anxiety disorders (Kampman, Keijsers, Hoogduin, & Hendriks, 2008; Poulin, Button, Westra, Constantino, & Antony, 2018; Vogel, Hansen, Stiles, & Gotestam, 2006). For example, in one study of CBT for GAD, only one of two self-report measures related to both proximal and distal outcomes, whereas an observational measure of patients' in-session resistance (one potential manifestation of low, or at least conflicted, change motivation) consistently predicted outcomes in the expected direction (Westra, 2011). Moreover, when the self-report measures of motivation and the observer-based measure of in-session resistance were included together in a simultaneous regression, only observer-coded resistance predicted posttreatment worry. Westra posited that self-report measures of motivation may be more susceptible to social desirability bias than observer measures of related constructs; that is, although patients may be reticent to *explicitly* report low motivation to change, such low motivation may be reliably revealed through observation of in-session processes of resistance that *suggest* low change drive.

In light of these comparative data sources, it seems that relying on explicit self-report of motivation may be limiting. Moreover, in-session resistance, although certainly a useful construct to assess, may reflect a *consequence* of low motivation, as opposed to the low motivation construct itself. Fortunately, there is a promising way to combine an explicit focus on motivation proper with objective observations. This method relies on coding patient language content that implicitly reflects differing levels of motivation (Glynn & Moyers, 2009). Rooted in self-perception theory (Bem, 1967) and cognitive dissonance theory (Festinger, 1962), change-talk (CT) represents language in favor of adaptive behavior change, while counter change-talk (CCT) represents language in favor of maintaining the problem behavior (Miller & Rollnick, 2002).

Studies to date have supported the predictive validity of these two types of motivational language across various treatments for various disorders. For example, in a meta-analysis of studies targeting behavior change with motivational interviewing (MI), motivational enhancement therapy (MET), and brief motivational interventions, patient CCT was negatively associated with adaptive outcomes (Magill et al., 2014). In another study focused on MET for problem drinking, patient CT and CCT were shown to predict positive and negative outcomes, respectively (Moyers et al., 2007). With regard to GAD in particular, several studies focused on standard CBT for GAD have demonstrated that variants of patient CCT, but not CT, were positively correlated with higher posttreatment and/or follow up worry outcomes (Hunter, Button, & Westra, 2013; Lombardi, Button, & Westra, 2014; Sijercic, Button, Westra, & Hara, 2016). In another study of GAD, this time across patients receiving either CBT or CBT integrated with MI, variants of CCT

again correlated positively with higher posttreatment and follow up worry outcomes, whereas higher CT associated with lower worry at follow up only (Poulin et al., 2018).

In the extant GAD research base examining associations between motivational language and treatment outcomes, CT and CCT have largely been assessed at baseline or early treatment, while the outcome variables have largely been assessed distally at posttreatment and/or follow up. To date, little attention has been paid to early treatment CT and CCT as predictors of more *proximal* outcomes, such as trajectories of dimensional symptom change over the course of active treatment, the "hazard" of obtaining a clinically significant response at some point during treatment, or the time it takes for patients to reach clinically significant response criteria. Furthermore, with the exception of the Poulin et al. (2018) study, research examining the CT/CCT-outcome relations has tended to do so within single-school treatments only (e.g., MI or CBT alone). Thus, it seems important to continue to examine these questions in newer generation therapies for GAD that have integrated into CBT strategies that address some theoretically important and previously neglected feature of the disorder in an effort to improve patient response (e.g., Dugas et al., 2010; Newman et al., 2011; Wells et al., 2010).

For example, in a recent trial, investigators tested the value of responsively integrating MI into CBT, as a means to increase patients' intrinsic motivation and change agency (Westra, Constantino, & Antony, 2016). Although there were no differences between standard CBT and MI-CBT at posttreatment, patients in MI-CBT showed significantly greater worry reduction across a 12-month follow up than CBT alone patients. These findings not only support the added efficacy for the integrative treatment

adaptation, but they also support examining predictors of change, like motivational language, in both standard CBT and the newer generation integrative CBT.

Finally, it also seems important to address whether treatment type (e.g., a single-school approach vs. an integrative approach) might formally moderate the language-outcome associations. As there is no research or theory to suggest that language-outcome associations should systematically vary based on treatment, several rival ideas can be examined. On the one hand, it could be that language has stronger effects on outcomes (negative or positive) when a therapist addresses low motivation in a directive manner, as is the case when CBT therapists treat low change drive as a problem or distorted cognition to be actively challenged and resolved. Alternatively, language may have stronger effects on outcomes when the therapist responds to low motivation in a non-directive, patient-centered, and autonomy-preserving manner, as is the case in MI-CBT. If such systematic variability exists, in whatever direction, it can inform future theory generation and research on what therapy factors are most effective for which patients.

Extending the extant literature and drawing on data from the aforementioned Westra et al. (2016) trial, the goals of the present study were to test CT and CCT as predictors of (a) change in worry across acute treatment, (b) hazard of clinically significant response, and (c) time to clinically significant response across both standard CBT and MI-CBT for GAD. Consistent with the literature, we predicted that CT would be associated with steeper acute phase symptom reduction and a faster time to response, whereas CCT would have the opposite effect on these outcomes. Our question of whether treatment type (CBT vs. MI-CBT) would moderate these language-outcome associations was novel and exploratory.

