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Expanding the Foundation for Population-Based Anxiety Management Interventions

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EXPANDING THE FOUNDATION FOR POPULATION-
BASED ANXIETY MANAGEMENT INTERVENTIONS

BY

JESSICA MORROW LIPSCHITZ

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF

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DOCTOR OF PHILOSOPHY
OF
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ABSTRACT

Anxiety is the most prevalent mental illness and treatments are effective but underutilized. Failure to design treatments that proactively reach individuals at varying levels of readiness may be one driver of under-utilization. The Transtheoretical Model of behavior change (TTM) offers a framework for designing treatments tailored to readiness to engage in exposure, the process of gradually approaching feared stimuli and the central behavioral component of evidence-based anxiety treatments. This study sought to develop the essential building blocks for applying the TTM to anxiety by developing a set of measures of core TTM constructs (Stage of Change, Decisional Balance, Self-efficacy, and Processes of Change) relevant for increasing approach behaviors in individuals with anxiety disorders.

Measurement development entailed qualitative methods for item development and refinement followed by a series of quantitative analyses. The Stage of Change measure was validated against external constructs such as treatment seeking behavior, anxiety severity, and quality of life. As expected, a chi-square test indicated that individuals in Action and Maintenance were significantly more likely to be in treatment than those in the pre-Action stages. ANOVA results indicated that individuals in Action or Maintenance reported significantly lower levels of anxiety ($F(1, 592) = 5.06, p=.025, \eta^2=.01$) and significantly higher quality of life ($F(1, 592) = 8.20, p<.01, \eta^2=.01$) than those in pre-Action stages.

Measures for Decisional Balance and Self-efficacy were developed using split-half, cross-validation procedures. In these, a series of Principle Component Analyses (PCAs) were conducted with half of the sample to narrow the item set and explore

factor structure, and Confirmatory Factor Analyses (CFA) was conducted on the second half of the sample to confirm factor structure and item loadings. For Decisional Balance, PCA supported two, 5-item factors, and CFA indicated a two-factor correlated model was the best fit to the data, $\chi^2(35)=80.82$, $p<.01$, CFI=.94, RMSEA =.7 with Pros $\alpha=.87$ and Cons $\alpha=.75$. For Self-efficacy, PCA supported one, 6-item factor, and CFA further supported this structure, $\chi^2(9)=30.39$, $p<.01$, CFI=.98, RMSEA=.088, $\alpha=.90$. Multivariate analyses indicated significant stage-construct relationships in expected directions with the exception of Cons, which showed no significant cross-Stage differences.

For Processes of Change, a series of iterative CFAs were conducted to narrow the item set, and then additional CFAs were conducted on the final set of items to determine which factor structure was the best fit to the data. A 10-factor, fully correlated model was the best fit to the data, $\chi^2(360)=905.82$, $p<.01$, CFI=.94, RMSEA =.51. Factor loadings were strong, ranging from 0.53 to 0.85, and internal consistency was acceptable to good (α ranged from to .69 to .88). Effect sizes for differences in POC across Stage were mostly in the medium range, indicating that POC represent important behavior change strategies for reducing anxiety-based avoidance.

Overall results support the validity of the measures developed and laid the foundation for applying the TTM to anxiety-based avoidance. Implications for application of the TTM to anxiety-based avoidance are discussed. Future research should explore the relationship between these measures and treatment outcomes longitudinally and examine the effectiveness of TTM-tailored feedback in the context of a computer-based intervention.

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PREFACE

This dissertation was prepared in manuscript format. The three manuscripts contained therein have been written with the intention of submission to the following journals: *Journal of Anxiety Disorders* (Manuscript 1), *American Journal of Health Promotion* (Manuscript 2), and *Journal of Nervous and Mental Disease* (Manuscript 3). The Appendix includes supplementary tables for the prepared manuscripts and discussion of additional analyses and findings that did not fit into the scope of the three primary manuscripts.

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MANUSCRIPT 1

Preliminary Validation of a Stage of Change Measure of Readiness to Reduce
Avoidance for Anxious Adults

Intended Journal for Submission: Journal of Anxiety Disorders (not yet submitted)

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Abstract

Anxiety is the most prevalent mental illness and treatments are effective but underutilized. Failure to design treatments that proactively reach individuals at varying levels of readiness may be one driver of under-utilization. The Transtheoretical Model of behavior change (TTM) offers a framework for designing treatments tailored to readiness to engage in exposure, a core behavioral component of anxiety treatment. The purpose of this study was to develop a measure of Stage of Change, the core TTM construct that defines readiness to change, relevant for anxiety-based avoidance. Online survey data were collected from 594 adults with clinically significant levels of anxiety. Survey data included measures of Stage of Change, anxiety severity, quality of life and current treatment status. Findings support the validity of the Stage of Change measure developed insofar as predicted relationships were observed between Stage and anxiety severity, quality of life and treatment status.

Keywords

Stages of Change, Anxiety, Exposure, Readiness, Transtheoretical Model

Anxiety is the most common form of mental health disorder, with lifetime prevalence estimates as high as a quarter of the general population.¹ Anxiety is associated with significant impairments in educational and occupational functioning, worse physical health, and huge public health cost (ranging from \$42 to \$46 billion annually).²⁻⁵

Cognitive-Behavioral treatments (CBTs) for anxiety are effective but underutilized. Effect sizes for CBTs for anxiety are large ($d = 1.14$ to 1.98)^{6,7} across treatment protocols and by definition, do not produce the same risk of side effects seen with pharmacological options. While protocols vary in a number of ways, exposure, or the process of systematically approaching feared stimuli in a progressively more emotionally challenging fashion, is a consistent part of CBTs for anxiety and arguably a cornerstone of these treatments. Dismantling studies have even found that exposure-only therapies often perform as well as therapies with exposure plus additional cognitive components.^{8 9}

Unfortunately, only 4-11% of individuals with anxiety disorders receive any treatment.¹⁰ Of those who do receive treatment, the majority receive pharmacotherapy. Of those who receive psychotherapy, a minority are getting psychotherapy with CBT techniques like exposure.^{2,11} While much of the dissemination research to date has focused on increasing access, avoidance itself and perceived need are other prominent barriers to seeking treatment.¹⁰⁻¹² These findings suggest a need to package exposure-based treatments differently such that they can reach a wider segment of the population of individuals with anxiety disorders.

At least two steps are necessary to enhance the reach of exposure-based treatments for anxiety. First, empirically-supported interventions must be made more accessible so that they can reach a larger share of the population with anxiety disorders. Computerized interventions offer a low-cost treatment strategy, ideal for placement in widely used medical settings. Second, proactive approaches to treatment are needed to reach the segment of the population of individuals who are suffering from anxiety disorders, but not yet willing to make behavior changes necessary to manage their anxiety (i.e., address anxiety-based avoidance).

The Transtheoretical Model of Behavior Change (TTM)¹³ provides a framework for developing interventions that could address issues related to both access and readiness to change key problematic behaviors like avoidance. The central organizing feature of the TTM is the five Stages of Change, which define an individual's progress in preparing for and adopting new behavior patterns. The stages include three pre-Action stages: Precontemplation (not intending to make a change in the foreseeable future), Contemplation (intending to make a change in the next 6 months), and Preparation (preparing to make a change in the next 30 days). There are two Action stages: Action (currently engaging in behavior change) and Maintenance (sustained behavior change for at least 6 months). Each stage of change is characterized in relation to a standard for the Action stage, which defines what is meant by successful change and therefore, is the driving characteristic of the staging algorithm.

The TTM provides guidance on development of stage-matched interventions. These have most often been delivered as computer-tailored interventions or CTIs.

Such interventions are easy to access, cost-effective and applicable both to individuals ready to engage in change and those not yet ready. TTM-based CTIs have been used to intervene effectively on a wide array of behaviors from weight management to depression to domestic violence¹⁴⁻¹⁶ and may be a useful framework for conceptualizing and intervening on anxiety-based avoidance.

To date, applications of the TTM to anxiety have been limited. In particular, no anxiety-specific staging algorithm has been developed. Several studies have utilized the University of Rhode Island Change Assessment (URICA)¹⁷ Stage of Change measure as a predictor of treatment outcomes in pharmacotherapy as well as of engagement and outcomes in psychotherapy.¹⁸⁻²⁰ While the URICA offers a strong measure of readiness in some contexts, it poses two core problems. First, difficulty of scoring and interpretation are a barrier to use. Second, the URICA leaves the target of change vague, and evaluations of staging algorithms for other types of behavior change indicate using a specific definition for the target of change is optimal.²¹

The purpose of this study was to develop and assess preliminary validity of a Stage of Change algorithm for reducing anxiety-based avoidance – the primary behavioral target of evidence-based treatments for anxiety. Measures of anxiety severity, quality of life, and treatment seeking behavior were evaluated in relation to Stage to examine the validity the Action criterion used to define this measure of Stage of Change. A wealth of literature on empirically supported behavioral treatments for anxiety has established a link between approach behaviors and anxiety reduction/improved quality of life. It was, therefore, hypothesized that individuals in Action and Maintenance (i.e., those who were regularly challenging themselves to

approach anxiety-producing stimuli in their environments) would report lower symptoms and impairment from anxiety and better quality of life. Additionally, we hypothesized that those in Action and Maintenance would be more likely to report being in treatment for their anxiety, as approach behaviors are a primary target of psychotherapy for anxiety and medications have been found to reduce symptoms of anxiety, such as avoidance.

1. Method

1.1 Participants

1.1.1 Recruitment

Participants needed to meet two eligibility criteria to participate in the study: they needed to be over the age of 18 and to score an 8 or higher on the Overall Anxiety Severity and Impairment Scale (OASIS), which has been found to indicate clinically significant anxiety.²² Prior to conducting online survey data collection, qualitative interviews were conducted with a small set of participants (n=10) to evaluate clarity and face validity of the staging algorithm. Qualitative interview participants were recruited through flyers placed at community centers, mental health treatment centers, and universities. Flyers asked that interested participants call the primary investigator, at which point they were consented to engage in a screening questionnaire for eligibility (age and OASIS score). Twenty individuals called to inquire about participation. Thirteen of these individuals were eligible to participate, and ten chose to participate in qualitative interviews. Participants in the qualitative interviews were reimbursed \$20 for their participation.

The sample for the online survey portion of the study was recruited through Survey Sampling International (SSI), an online survey sampling company. Toward the end of survey data collection, additional eligibility criteria—only non-white participants (25 completes) and only pre-Action Stage of Change (128 completes)—were included for the remaining recruitment process in order to ensure an adequately diverse sample. All recruitment and human subjects procedures were approved by the University of Rhode Island’s institutional review board.

1.1.2 Sample Characteristics

Ten individuals participated in qualitative interviews. The average age was 36.6 and the average OASIS score was 11.3. Three of the qualitative interview participants were recruited from a local mental health treatment center, four were recruited from a community support center, and three were recruited from the University of Rhode Island community. Seven of the qualitative interview participants were male and three were non-white.

SSI recruited 594 eligible adults to participate in the online survey portion of this study (sample demographics are summarized in Table 1). The sample was primarily female (69.4%, $n=412$), and ages ranged from 18 to 80 ($M = 38.6$, $SD = 13.8$). The majority of the sample was white ($n=454$, 76.4%), 12.8% were Black ($n=76$), 3.7% were Asian ($n=22$), and 7.1% classified themselves as not fitting any of these racial categories ($n=42$). Of the 594 participants, 14.1% were in Precontemplation ($n=84$), 3.9% were in Contemplation ($n=23$), 20.7% were in Preparation ($n=123$), 17.0% were in Action ($n=101$), and 44.3% were in Maintenance ($n=263$). Self-reported diagnoses were as follows: Panic Disorder 44.9% ($n=267$),

Agoraphobia 11.8% (n=70), Obsessive Compulsive Disorder 25.6% (n=152), Post-traumatic Stress Disorder 19.9% (n=118), Social Anxiety Disorder 45.1% (n=268), Generalized Anxiety Disorder 52.5% (n=312), Specific Phobia 12.1% (n=72), Anxiety Not Otherwise Specified 13.8% (n=82), diagnosed with “anxiety” but not specific disorder 4.2% (n=25), never diagnosed with an anxiety disorder 5.2% (n=31).

Diagnoses were self-reported and individuals were asked to select all diagnoses that they had been given so diagnostic categories reported are not mutually exclusive.

1.2 Measures

In addition to the measures described below, the survey administered included measures of demographic characteristics, self-reported anxiety diagnoses and current treatment status. In terms of treatment status, individuals were asked to select one of the following treatment status categories: (a) I am NOT currently in treatment for anxiety; (b) I currently take medication for anxiety (prescribed by a health professional like a doctor, nurse or psychiatrist); (c) I currently go to therapy or counseling for anxiety (meeting for 30 minutes to an hour to discuss your feelings with a professional); (d) I currently take medication and go to therapy for anxiety.