CHAPTER 2

METHOD

2.1 Participants

Patients were 85 adults randomly assigned to receive 15 sessions (50 minutes each) of either MI-CBT (n = 42) or CBT (n = 43) at one of two sites in Toronto, Canada. To be included in the trial, patients had to meet *Diagnostic and Statistical Manual of Mental Disorders* versions IV, Text Revision (*DSM-IV-TR*; American Psychiatric Association, 2000) and 5 (*DSM-5*; American Psychiatric Association, 2013) criteria for principal GAD, and score above a high worry severity cutoff of ≥ 68 on the *Penn State Worry Questionnaire* (PSWQ; Meyer, Miller, Metzger & Borkovec, 1990; described below). To enhance generalizability, most comorbid diagnoses were allowable. Also, although unmedicated patients were required to remain unmedicated during the trial, being on antidepressant medication was allowable if the individual was using the same medication and dose for at least 3 months prior to study inclusion and agreed to remain on this dose throughout treatment. Exclusion criteria were concurrent psychotherapy, benzodiazepine use, psychotic spectrum disorders or bipolar disorder, major cognitive impairment, substance dependence within the past 6 months, and significant current suicidal ideation.

Therapists were 21 female doctoral students in clinical psychology programs who self-selected to treat patients in *either* MI-CBT (n = 9) or CBT (n = 12). This nesting was designed to mitigate allegiance effects. The MI-CBT therapists' caseloads ranged from 1 to 13 cases (Mdn = 4), while CBT therapists' caseloads ranged from 1 to 6 cases (Mdn =

4). Therapists were trained through a combination of workshops and readings, and they were only allowed to treat study cases after demonstrating competence with at least one practice case. During the trial, supervision was provided by an expert in each condition, and it consisted of weekly individual meetings and video review.

2.2 Treatments

2.2.1 CBT

For both conditions, therapists delivered CBT according to multiple evidence-based protocols for treating GAD (Borkovec & Costello, 1993; Borkovec & Mathews, 1988; Borkovec, Newman, Pincus, & Lytle, 2002). Targeting the core features of GAD, including uncontrollable worry, inhibited emotional processing secondary to worry, and chronic hyperarousal, this multi-component treatment included psychoeducation about worry/anxiety, exposure to worry and worry cues, applied relaxation, behavioral approach tasks, self-monitoring of thoughts, and challenging of distorted cognitions. Therapists managed patient resistance using techniques recommended in the CBT literature (e.g., functional analysis, collaborative goal setting, problem-solving; Beck, 2005; Sanderson & Bruce, 2007; Tompkins, 2004).

2.2.2 MI-CBT

Therapists delivered the integrative treatment according to Westra's (2012) guidelines for assimilating MI principles (Miller & Rollnick, 2002) into action-oriented treatments (like CBT) for anxiety. Applied to GAD, MI is a person-centered approach focused on helping patients resolve ambivalence about reducing their worry and addressing interpersonal

resistances that might stem from such ambivalence. MI-specific strategies include helping patients develop discrepancies between their current experiences and their most valued experiences (to promote self-arguments for moving toward their valued self) and purposefully "rolling with" patient resistance by empathically exploring both the positive and negative aspects of behavior change, while validating and normalizing ambivalence about changing.

Procedurally, patients first received up to 4 preparatory sessions of MI, followed by 11 CBT sessions with MI responsively integrated. Although the typical patient received all 4 of the "pure" MI sessions, for patients who were highly motivated for change-oriented interventions, the shift to CBT occurred 1 to 2 sessions earlier. In the subsequent CBT-based sessions, therapists continued to use MI "spirit" (collaboration, empathy, validation, evocation, and enhancing self-efficacy) as a foundational stance, and they explicitly shifted into primary MI strategies in response to markers of patient resistance. Once a resistance episode was deemed resolved, therapists shifted back into CBT with MI spirit. These marker-driven responsive shifts occurred as needed. Therapist adherence to their respective treatment protocol was observer-rated on a random subset of 20% of sessions for each therapist in each condition. As expected, adherence to CBT was high across both conditions, with adherence measures discriminating between conditions on the key components of preparatory and responsively integrated MI (see Westra et al., 2016, for details).

2.3 Measures

2.3.1 Patient Motivational Language

CT and CCT were observer-assessed according to an adapted (for CBT; Lombardi et al., 2014) version of the Motivational Interviewing Skills Code 1.1 (MISC 1.1; Glynn & Moyers, 2009). In this coding system, patient language across an entire session is first parsed into turns at talk, and then further deconstructed into utterances (i.e., complete and separate thoughts). Patient utterances are then coded as CT language in favor of changing the target behavior (e.g., "I want to stop worrying") or CCT utterances in favor of sustaining the target behavior (e.g., "Worry makes me work extra hard"). All other non-change-related patient utterances are left uncoded (Button, Westra, Hara, & Aviram, 2015). The MISC has shown strong predictive validity in the treatment of problem drinking (Magill et al., 2014; Moyers et al., 2007) and GAD (e.g., Hunter et al., 2013; Lombardi et al., 2014; Poulin et al., 2018).

The adapted MISC 1.1 coders were two upper-level undergraduate students in psychology and a clinical psychology master's level graduate student. Coders were trained over four months, participating in two 3-hour training workshops and independently coding test material to determine proficiency. The study coders all achieved 85% observed agreement with criterion codes for the test materials. For the current study, 25% of the material was double coded to determine interrater reliability. Kappa coefficients for each pair of coders indicated good to excellent interrater reliability (average $\kappa = .86$).

2.3.2 Worry

The primary outcome variables for this study were derived from the PSWQ (Meyer et al., 1990), a widely-used self-report measure of trait worry. All 16 items are rated on a 5-point scale ranging from 1 to 5, with higher total scores reflecting more worry (range = 16 to 80). The PSWQ has sound psychometric properties (Brown, Antony, & Barlow, 1992; Meyer et al., 1990), and it demonstrated high internal consistency across the repeated measures in this study (average α = .93).

2.4 Procedure

Participants responded to community advertisements posted in the greater Toronto area. After responding, potential participants were phone screened. If eligible, a trained graduate assessor administered the *Structured Clinical Interview for DSM-IV-TR Axis I Disorders* (SCID-I; First, Spitzer, Gibbon, & Williams, 1996) to consenting participants to determine diagnostic eligibility and assess other clinical features. Eligible patients were then randomized to treatment across the two sites. The randomization protocol was administered at a neutral third site by a co-investigator uninvolved in site procedures and therapist training, and blind to patient clinical features. The MISC 1.1 was applied to motivational language uttered in the first session. The PSWQ was administered at baseline and after every session. The institutional review boards at the two data collection sites approved the trial, as well as subsequent secondary analyses of de-identified data.

2.5 Data Analysis

First, to control for patient verbosity, ratios of CT and CCT frequencies to total session utterances were created, and these ratios were used as the predictor variables in all analytic models. Second, we calculated descriptive statistics for patient and therapist samples and all study variables, including their distributions and potential outliers. Third, we examined the intercorrelations among all study variables to determine if there were any problems of collinearity (e.g., between the baseline self-report variable of change motivation and session 1 motivational language). Finally, we addressed the primary research questions with three separate sets of analyses.

To examine the relation between patient motivational language and change in worry during the acute treatment phase, we used multilevel modeling given its ability to account for dependencies in the data due to repeated measures.[1] As our primary focus was on proximal rather than distal outcomes, time for the multilevel models was centered at midtreatment (session 7.5). Using the hierarchical linear modeling program (HLM7; Raudenbush, Bryk, & Congdon, 2011), we first fit two individual 2-level models (one for CT and one for CCT) to estimate within patient change in worry at level-1, and between patient differences in worry change at level-2. Visual inspection of the average rate of change in worry revealed a slight curvature. Thus, we first fit an unconditional linear model, and then an unconditional quadratic model to determine which model was a better fit to the data. Then, at level-2, we examined the effect of patient CT and CCT,

[1] Although there is another source of dependency in these data (i.e., patients nested within therapists), we did not examine therapist effects on worry given that Westra et al. (2016) found that the therapist accounted for < 1% of the variability in patients' posttreatment worry and during-treatment rates of change in worry.

respectively, on worry trajectories. To assess whether treatment condition moderated the association of each language variable and worry change, we added CT x treatment and CCT x treatment interaction terms to their respective model. Effect sizes were calculated by evaluating the additional percent variance explained with the addition of predictors (a pseudo r^2 statistic).

To examine the relation between patient motivational language and the hazard of clinically significant response (i.e., the instantaneous "risk" of achieving the response criteria at the next session), we used *R: A language and environment for statistical computing* (R Core Team, 2015) to estimate survival models. To determine statistically reliable and clinically significant response, we used Jacobson and Truax's (1991) criteria, as Westra et al. (2016) did in the flagship outcome report for this trial; namely, to be considered a responder, patients had to pass an empirically derived cut point for reliable response (the Reliable Change Index; RCI) and clinically meaningful response (i.e., Cutoff C). Drawing on Gillis, Haaga, and Ford's (1995) normative data, the PSWQ has a RCI of 9 and a Cutoff C of 58 (i.e., a score of ≤ 58 is closer to the normal than clinical range). Thus, we defined response as a decrease of 9 points on the PSWQ, with a score of ≤ 58.

As the underlying hazard function for our variables was unknown, and the negative statistical repercussions of inaccurately specifying the hazard function are high, we used the semi-parametric Cox model (Cox, 1972) for our analyses. Though Cox models relax assumptions compared to fully parametric models (e.g., the Weibull proportional hazards model), there are two assumptions that need to be met to ensure reliability of Cox model estimates: non-informative censoring and proportional hazards.

To test the assumption that censoring was non-informative, we conducted a sensitivity analysis, first treating all censored cases as though they achieved clinically significant response at the time of censoring, and then treating all censored cases as though they achieved clinically significant response at the time point when the majority of patients achieved clinically significant response.

The assumption of proportional hazards is met when the ratio of hazards for any two patients is constant and is not time dependent. We tested this assumption through visual inspection of Schoenfeld residual plots, and the cox.zph function in R, which assessed the correlation of predictor variables with time. For any variable that violated this assumption, a time-varying covariate was created and included in the final model. In addition to the predictors of interest (CT and CCT), we also assessed whether treatment condition moderated the association of each language variable and hazard of response by adding CT x treatment and CCT x treatment interaction terms to our final model. Finally, to examine the relation between patient motivational language and time to clinically significant response, we used Kaplan Meier curves.

CHAPTER 3

RESULTS

3.1 Preliminary Analyses

The mean CT and CCT ratios were 0.18 (*SD* = 0.11) and 0.11 (*SD* = 0.07), respectively. These variables did not significantly differ between conditions – CT: $t(82.5) = -1.28$, $p = .20$; CCT: $t(82.5) = 1.05$, $p = .30$. CT was non-normally distributed, with skewness of 2.20 (*SE* = 0.26) and kurtosis of 8.15 (*SE* = .52). CCT was also non-normally distributed, with skewness of 1.46 (*SE* = 0.26) and kurtosis of 3.30 (*SE* = .52). Thus, we performed square root transformations on both predictors. The transformed CT has a skewness of 0.96 (*SE* = 0.26) and kurtosis of 1.91 (*SE* = .52), and the transformed CCT has a skewness of 0.31 (SE = 0.26) and kurtosis of 0.67 (SE = .52). Inspection of Q-Q and stem-and-leaf plots revealed two statistical outliers for our predictor variables (CCT, $z = 4.206$; CT, $z = 5.206$). However, there was no reason to believe that these extreme values were a function of data entry or measurement error. Thus, they were considered legitimate observations and included in our analyses. Intercorrelations between predictors were weak to moderate (*r*s range from -.130 to .319).