1.2.1 Overall Anxiety Severity and Impairment Scale (OASIS)²³

The OASIS was used to determine eligibility for participation. The OASIS is a 5-item self-report measure that evaluates the severity of and impairment associated with an anxiety disorder. Participants rate the degree to which each item describes them over the past week on a 5-point scale ranging from 0 (None) to 4 (Extreme/All the Time). A sum score of 8 or greater has been found to accurately classify 87% of individuals as having an anxiety diagnosis.²² This scale was selected because of its

strong psychometric properties, adequate coverage of symptoms relevant for all anxiety diagnoses, and ease of use (i.e., short length, free access, and easy scoring).

1.2.2. Quality of Life Enjoyment and Satisfaction Questionnaire – Short Form (QLSE-Q-SF)²⁴

The Q-LES-Q-SF is designed to assess the level of enjoyment and satisfaction individuals experience in activities of daily functioning. It is comprised of 14 items evaluating satisfaction in a number of realms and two additional overall life satisfaction items that are not included in the score for the measure. Participants rate items on a 5-point scale ranging from 1 (Very Poor) to 5 (Very Good). A summary score is calculated for the first 14-items and then converted to a proportion of the maximum possible score. Higher proportions, therefore, indicate greater satisfaction with life. This scale shows strong reliability and validity and, in particular, has shown adequate sensitivity to the severity of anxiety.^{25,26}

1.2.3. Stage of Change

Participants were asked to answer a series of questions about whether they regularly challenge their tendency to avoid anxiety-producing stimuli (see appendix for a printed copy of the measure). Questions placed participants in one of five mutually exclusive Stage of Change categories based on their answers to a series of Yes/No questions (see appendix for Stage of Change Measure). The behavioral target or criterion for assigning an individual to the Action stage, was defined as “at least once a week, you push yourself to approach some of the things that you often avoid (or choose not to do) because of anxiety.” This criterion was based on evidence that exposure to feared stimuli reduces symptoms of anxiety and impairment from anxiety.

For pre-action stages, participants were assigned to: Precontemplation if they indicated that they were not currently approaching feared stimuli regularly and did not intend to do so in the next six months; Contemplation if they were not currently approaching feared stimuli regularly, but intended to begin doing so in the next six months; and Preparation if they were not currently approaching feared stimuli regularly, but intended to begin doing so in the next 30 days. Participants were assigned to Action if they reported currently meeting the Action criterion and were assigned to Maintenance if they reported having been engaged in this behavior for at least six months.

1.3 Data Analysis

ANOVA was used to determine whether individuals in the Action/Maintenance stages of change showed different levels of anxiety severity and quality of life than those in pre-Action stages. A chi-square test was used to evaluate whether there was a significant association between participants' treatment status (in treatment versus not in treatment) and being in a pre-Action versus Action/Maintenance Stage of Change.

2. Results

2.1.1 Descriptive Results

In terms of current anxiety treatment, 30.6% (n=182) were not currently in any treatment, 41.3% (n=256) were taking medication only, 9.1% (n=54) were in psychotherapy only, and 17.1% (n=102) were taking medication and going to psychotherapy. Among the individuals who reported that they were in psychotherapy, 92.3% (n=144) reported that their therapist had encouraged them to engage in exposure exercises.

2.1.2 External Validity of SOC Action Criterion

To test validity of the Action criterion as a basis for measuring Stage of Change, differences in anxiety levels (OASIS score) and quality of life (QLESQ-SF score) among individuals in pre-Action versus the Action/Maintenance Stages of Change were evaluated using ANOVA. A significant difference was observed in OASIS scores between those in pre-Action stages versus Action/Maintenance ($F(1, 592) = 5.06, p = .025, \eta^2 = .01$). Individuals in Action or Maintenance ($M = 12.01, SD = 3.20$) reported significantly lower levels of anxiety than individuals in the pre-Action stages ($M = 12.60, SD = 3.06$). A significant difference was also observed in QLESQ-SF scores between those in pre-Action versus Action or Maintenance ($F(1, 592) = 8.20, p < .01, \eta^2 = .01$). Individuals in Action or Maintenance ($M = 0.47, SD = 0.19$) reported significantly higher quality of life than individuals in the pre-Action stages ($M = 0.43, SD = 0.18$).

A chi-square test evaluating the relationship between Stage (pre-Action versus Action/Maintenance) and current treatment status was significant, thereby supporting an association ($\chi^2(1, n=594) = 10.26, p < .01, \phi = .13$). Participants reporting that they were currently engaging in approach behaviors on a regular basis (i.e., Action or Maintenance stages) were more likely to be in treatment than not in treatment (see Table 1 in appendix).

3. Discussion

The primary purpose of this study was to develop and evaluate the preliminary validity of a Stage of Change algorithm for reducing anxiety-based avoidance. To our knowledge, no other study to date has built and validated a staging algorithm for

application to anxiety disorders. The URICA staging algorithm, has been used in anxiety research, but this measure is difficult to score and interpret and is not best practice when applying the TTM to a new behavior because the target of change is not specified. Accurate assessment is key to developing population-based interventions tailored to readiness to engage in behavior change.

Results supported the validity of the Action criterion used—at least once a week, you push yourself to approach some of the things that you often avoid (or choose not to do) because of anxiety. Reports of accomplishing this behavioral goal were associated with lower levels of anxiety and impairment (OASIS scores), better reported quality of life (QLESQ-SF scores) and higher rates of treatment seeking. Thus, this study provides preliminary support for the developed measure of Stage of Change to engage in approach behaviors.

This study had several limitations. First, the sample consisted of individuals who expressed an interest in online survey research participation, which may have introduced some sample bias. Future studies could evaluate findings in samples collected via proactive recruitment in a community or medical settings. Second, the sample, while nearly representative of national racial demographics, was primarily white and female. This may limit the generalizability of findings. Third, all data were self-reported, and there was wide variation in the length of time it took individuals to complete the survey. As with most research that relies on self-report, these factors raise the possibility of random and careless responding. Fourth, test-retest data was not available in this dataset, but would be useful for further, future validation. Fifth, the definition of Stage of Change may have provided enough information to some

participants to make them more likely to consider change and, therefore, indicate that they were in later Stage of Change (i.e., not Precontemplation). Finally, the ideal external criteria for validation of the Stage of Change tool developed would have been a behavioral measure of engagement in self- or therapy-directed exposure.

Unfortunately no such previously validated measure exists that cuts across anxiety diagnoses. However future research could evaluate the relationship between stage and clinician report of exposure exercise engagement or previously validated behavioral measures of engagement in exposure designed for use in a specific diagnostic subsample (e.g., the Liebowitz Social Anxiety Scale²⁷ for individuals with social anxiety disorder).

Nevertheless, this study has a number of strengths and will help guide future investigation. It describes the development and initial validity findings for a Stage of Change algorithm specific to anxiety treatment. This measure can be used in future research to evaluate the impact that readiness has on treatment outcomes. It may also be used in clinical work to inform intervention strategies (e.g., more motivational session content versus more action-oriented session content). Finally, it may be used in the context of intervention development to create scalable treatments that are tailored to individuals' readiness to change patterns of avoidance.

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Table 1.

Sample Characteristics

Variable	Participants
Sex	
Male	30.6% (n=182)
Female	69.4% (n=412)
Race	
White	76.4% (n=454)
Black	12.8% (n=76)
Asian	3.7% (n=22)
Other	7.1% (n=42)
Stage of Change for anxiety management	
Precontemplation	14.1% (n=84)
Contemplation	3.9% (n=23)
Preparation	20.7% (n=123)
Action	17.0% (n=101)
Maintenance	44.3% (n=263)
Self-reported diagnoses (not mutually exclusive)	
Panic Disorder (with or without Agoraphobia)	44.9% (n=267)
Agoraphobia (with or without Panic)	11.8% (n=70)
Obsessive Compulsive Disorder	25.6% (n=152)
Post-traumatic Stress Disorder	19.9% (n=118)
Social Anxiety Disorder	45.1% (n=268)
Generalized Anxiety disorder	52.5% (n=312)
Specific Phobia	12.1% (n=72)
Anxiety NOS	13.8% (n=82)
Diagnosed with Anxiety, but no specific disorder	4.2% (n=25)
Never diagnosed with and anxiety disorder	5.2% (n=31)
Treatment status (mutually exclusive categories)	
No treatment	30.6% (n=182)
Medication only	43.1% (n=256)
Therapy only	9.1% (n=54)
Combined (medication and therapy)	17.2% (n=102)

Appendix (to be included in manuscript submission)

Stage of Change Measure for Reducing Anxiety-Based Avoidance

Anxiety is not just feeling “stressed” or “nervous.” Anxiety is when stress or nervousness interfere with your daily life. People who are anxious may:

- Avoid events, activities, places or things that make them anxious
- Have unpleasant physical feelings like racing heart, dizziness and/or upset stomach
- Experience upsetting thoughts that seem to take over their minds such as
 - Worries (e.g., “what if” questions)
 - Concerns about some specific thing like getting sick or dirty
 - Thoughts about a traumatic past event like abuse or a car accident

At least one in four people experience anxiety at some point in their lives.

For example, managing your anxiety may mean

- Committing to do things that are important to you (e.g., look for a new job or go on a date) even if worry or anxiety makes you not want to do those things.
- Pushing yourself to speak up at a meeting or give a speech to an audience.
- Doing light exercise even if this is a trigger for panic attacks.
- Touching things others are ok with touching, but that you often see as dirty.
- Leaving your house if you become anxious when you are far away from home.
- Getting on a plane if you are nervous when flying.
- Allowing yourself to experience thoughts about a past trauma.

Even though doing these things can make you feel more anxious at first, research shows that doing them actually makes you LESS anxious over the long term.

Q1: Do you currently, at least once a week, push yourself to approach things that you often avoid (or choose not to do) because of anxiety?

Yes (if YES, please skip to Question 4)

No (if NO, continue to next question)

Q2: In the next 6 months, do you intend to start managing your anxiety by, at least once a week, pushing yourself to approach things that you often avoid (or choose not to do) because of anxiety?

Yes (if YES, continue to next question)

No (if NO, this questionnaire is complete)

Q3: In the next 30 days, do you intend to start managing your anxiety by, at least once a week, pushing yourself to approach things that you often avoid (or choose not to do) because of anxiety?

Yes (You are done. This questionnaire is complete.)

No (You are done. This questionnaire is complete.)

Q4: (Only answer if you answered 'YES' to Question 1) For how long have you been managing your anxiety by, at least once a week, pushing yourself to approach things you would often avoid (or choose not to do) because of anxiety?

___ Less than 6 months (*You are done. This questionnaire is complete.*)

___ More than 6 months (*You are done. This questionnaire is complete.*)

Scoring:

-Precontemplation – NO to Question 1 and NO to Question 2

-Contemplation – NO to Question 1 and YES to Question 2 and NO to Question 3

-Preparation – NO to Question 1 and YES to Question 2 and YES to Question 3

-Action – YES to Question 1 and NO to Question 4

-Maintenance - YES to Question 1 and YES to Question 4

MANUSCRIPT 2

Validation of Decisional Balance and Self-efficacy Measures for Managing Anxiety in
a National Sample of Clinically Anxious Adults

Intended Journal for Submission: American Journal of Health Promotion (not yet
submitted)

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Abstract

Purpose. Anxiety is the most common and costly mental illness in the United States. Avoidance is the cornerstone of anxiety, and reducing the incidence of avoidance is a core element of evidence-based treatments. Investigating anxiety-based avoidance from a Transtheoretical Model (TTM) perspective could facilitate development of interventions applicable for both individuals ready and not yet ready to address their anxiety. This study validated TTM measures of Decisional Balance and Self-efficacy for reducing anxiety-based avoidance.

Design. Cross sectional measurement development.

Setting. Qualitative interview and online survey.

Subjects. 604 individuals, ages 18-70 with clinically significant anxiety.

Measures. Stages of Change, Decisional Balance, and Self-efficacy.

Analysis. The sample was randomly split into halves for exploratory principal components analysis (PCA), followed by confirmatory factor analyses (CFA) to test measurement models. Multivariate analyses examined relationships between constructs.

Results. For Decisional Balance, PCA indicated two, 5-item factors (Pros $\alpha=0.85$; and Cons $\alpha=0.67$). CFA supported a two-factor correlated model, $\chi^2(35)=80.82$, $p<.01$, CFI=.94, RMSEA =.7 with Pros $\alpha=.87$ and Cons $\alpha=.75$. For Self-efficacy, PCA indicated one 6-item factor ($\alpha=0.87$). CFA supported this structure, $\chi^2(9)=30.39$, $p<.01$, CFI=.98, RMSEA=.088, $\alpha=.90$. Multivariate analyses indicated significant cross-stage differences for Pros and Self-efficacy in expected directions.