Table 1 presents the sample descriptive statistics by treatment condition. Between treatments, patients did not differ on baseline PSWQ or any demographic variable other than gender; there were more women and less men in the CBT vs. MI-CBT condition, $\chi^2 (1) = 4.24$, $p = .04$. The groups differed significantly on baseline motivation for change, as assessed by the *Change Questionnaire* (CQ; Miller & Johnson, 2008), which includes 12 items rated on a scale from 0 to 10. Specifically, CBT patients reported significantly

higher motivation than MI-CBT patients, $t(83) = -2.55$, $p = .013$. Furthermore, between group differences in medication status approached significance, with more CBT patients reporting medication use than MI-CBT patients, $\chi^2 (1) = 3.94$, $p = .05$. For our first primary research question, given the two treatment sites and the fact that the treatment groups differed on baseline change motivation and antidepressant medication status, we residualized out the effects of site, motivation, and medication from the PSWQ variable, as was done in the flagship outcome analyses for this trial (Westra et al., 2016). Thus, our variable for the multilevel models presented below represents the variability in worry that is not accounted for by these three baseline variables. For our second primary research question, we included site, baseline self-report motivation, and medication status as covariates in our model.

Returning to the trial characteristics, attrition during the active treatment phase included 23% ($n = 10$) of CBT patients and 10% ($n = 4$) of MI-CBT patients. This differential attrition rate approached significance, $\chi^2 (1) = 2.91$, $p = .09$. Regarding therapists, they did not significantly differ between groups on age (MI-CBT, $M = 28.33$ years; CBT, $M = 29.08$ years), $t(19) = -.482$, $p = .64$, or clinical experience (MI-CBT, $M = 451.53$ hours; CBT, $M = 190.21$ hours), $t(7.20) = 1.13$, $p = .293$.

3.2 Motivational Language and Worry Change

Results of the model comparison test indicated that the unconditional quadratic model (see Table 2, column 1) was a significantly better fit to the data than the unconditional linear model, $\chi^2(4) = 85.32$, $p < 0.001$. We therefore used this quadratic model for our HLM analyses. To examine the CT-worry association, we added the

session 1 CT ratio to the quadratic model as a predictor at level-2 (see Table 2, column 2). Higher CT was associated with lower worry at midtreatment (γ_{02} = -22.10, p = .03), accounting for 5% of the unexplained variance. Additionally, higher CT was marginally associated with greater worry reduction at midtreatment (γ_{12} = -2.32, p = .06), accounting for 4% of the unexplained variance. CT was unrelated to the rate of acceleration/deceleration in worry change across treatment. As per Table 2, column 3, the CT x treatment interaction term significantly predicted worry at midtreatment (γ_{03} = 47.33, p = .03) and the rate of change in worry at midtreatment (γ_{13} = 5.47, p = .03); namely, in CBT, more session 1 CT was associated with a lower level of worry and a greater decrease in worry at midtreatment, whereas in MI-CBT, CT was unrelated to worry level and worry change at midtreatment. This moderating effect is graphically depicted in Figure 1. Finally, the CT x treatment interaction term was unrelated to the rate of acceleration/deceleration in worry change across treatment.

To examine the CCT-worry association, we added the session 1 CCT ratio to the quadratic model as a predictor at level-2 (see Table 3, column 2). Higher CCT was associated with less worry reduction at midtreatment (γ_{12} = 2.88, p = .04), accounting for 2% of the unexplained variance. CCT was unrelated to worry level at midtreatment and the rate of acceleration/deceleration in worry change across treatment. As per Table 3, column 3, the CCT x treatment interaction term was unrelated to worry level at midtreatment, the rate of change in worry at midtreatment, or the rate of acceleration/deceleration in worry change across treatment.

3.3 Motivational Language and Hazard of Clinically Significant Response

To examine the relation between patient motivational language and the hazard of clinically significant response, we conducted a Cox proportional hazards model, with the ratio of session 1 CT, the ratio of session 1 CCT, treatment group, a CT x treatment interaction term, and a CCT x treatment interaction term as predictors. (As noted, site, baseline self-report motivation, and medication status were included as covariates.) We first conducted a sensitivity analysis to test the assumption of non-informative censoring with the ratio of session 1 CT, the ratio of session 1 CCT, and treatment group. In our first model (see Table 4), all randomly censored cases were treated as though they experienced clinically significant response immediately after being censored (n = 85, number of events = 85). In our second model (see Table 5), all randomly censored cases were treated as though censoring occurred at the time-point when the majority of patients experienced clinically significant response (n = 85, number of events = 58). Comparison of the results of these two models indicated partially informative censoring, with variation between models particularly apparent in the differences in the coefficient for treatment group, β = -.04, p = .079; β = -.07, p = .79. However, in both of these extreme models, coefficients and p-values for our primary predictors of interest (CT and CCT) changed little, and we have no reason to believe that one of these extreme models is more accurate that our original model.

Next, visual inspection of Schoenfeld residual plots did not indicate that the hazard of predictors varied with time. However, the cox.zph function in R, which correlates corresponding scaled Schoenfeld residuals with time, indicated that the proportional hazards assumption had been violated. In particular, session 1 CCT was

significantly correlated with time (p = 0.021). All other predictors, and the global test of the model, were not significantly correlated with time. To correct for the violation of proportional hazards, a CCT x time interaction term was added to our model. Our final Cox model with predictors, covariates, and interaction terms can be seen in Table 6. Results indicated that session 1 CT was a significant predictor in this model (HR = 1.04, p = 0.004), such that for every 1 unit increase in session 1 CT, there was 4.12% increase in the hazard of clinically significant response. Session 1 CCT was also a significant predictor (HR = 0.87, p = 0.002), such that for every 1 unit increase in session 1 CCT, there was a 7.44% decrease in the hazard of clinically significant response. Treatment group was also a significant predictor (HR = 0.58, p = 0.05), indicating that the hazard of clinically significant response for the CBT-only group was 72% that of the MI-CBT group.

3.4 Motivational Language and Time to Clinically Significant Response

To estimate the survival function for clinically significant response at differing levels of session 1 CT and CCT we used the Kaplan Meir estimator, with corresponding plots of the survival function. Patients in the upper 75th percentile of session 1 CT had a median time to clinically significant response of 5 weeks, compared to a median time to clinically significant response of 9 weeks for the remainder of the sample, χ^2 (1) = 3.80, p = .05 (see Figure 2, Panel A). Patients in the upper 75th percentile of session 1 CCT had a median time to clinically significant response of 14 weeks, compared to a median time to clinically significant response of 7 weeks for the remainder of the sample. However, the

difference between these survival estimates only approached significance, χ^2 (1) = 3.5, p = .06 (see Figure 2, Panel B).

CHAPTER 4

DISCUSSION

We tested CT and CCT as predictors of (a) change in worry across acute treatment, (b) hazard of clinically significant response, and (c) treatment efficiency, or time to clinically significant response, across both standard CBT and integrative MI-CBT for GAD. Regarding the relation between patient motivational language and worry level and change, CCT associated with a slower rate of worry reduction at midtreatment across both treatments. With regard to CT, CBT patients with higher vs. lower CT had less worry and a faster rate of worry reduction, whereas for MI-CBT patients, CT was unrelated to the worry outcomes. Regarding the relation between patient motivational language and clinically significant response, across both treatments, more CT associated with a greater hazard of response, and more CCT associated with a lower hazard of response (with each variable predicting efficiency of response in a consistent manner, but at a trend level).

Our results generally replicate previous research patterns that link CT and CCT, especially when observed through language, with positive and negative outcomes, respectively (e.g., Moyers et al., 2007; Magill et al., 2014; Poulin et al., 2018). They extend prior research by showing that these associations largely hold for the more proximal outcomes vs. distal, posttreatment outcomes only, and whether receiving standard CBT or integrative MI-CBT for GAD. In this sense, patients engaging in more CT is a common facilitating factor, whereas engaging in more CCT is a common hindering factor, both of which can be informative for case conceptualization and

treatment planning. Thus, our results continue to highlight the importance of patient motivational language as a clinical prognosticator of varied forms of dimensional and categorical treatment response; that is, the likelihood that standard or adapted CBT will work for a given patient with GAD (with regard to dimensional symptom reduction or crossing a clinical significance threshold), and how long it might be expected to take before showing its ameliorative effect.

Regarding the latter outcome, it might be useful for clinicians to use motivational language (of both types) as an important input into estimations of treatment dose. As the present data suggest that higher CT and lower CCT will require fewer sessions for response, whereas lower CT and higher CCT will require more sessions (though not an inordinately higher number), therapists can use this information to educate their patients on expected time course at treatment's outset. Such education has been shown to change patients' duration expectations *and* to reduce dropout and facilitate treatment engagement (Swift & Callahan, 2011). Of course, this implication should be considered with caution given that CT and CCT related only marginally to treatment efficiency. Future research is needed to confirm or disconfirm the relevance of these variables for time to response, and to test directly associations among motivational language, treatment expectancies, treatment processes, and treatment outcomes.

Of additional note in the present study is that treatment condition moderated the association between CT and dimensional worry level and change and midtreatment. Given that CT related to these outcomes in CBT, but not MI-CBT, we can draw on the stages of change literature to frame these differential results. Namely, Prochaska, Norcross, and DiClemente's (2013) transtheoretical model emphasizes the importance of

matching appropriate therapy modalities to the patient's readiness to change. In this case, highly motivated patients who are in, for example, the *preparation* stage may derive less benefit from therapies using MI spirit and strategy to address the resistance to, or low motivation for, change that would be hallmarks of the earlier readiness stages (e.g., *precontemplation*) for which MI was explicitly developed. Instead, these motivated patients, as indicated in their higher change-oriented language, might be prepared to benefit immediately from more action-oriented therapies, such as CBT. For those with lower CT, CBT might be outpacing their change readiness, thereby by resulting in less improvement over acute treatment.

In MI-CBT, it is possible that MI levels the playing field, so to speak, for those with lower vs. higher change readiness, as indicated in their CT language. Put differently, for patients with lower CT, the integration of MI can help them overcome this risk factor given its explicit focus on low intrinsic motivation. However, for patients with higher CT (essentially when presenting for treatment), MI might actually interfere with this facilitative factor, thereby delaying the benefit that these change-ready patients might receive from change-oriented interventions. In these ways, MI might mitigate the negative effect of low motivation, but also dampen the positive effect of high motivation, essentially negating the influence of language on proximal outcomes.

Thus, our moderator results may have implications for treatment assignment, at least in the context of standard CBT or integrative MI-CBT for GAD. When a patient is assessed as engaged in high CT as early session 1, CBT may be the most indicated intervention. For patients exhibiting low CT in session 1, MI-CBT may be the most indicated. Of course, when patients exhibit high CCT, therapists doing either treatment

will need to attend to this risk factor for poor proximal outcomes. Future work is needed to identify the best strategies for doing so, as it may be somewhat surprising that using MI integratively did not mitigate such risk. Additionally, future work is also needed to replicate our findings with regard to the CT by treatment interaction, as this moderation effect emerged for only one of our outcome variables (i.e., dimensional worry change).