Conclusion. Findings support internal and external validity of these measures. Stage-construct relationships suggest Cons for reducing avoidance may be more stable across stages than Cons for other behavior changes. These measures may be used to develop a computer-tailored intervention for anxiety.

Key Words: anxiety, Transtheoretical Model, Decisional Balance, Self-efficacy, exposure therapy, Stages of Change

Indexing Key Words: Manuscript format: research; Research Purpose: instrument development/validation; Study Design: Cross-Sectional; Outcome measure: behavioral; Setting: population-based; Health focus: medical self-care; Strategy: skill building/behavior change; Target population age: adults; Target population circumstances: survey company database.

PURPOSE

Anxiety is the most prevalent form of mental illness in the United States. It is estimated that at least one in four people develop an anxiety disorder at some point during his or her life.¹ Compared with the general population, individuals with anxiety disorders experience lower quality of life,^{2,3} educational and occupational impairment,⁴⁻⁸ as well as increased risk of comorbid medical problems^{4,9,10} and suicide.^{11,12} In addition to personal costs, anxiety disorders have a large public health cost, accounting for about one third of total expenditures on mental illness. The annual cost of anxiety disorders in the US is estimated to be between \$42 and \$46 billion dollars.¹³⁻¹⁵

Research on the efficacy of cognitive-behavioral treatments (CBTs) for anxiety shows consistently large effect sizes ($d = 1.14$ to 1.98 ¹⁶) and suggests 50%-80% of patients attain clinically significant effects.¹⁷ The primary behavioral component of evidence-based treatments for anxiety is exposure exercises, in which patients practice facing anxiety-provoking stimuli that are progressively more emotionally challenging.¹⁸ For example, a patient with social anxiety may complete exposure exercises that involve a set of social activities ranging from less anxiety-provoking (e.g., asking a close friend if he/she is interested in getting together informally) to more anxiety-provoking (e.g., asking someone out on a date). This treatment strategy is based on classic behavioral studies of extinction of feared responses.¹⁹⁻²¹

Research suggests that exposure exercises are key to overcoming anxiety. A number of dismantling studies aimed at determining the active components of evidence-based treatments for anxiety indicate that the cognitive elements of

evidence-based therapies for anxiety do not significantly increase the efficacy of exposure therapy. For example, exposure-only treatments have been found to be as effective as treatments with exposure and cognitive components in treatment of social anxiety disorder and posttraumatic stress disorder.²²⁻²⁶ Similarly, meta-analyses suggest that exposure-only treatments perform equivalently to exposure plus cognitive treatments for Generalized Anxiety Disorder, Obsessive-Compulsive Disorder, Panic Disorder, and Social Phobia.²⁷⁻³²

Unfortunately, most individuals with anxiety disorders do not receive exposure-based therapy. It is estimated that as few as 4-11% of individuals with anxiety disorders seek mental health treatment at all.^{33,34} Research suggests that the main reasons for not getting treatment are: poor access (encountering logistical barriers such as cost and availability) and intra-individual variables that affect readiness (not being receptive to treatment or not believing one's symptoms warrant treatment).³⁵ In support of the importance of intra-individual variables, studies have found that many people with access to trained exposure therapy practitioners do not initiate or stay in treatment. Pre-treatment attrition among patients diagnosed with anxiety disorders and offered free therapy is 30-52%.³⁶⁻³⁸ Dropout rates among those seeking treatment are estimated to be as high as 31%.³⁸ Intra-individual barriers are particularly relevant in exposure therapy because approaching feared stimuli is not an intuitive or comfortable way to address anxiety.³⁹

A Computer-Tailored Intervention for Anxiety

A population-based approach to anxiety disorders is needed in order to improve the massive public health toll of this treatable mental illness. Such an approach would

need to involve efforts to improve access to treatment and address intra-individual variables that affect readiness to address one's anxiety. To date, dissemination efforts have focused on increasing access (e.g., training more providers, providing group treatment, making treatments available in non-specialty settings^{39,40}) rather than reducing intra-individual barriers. A readiness-focused, Computer-Tailored Intervention (CTI) would address both access and intra-individual barriers.

CTIs are optimal for improving reach since they are easy to access, inexpensive to distribute, and have a strong history of effectively incorporating readiness-based information using the Transtheoretical Model of behavior change (TTM). Such an intervention could be used as a primary treatment for individuals without access to or not yet ready for in-person treatment. It could also be a complement to in-person treatment aimed at encouraging individuals with clinically significant anxiety to engage exposure exercises or to gradually begin approaching feared stimuli.

The Transtheoretical Model Of Behavior Change (TTM)

The TTM provides an evidence-based framework for organizing CTIs that help motivate individuals to engage in new behaviors.⁴¹ Numerous randomized controlled trials support the effectiveness of computerized, TTM-tailored interventions targeting a variety of behavioral and mental health issues such as exercise adoption, depression management and domestic violence cessation.⁴²⁻⁴⁴ The TTM's readiness-based approach to behavior change is consistent with recent evidence that readiness-based therapy techniques, such as Motivational Interviewing, enhance the efficacy of CBT for anxiety when applied as a pre-treatment.^{45,46} The TTM is particularly powerful as a theoretical basis for such an intervention because it provides empirically-based

guidance on which intervention strategies work best in each stage, and hence systematically meets patients where they are in terms of readiness.

The TTM posits that initiating new behavior patterns involves progressing through a series of five Stages of Change: Precontemplation (not yet intending to take action), Contemplation (intending to take action in the near future, but not immediately), Preparation (taking steps necessary for action), Action (initiating the new behavior pattern) and Maintenance (>6 months of successful action). Action is defined with respect to the behavioral target: in the case of this study, action is readiness to engage in exposure exercises.

According to the TTM, readiness to change is largely based on the relative weights of the pros (advantages of change) compared with the cons (disadvantages of change).⁴⁷ A stable pattern of Decisional Balance across Stages of Change has been observed across over 48 different health behaviors.⁴⁸ In the Precontemplation Stages of Change, the Cons outweigh the Pros. The relative weight of Pros and Cons reverses between the Contemplation and Preparation stages, such that Pros become more important and Cons less important.⁴⁹ This pattern of change in Decisional Balance is hypothesized to be an essential driver of progress toward Action and Maintenance.

In addition to Decisional Balance, the TTM focuses on Self-efficacy as an important factor in an individual's readiness to change. Self-efficacy is defined as one's level of confidence in one's ability to successfully change a target behavior across a variety of challenging situations.⁵⁰ Research indicates that Self-efficacy scores are higher in the later Stages of Change. The largest differences in Self-efficacy

have been observed in comparisons of individuals in the Action Stage of Change with those in the earliest Stages of Change.^{50,51}

Goals of the Current Study

Given the serious health effects of anxiety disorders and the low rate of utilization of evidence-based interventions, alternative models of treatment are needed. Research indicates that the exposure process, that is the gradual confrontation of feared internal, external and imagined stimuli, is an effective way to reduce the severity of anxiety and impairment from anxiety. The aim of the current study is to develop and validate measures of Decisional Balance and Self-efficacy for adults with clinically significant levels of anxiety. This is an essential step toward the development of a TTM-directed CTI for anxiety.

Although some research on anxiety has utilized generic Stages of Change measures,⁵² no study has yet evaluated core TTM constructs that drive change such as Decisional Balance and Self-efficacy. This study, therefore, builds upon existing literature by developing and evaluating measures expected to be useful in increasing self- or therapist-directed engagement in exposures for anxiety. This study also seeks to evaluate the potential usefulness of an application of the TTM to anxiety-based avoidance. Its findings could have a substantial impact on the way that treatment is conceptualized and eventually delivered.

METHODS

Design

This study used a sequential process of measurement development to develop of measures of two key TTM constructs—Decisional Balance and Self-efficacy.⁵⁴⁻⁵⁶

Items were developed via a series of semi-structured expert and participant interviews. Item development was followed by exploratory, confirmatory and external validation quantitative analyses.

Item Development

Items were initially developed based on a comprehensive review of TTM measures for other behaviors and conclusions from the literature on reasons individuals tend to persist in avoiding things that make them anxious and on barriers to changing avoidance patterns.

Expert Interviews

After this initial development, items were further refined using feedback from experts in anxiety disorders and the TTM. Two, PhD- level experts in anxiety disorders were engaged in semi-structured interviews in which they provided feedback on the proposed set of items. Additionally, three experts in the TTM were asked to review the proposed set of items for clarity and adherence to the theoretical foundations of the constructs.

Qualitative Participant Interviews

Once feedback from experts was incorporated, 10 structured qualitative interviews with anxious adults recruited from the community were conducted. The goal of the qualitative interviews was to elicit participant feedback on item clarity, acceptability, and face validity. In order to be eligible for participation in qualitative interviews, individuals had to be over 18 and had to receive a score of 8 or above on the Overall Anxiety Severity Questionnaire (OASIS).⁵⁷ Qualitative interviews were conducted in a private room in a location convenient for the participants (i.e.,

community library, university office, or the mental health clinic from which they were recruited). When participants arrived, they were presented with an informed consent form, it was explained orally, and they were then given the opportunity to review the written copy on their own before signing. No participants withdrew from the study after reviewing informed consent form. Participants then completed a survey and provided oral feedback in an interview format. Consistently problematic items were discussed by the research team and eliminated or modified.

Survey Administration

The survey was administered using FluidSurveysTM online survey software. Participants accessed the survey via an online link, which took them to the informed consent page. Individuals were asked to check a box indicating that they had read the informed consent form and agreed to participate. They were then routed to questions on eligibility criteria (which were the same as those for the qualitative interviews), on age and on level of anxiety per the OASIS. Eligible individuals were then linked to the full survey. Data were extracted from FluidSurveysTM into SPSS for exploratory and external validation analyses and EQS for confirmatory analyses.

Sample

Recruitment

Participants for qualitative interviews were recruited through flyers placed at universities, community centers, and mental health treatment centers. Interested participants were asked to call the primary investigator to get more information. When participants called, they were presented with an informed consent form to engage in a screening questionnaire, which included the OASIS.⁵⁷ Individuals with sufficiently

high levels of anxiety per the OASIS (≥ 8) were given the option to participate. Twenty individuals called expressing interest in participating and 13 of these individuals were eligible. Of the thirteen individuals three had difficulty scheduling a time to participate and 10 participated. Qualitative interview participants were reimbursed \$20 for their participation.

Participants for the online survey administration phase of the study were recruited through Survey Sampling International. Eligibility criteria were added during recruitment to ensure adequate representation across certain groups. Additional eligibility criteria were included as follows: only non-white participants (25 completes) and only pre-Action Stages of Change (128 completes). All recruitment and human subjects procedures were approved by the University of Rhode Island's Institutional Review Board.

Qualitative Interview Sample

Ten, one-on-one qualitative interviews were conducted by a doctoral student with eligible and interested individuals. The average age of cognitive interview participants was 36.6 and the average OASIS score was 11.3. Three of the qualitative interview participants were recruited from a local mental health treatment center, four were recruited from a community support center, and three were recruited from the University of Rhode Island community. Seven of the qualitative interview participants were male and three were non-white.

Survey Sample

A sample of N=594 individuals between the ages of 18 and 80 (M=38.62, SD=13.84) were recruited via Survey Sampling International (SSI). The majority of

the sample was white ($n=454$, 76.4%), 12.8% were Black ($n=76$), 3.7% Asian ($n=22$), and 7.1% classified themselves as not fitting into these racial categories ($n=42$). Of the 594 participants, 14.1% were in Precontemplation ($n=84$), 3.9% were in Contemplation ($n=23$), 20.7% were in Preparation ($n=123$), 17.0% were in Action ($n=101$) and 44.3% were in Maintenance ($n=263$). The majority of the sample was in some form of treatment for their anxiety (69.4%, $n=412$). 43.1% of the sample was taking medication without therapy ($n=256$), 9.1% was in therapy only ($n=54$), and 17.2% was taking medication and was in therapy ($n=102$).

Measures

Measures Used

*Overall Anxiety Severity and Impairment Scale (OASIS).*⁵⁸ The OASIS was used to determine eligibility to participate. The OASIS is a 5-item self-report measure that evaluates severity and impairment associated with any anxiety disorder. Participants rate the degree to which each item describes himself or herself over the past week on a 5-point scale ranging from 0 (None) to 4 (Extreme/All the Time). A score of 8 or greater has been found to accurately classify 87% of individuals as having an anxiety diagnosis.⁵⁷ This scale was selected based on strong psychometric properties, adequate coverage of symptoms relevant for all anxiety diagnoses, and ease of use (i.e., short length, free access, and easy scoring). Good internal ($\alpha=0.80$) and one-month test-retest reliability ($\kappa = 0.82$) have been reported. Research shows strong convergent validity with other measures of anxiety.⁵⁸

Measures Developed

Stage of Change. Participants were asked to answer a series of questions about whether they regularly (at least once a week) approach things they would usually avoid because of anxiety. These questions placed participants in one of five mutually exclusive Stages of Change categories. The Action criterion, which was phrased “managing your anxiety,” was defined as “at least once a week, you push yourself to approach some of the things that you often avoid (or choose not to do) because of anxiety.” This action criterion was based on the evidence that exposure to feared stimuli reduces anxiety and impairment.