This study had several limitations. First, although it intentionally investigated CT and CCT as *independent* predictors of proximal treatment response, these language variables do not exist in a vacuum. In fact, most patients, across any sample or type of clinical population, would likely make *both* CT and CCT statements. Thus, future research should examine the interaction of these variables in order to tease apart how their variance combinations may influence treatment outcomes. For example, it is possible that a combination of both high CT and high CCT may reflect change ambivalence, which is another construct that has been associated with treatment resistance, and that could have implications for treatment response.

Second, treatment response in our survival models was treated as a finite vs. a repeated event. This way of measuring response could overlook nuance in that a patient could achieve clinically significant response at one point in therapy, but then return to a level of symptom severity above the response criterion at another point, and perhaps even dip back below it at yet another time, etc. Third, although our study framed patient motivational language essentially as a presenting patient trait, future research should look beyond the single early time point to better understand language as a state (and how change in motivational language relates to both proximal and distal treatment outcomes in treatments for GAD). Finally, the generalizability of our findings is limited by our

sample of mostly white women with severe worry. Future research should investigate whether these patient language-outcome relations hold in other GAD treatment samples of differing demographic characteristics and of lesser worry severity.

Limitations notwithstanding, the present study adds to the limited research on the patient motivational language-outcome association in the treatment of anxiety disorders. The results point to potential clinical implications of CT and CCT, especially as they relate to treatment selection and prognostication of the proximal outcomes that complement posttreatment symptom reduction and functional improvement. With additional research that extend to patients with different diagnoses who are receiving therapy modalities beyond MI and CBT, it can be determined if patient motivational language reaches the level of a transdiagnostic and pantheoretical clinical prognosticator.

APPENDIX A

TABLES

Table 1

Participant Characteristics at Baseline by Treatment Condition

	CBT (n = 43)				MI-CBT (n = 42)			
Variables	*M*	*SD*	*N*	%	*M*	*SD*	*n*	%
Age	34.19	11.92			32.45	10.54		
Sex*								
Female			41	95.34			34	80.95
Male			2	4.65			8	19.05
Race								
Caucasian			32	74.42			31	73.81
Asian			5	11.62			6	14.29
African Canadian			0	0.00			2	4.76
Hispanic			2	4.65			1	2.38
Multiracial			3	6.98			2	4.76
Annual household income								
Less than 25,000			10	23.26			6	14.29
25,000-50,000			9	20.93			8	19.05
50,000-75,000			11	25.58			8	19.05
75,000-100,000			8	18.60			6	14.29
100,000 or more			5	11.63			13	30.95
Education								
High school or less			4	9.30			2	4.76
Some college/university			13	30.23			9	21.43
Completed college			18	41.86			19	45.24
Some graduate school			8	18.60			12	28.57
Marital status[a]								
Single			19	44.19			18	42.86
Cohabiting/married			23	54.76			24	57.14
Current medication use*								
Yes			14	32.56			6	14.29
No			29	67.44			36	85.71
Previous psychotherapy								
Yes			32	74.42			31	73.81
No			11	25.58			11	26.19
Comorbidity[b]								
Anxiety disorder			31	72.09			29	69.05
Depression/dysthymia			17	39.53			13	30.95
Outcome variable								
PSWQ	75.05	3.43			74.69	3.44		
CQ*	107.23	8.76			101.60	11.50		

Note. *M* = mean; *SD* = standard deviation; PSWQ = Penn State Worry Questionnaire; CQ = Change Questionnaire.

[a] Category sums to less than 43 (and less than 100%) for the CBT condition due to missing data.
[b] Category sums to more than each group's sample size due to some patients having more than one comorbid disorder.
* Groups differences on these variables at baseline were either significant or approached significance ($p \leq .05$).

Table 2

Change-Talk as a Predictor of Midtreatment worry, Subsequent Worry Change, and Subsequent Acceleration/Deceleration in the Rate of Worry Change

	Unconditional model		**CT only model**		**CT x Tx model**	
Fixed Effects	Coefficient (*SE*)	*p*	Coefficient (*SE*)	*p*	Coefficient (*SE*)	*p*
Midtreatment PSWQ (intercept), γ_{00}	2.15 (1.21)	.079	2.19 (1.18)	.066	1.87 (1.15)	.108
Treatment group, γ_{01}	--	--	-0.77 (2.37)	.746	-0.65 (2.30)	.778
Change-talk session 1, γ_{02}	--	--	-22.10 (10.03)	.030	-30.03 (10.37)	.005
Change-talk x treatment, γ_{03}	--	--	--	--	47.33 (20.73)	.025
Midtreatment change in PSWQ (slope), γ_{10}	-1.67 (0.15)	< .001	-1.66 (0.14)	< .001	-1.70 (0.14)	< .001
Treatment group, γ_{11}	--	--	0.05 (0.29)	.874	0.06 (0.28)	.818
Change-talk session 1, γ_{12}	--	--	-2.32 (1.22)	.060	-3.21 (1.25)	.012
Change talk x treatment, γ_{13}	--	--	--	--	5.47 (2.50)	.032
Rate of acceleration/deceleration in PSWQ (curvature), γ_{20}	0.01 (0.2)	.651	0.01 (0.02)	.682	0.01 (0.02)	.596
Treatment group, γ_{21}	--	--	0.01 (0.04)	.879	0.01 (0.04)	.880
Change-talk session 1, γ_{22}	--	--	0.20 (0.15)	.181	0.26 (0.16)	.113
Change-talk x treatment, γ_{23}	---	---	---	—	-0.29 (.32)	.362
Random effects	Variance component	*p*	Variance component	*p*	Variance component	*p*
PSWQ intercept, τ_{00}	112.54	< .001	106.28	< .001	99.46	< .001
PSWQ slope, τ_{11}	1.64	< .001	1.58	< .001	1.48	< .001
PSWQ curvature, τ_{22}	0.02	< .001	0.02	< .001	0.02	< .001
Level 1, σ^2	44.06	--	44.06	--	44.06	--
Model deviance (df)	8606.48(10)	--	8600.48 (16)	--	8594.44 (19)	--

Note. PSWQ = *Penn State Worry Questionnaire*, CT = session 1 change-talk

Table 3

Counter Change-Talk as a Predictor of Midtreatment worry, Subsequent Worry Change, and Subsequent Acceleration/Deceleration in the Rate of Worry Change

	Unconditional model		**CCT only model**		**CCT x Tx model**	
Fixed Effects	Coefficient (*SE*)	*p*	Coefficient (*SE*)	*p*	Coefficient (*SE*)	*p*
Midtreatment PSWQ (intercept), γ_{00}	2.15 (1.21)	.079	2.16 (1.19)	.074	2.10 (1.20)	.086
Treatment group, γ_{01}	--	--	-0.90 (2.41)	.710	-0.85 (2.41)	.724
Counter change-talk session 1, γ_{02}	--	--	15.95 (11.57)	.172	16.75 (11.71)	.157
Counter change-talk x treatment, γ_{03}	--	--	--	--	-6.55 (23.43)	.780
Midtreatment change in PSWQ (slope), γ_{10}	-1.67 (0.15)	< .001	-1.67 (0.14)	< .001	-1.66 (0.14)	< .001
Treatment group, γ_{11}	--	--	0.07 (0.29)	.796	0.07 (0.28)	.803
Counter change-talk session 1, γ_{12}	--	--	2.88 (1.37)	.040	2.80 (1.39)	.047
Counter change talk x treatment, γ_{13}	--	--	--	--	1.26 (2.77)	.651
Rate of acceleration/deceleration in PSWQ (curvature), γ_{20}	0.01 (0.2)	.651	0.007 (0.02)	.672	0.010 (0.02)	.594
Treatment group, γ_{21}	--	--	0.02 (0.04)	.660	0.01 (0.04)	.686
Counter change-talk session 1, γ_{22}	--	--	0.13 (0.17)	.462	0.10 (0.17)	.557
Counter change-talk x treatment, γ_{23}	---	---	---	—	0.24 (0.34)	.501
Random effects	Variance component	*p*	Variance component	*p*	Variance component	*p*
PSWQ intercept, τ_{00}	112.54	< .001	106.28	< .001	109.01	< .001
PSWQ slope, τ_{11}	1.64	< .001	1.58	< .001	1.55	< .001
PSWQ curvature, τ_{22}	0.02	< .001	0.02	< .001	0.02	< .001
Level 1, σ^2	44.06	--	44.08	--	44.09	--
Model deviance (df)	8606.48(10)	--	8599.61 (16)	--	85948.81 (19)	--

Note. PSWQ = *Penn State Worry Questionnaire*, CCT = session 1 counter change-talk

Table 4

Randomly Censored Cases Treated as Though Experiencing Event Immediately After Censoring

Variable	B	*SE*	*HR*	*95%CI*(*HR*)	*P*
Change-talk session 1	0.03	0.01	1.03	1.01 - 1.05	.007
Counter change-talk session 1	-0.06	0.02	0.93	0.90 - 0.97	.001
Treatment group	-0.41	0.23	0.66	0.42 - 1.04	.079

Table 5

Randomly Censored Cases Treated as Though Experiencing Event at Largest Event Time-Point

Variable	B	*SE*	*HR*	*95%CI*(*HR*)	*P*
Change-talk session 1	0.04	0.01	1.04	1.02 - 1.07	.001
Counter change-talk session 1	-0.04	0.02	0.95	0.92 - 1.00	.047
Treatment group	-0.07	0.27	1.08	0.55 - 1.59	.790

Table 6

Final Cox Proportional Hazards Model

Variable	β	*SE*	*HR*	*95%CI*(*HR*)	*p*
Change-talk session 1	0.04	0.01	1.04	1.01 - 1.07	.004
Counter change-talk session 1	-0.13	0.04	0.87	0.81 - 0.95	.001
Counter change-talk x Time	0.01	0.01	1.01	1.00 - 1.02	.092
Treatment group	-0.54	0.27	0.58	0.34 - 0.99	.470
Medication status	0.37	0.28	1.45	0.83 - 2.52	.191
Site	-0.20	0.23	0.82	0.52 - 1.29	.395
Motivation (*Change Questionnaire*)	0.01	0.01	1.00	0.98 - 1.02	.852
Change-talk x Treatment	-0.04	0.03	0.96	0.91 -1.02	.166
Counter change-talk x Treatment	-0.02	0.04	0.98	0.90 -1.06	.575