Participants were assigned to a Stage of Change category based on their answers relative to the Action criterion. They were put in the Precontemplation stage if they indicated that they were not currently approaching feared stimuli regularly and did not intend to do so in the next six months; to Contemplation if they intended to begin doing so in the next six months; and to Preparation if they intended to begin doing so in the next 30 days. Participants were assigned to the Action stage if they were currently approaching feared stimuli regularly, but had been doing so for less than six months, and to Maintenance if they had been doing so for six months or longer.

Decisional Balance. Twenty items were used to create the Decisional Balance scale. Ten items represented the Pros of approaching feared stimuli regularly and ten reflected the Cons of approaching feared stimuli regularly. Respondents were asked to indicate how important each item was in their decision of whether to change avoidance patterns on a 5-point Likert scale ranging from 1 = ‘Not Important at All’ to

5= 'Extremely Important.' The score for this scale was the sum of participant's responses.

Self-efficacy. Ten items were used to develop the Self-efficacy scale. Items evaluated participants' confidence in their ability to approach feared stimuli regularly in a variety of challenging situations (e.g., when their schedules become busy). Participants indicated their confidence levels on a 5-point Likert scale, ranging from 1 = "Not at All Confident" to 5 = "Extremely Confident. The total score for this scale consisted of the sum of the participant's responses.

Analysis

Three phases of analyses were conducted: exploratory, confirmatory, and external validation. The sample was randomly split such that one half could be used for the Principal Components Analyses (PCAs, n=289). PCAs were conducted to determine the number of components and reduce scales to a smaller set of items. Item selection was an iterative process that involved removing items for quantitative reasons (loadings $<.40$, correlations $>.70$ with other items, or high loadings on multiple factors) and qualitative reasons (to avoid redundancy and maintain the conceptual breadth of construct). In the second phase of analysis, Confirmatory Factor Analyses (CFAs) were conducted using the second half of the sample (n=305). CFAs were used to evaluate the degree to which an independent portion of the data fit the model created by iterative PCAs. Model fit and factor loadings were evaluated. Finally, external validation analyses were conducted with the full sample (N=594). In this phase, MANOVA was used to evaluate the relationships between Decisional Balance factors and Stage of Change. ANOVA was used to evaluate the relationship

between Self-efficacy and Stage of Change. Relationships were evaluated for consistency with patterns seen for other health behaviors.⁴⁸ Linear regressions were also conducted to evaluate whether predicted relationships between TTM constructs and severity of anxiety were observed.

RESULTS

Exploratory Analyses

Exploratory procedures included PCA with varimax rotation. Sample size (n=289) was adequate based on existing literature.^{59,60} Decisions regarding retention of components were based on parallel analysis⁶¹ and minimum average partial procedures (MAP),⁶² both of which have been found to be accurate methods.⁶³

Exploratory analyses were used to determine the number of components, the correlations between components, and the loadings of items on these components. Items with poor (<.40) and complex loadings (>.40 on more than one factor) were removed. In later steps of exploratory analyses, items that had content that overlapped with items that had higher loadings were also removed.

Decisional Balance

The initial PCA included twenty Decisional Balance items. In total, five PCAs were conducted. These reduced the measures to 10 items equally representing the Pros and Cons of regularly approaching feared stimuli. MAP and parallel analysis supported a two-component solution. Final item loadings ranged from .53 to .83. Internal consistency was good for the 5-item Pros scale ($\alpha = .86$) and adequate for the 5-item Cons scale ($\alpha = .67$). Together the two factors accounted for 53.96% of the total item variance.

Self-efficacy

The initial PCAs included ten Self-efficacy items. Four PCAs were conducted, which reduced the original ten items to six. MAP and parallel analysis supported a single component solution. Item loadings ranged from .76 to .83. The final set of six items had good internal consistency ($\alpha = .87$) and accounted for 62.67% of the total item variance.

Confirmatory Analyses

Confirmatory factor analyses were conducted with the structural equation modeling software EQS using the remaining subsample ($n=305$).⁶⁴ Sample size was adequate based on existing literature.⁵⁹ Robust estimation methods were used for fit indices since item data was ordinal.⁵⁹ The fit indices calculated were the Satorra-Bentler scaled chi-square, the comparative fit index (CFI), and the absolute standardized residual statistic (AASR). Traditionally, CFI values of 0.90 and above are considered to indicate good fit.⁶⁵ RMSEA values between .05 and .08 suggest reasonable error of approximation and values ≥ 1 indicate poor fit.⁶⁶

Decisional Balance

The following measurement models were compared for the ten-item Decisional Balance measure: (1) a null model that supported ten independent variables and no latent factors; (2) a two-factor uncorrelated model; and (3) a two-factor correlated model. Fit indices for each model are summarized in Table 1.

The two-factor correlated model showed the best fit to the data. Factor loadings ranged from .49 to .83. Fit indices suggested strong model fit, $\chi^2(34)=68.23$, $p<.01$, CFI=.95, RMSEA =.06. The correlation between the two scales was $r=0.28$ and

coefficient alphas were good for Pros ($\alpha = .87$) and acceptable for Cons ($\alpha = .75$). The final items and their loadings in the confirmatory subsample are presented in Figure 1.

Self-efficacy

The following measurement models were compared for the Self-efficacy scale: (1) a null model that supported six independent variables and no latent factors and (2) a single factor model. The one-factor model had the best fit. Factor loadings ranged from .67 to .86 and there was excellent model fit, $\chi^2(9)=30.39$, $p<.01$, CFI=.98, RMSEA =.09. Internal consistency was excellent ($\alpha = .90$). Final items and their loadings are presented in Figure 2.

External Validation

External validity was evaluated in two ways. First, the relationship between TTM constructs and Stages of Change was evaluated and compared to patterns seen in other areas of behavior change (Figure 3 and Figure 4). Raw TTM construct scores (see Table 2) were translated to T scores and weighted by group size to eliminate bias created from uneven Stage groups. Second, relationships between TTM constructs and anxiety severity were evaluated for predicted relationships.