APPENDIX B

FIGURES

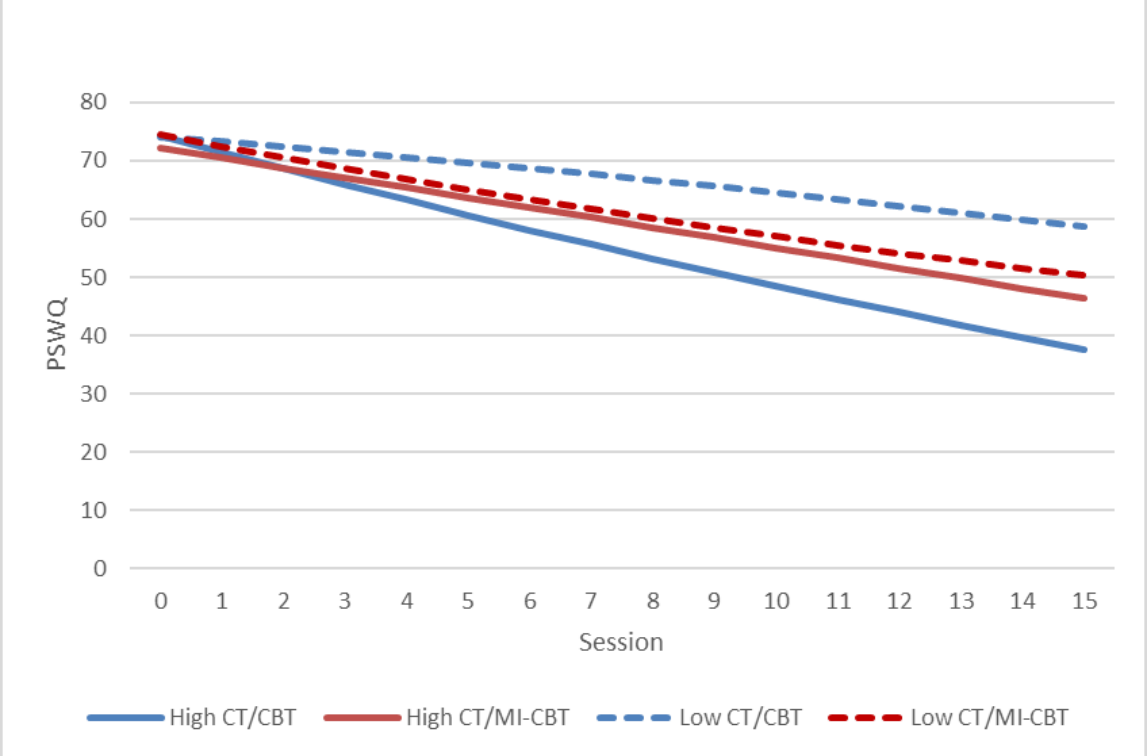
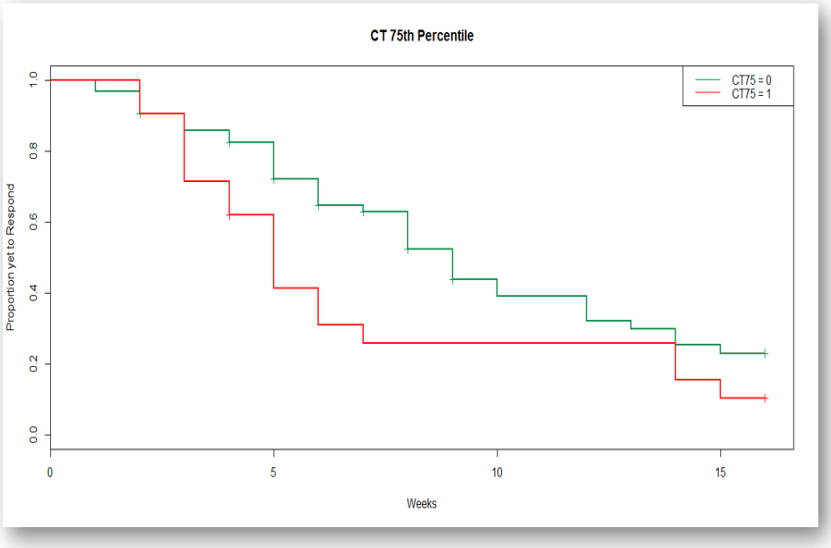


Figure 1. The moderating effect of treatment group on the CT-worry association. In CBT, patients 1 standard deviation above the mean of session 1 CT had a greater decrease in worry than patients 1 standard deviation below the mean. In the MI-CBT condition, different levels of CT had a negligible impact on worry reduction.

Note. PSWQ = *Penn State Worry Questionnaire*, CT = session 1 change-talk

Panel A



Panel B

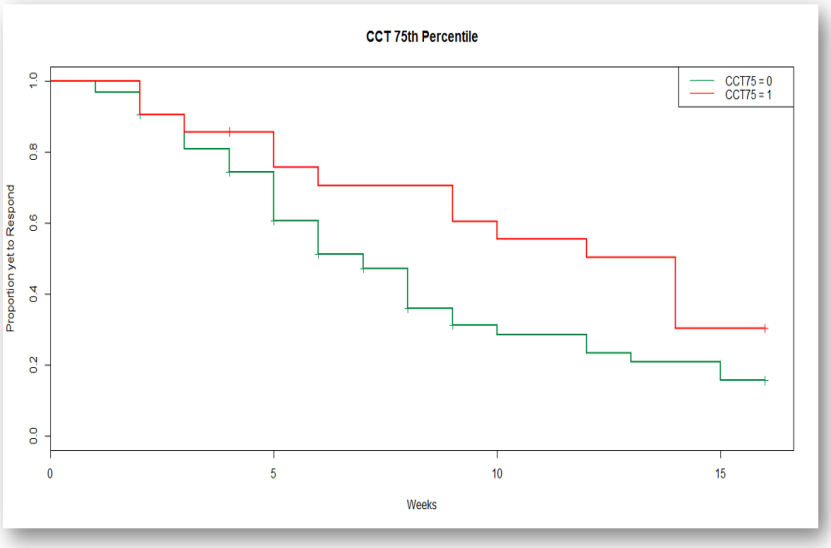


Figure 2. Survival estimates for different levels of CT and CCT. Panel A depicts the survival estimates for the upper 75th percentile of CT at session 1 compared to the rest of the sample (0 = 75th percentile, 1 = remainder of the sample). Panel B depicts the survival estimates for the upper 75th percentile of CCT at session 1 (0 = 75th %, 1 = remainder of the sample).

Note. CT = session 1 change-talk; CCT = session 1 counter change-talk.

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