Decisional Balance by Stages of Change

Multivariate analysis of variance (MANOVA) indicated the individuals at different Stages of Change (vis-a-vis regularly approaching feared experiences) differed significantly on Decisional Balance constructs ($F(8, 584) = 4.27$, $p<0.01$, $\eta^2 = .028$). Follow-up ANOVAs indicated that there were significant between-stage differences on the Pros ($F(4, 589) = 7.94$, $p<.01$, $\eta^2 = 0.05$). Post-hoc analyses indicated that the Pros were significantly higher for individuals in the Action and

Maintenance stages than for those in the Precontemplation stage. Pros showed a maximum average difference of .62 standard deviation units between Precontemplation and Maintenance. No significant between-stage differences were observed on the Cons ($F(4, 589) = 0.75, p=0.56, \eta^2=0.005$). Cons showed a maximum average difference of .30 standard deviation units. Weighted T Scores of Pros and Cons at each Stage of Change are presented in Figure 3.

Self-efficacy by Stages of Change

Analysis of variance (ANOVA) indicated that Self-efficacy was significantly different across the Stages of Change, $F(4, 589) = 10.13, p<.01, \eta^2=0.06$. Follow-up comparisons showed that Self-efficacy of individuals in the Precontemplation and Preparation stages was substantially lower than that of those in the Action and Maintenance stages. Self-efficacy was .69 of a standard deviation unit higher among individuals in Action compared to individuals in Precontemplation. Weighted T Scores of Self-efficacy at each Stage of Change are presented in Figure 4.

Relationships Between TTM Constructs and Severity of Anxiety

A series of linear regressions were performed to evaluate the relationship between anxiety severity (OASIS) and TTM constructs (Pros, Cons, and Self Efficacy). Results indicated that higher perceptions of the importance of the Pros of managing anxiety was associated with more severe levels of anxiety ($\beta = 0.17, p<.01$). Higher perceptions of the importance of the Cons of managing anxiety were also associated with more severe levels of anxiety ($\beta = 0.25, p<.01$). Finally, higher Self-efficacy was associated with lower levels of anxiety severity ($\beta = -0.29, p<.01$).

DISCUSSION

This is one of the first studies to apply the TTM, beyond generic Stages of Change measures, to anxiety. Measurement development results demonstrated good construct validity for two TTM scales, one measuring Decisional Balance and the other measuring Self-efficacy, in a large national sample of adults with clinically significant levels of anxiety. Both scales also demonstrated good external validity in terms of their relationship with Stages of Change. Data on average scores in each Stage of Change on these scales can be used in future research as the foundation for a CTI.

Decisional Balance

Through a sequential process of measurement development, this research supported a two factor correlated model for the Decisional Balance scale with one factor representing the Pros and the other the Cons of reducing anxiety-based avoidance. A two-factor model for Decisional Balance has been observed across many health risk behaviors. The findings are also consistent with the broader literature on Decisional Balance insofar as the Cons outweighed the Pros in Precontemplation, Pros are nearly equal to Cons in Contemplation, and there was a crossover in perceived importance of Pros versus Cons in the Contemplation Stage of Change.⁴⁹ Also, Pros rose significantly as people progressed to the Action and Maintenance Stages of Change.^{48,49}

Findings also showed some differences between Decisional Balance applied to anxiety-based avoidance and Decisional Balance in other problem areas. First, the change in Pros was lower in magnitude than has been observed in other behavior areas. The change in Pros was 0.62 standard deviation units and changes closer to 1.0

standard deviation units are typically observed.^{48,49} One interpretation of this is that Pros of changing anxiety-based avoidance may be fairly important even when individuals are not taking action. Second, cross-stage differences in the perceived importance of Cons were not significant, so even among individuals who were regularly approaching feared stimuli, the downsides of challenging their anxiety in this way felt important. This may be one reason why drop out rates from evidence-based treatments are high. If these findings are replicated in future research, CTIs may benefit from a greater focus on feedback to increase the salience of Pros rather than to reduce the perceived importance of Cons.

The positive relationship between the severity of anxiety and both perceived Pros and Cons of approaching anxiety-producing stimuli provided further external validation for the Decisional Balance measure. It was predicted that individuals with high anxiety would be keenly aware of the upsides of reducing avoidance. It was also predicted that the higher one's anxiety would be more aware of the Cons of approaching feared-stimuli. Findings confirmed both predictions.

Self-efficacy

As hypothesized, results supported a single factor scale assessing Self-efficacy. Confirmatory fit indices for the Self-efficacy scale showed good fit. As observed in other areas of behavior change, Self-efficacy was greater among individuals in the Action and Maintenance stages than in the pre-Action stages. Contemplation was an exception insofar as the difference between Self-efficacy in Contemplation and that in Action and Maintenance was not significant, however, this finding may be a result of the small sample size of participants in Contemplation.^{51,67} Therefore, it appears that

individuals in more advanced Stages of Change for approaching anxiety-producing stimuli report greater situational Self-efficacy. Finally, the significant relationship between higher Self-efficacy and lower severity of anxiety provides additional external validation for this measure. These results support the validity of this scale and indicate that Self-efficacy may be a fruitful construct for feedback in a CTI aimed at reducing anxiety-based avoidance.

Limitations & Future Directions

This study has several limitations. First, approximately 60% of this sample was in Action or Maintenance and less than 4% was in Contemplation. Sample sizes were adequate for principle component analyses and structural equation modeling conducted and scores were weighted by sample size for external validation analyses. Nevertheless the small Contemplation sample size likely limited the power for comparisons with other stage groups. Additionally, the dominance of individuals in Action and Maintenance may have affected observed loadings. Future research re-evaluating findings in a pre-Action sample is warranted. Second, findings are based on cross-sectional comparisons of individuals in each Stages of Change. Cross-sectional findings provide some insight into factors that drive change, but do not necessarily have longitudinal implications. Finally, present findings are based on a sample of convenience. Although efforts were made to recruit a racially and ethnically diverse group of participants the vast majority of participants were white and non-Hispanic. Representation of minorities is not too disparate from national or racial minority representation according to US Census data, but additional research looking at the validity of developed measures in non-white groups would shed light on the

generalizability of these measures. The sample was also not representative of treatment-seeking rates in the general population insofar as the majority of participants were in some sort of treatment for anxiety. Further evaluation of both validity and stage-construct relationships is needed in a sample of non-treatment seeking, anxious adults.

This study suggests several useful directions for future investigation. First, these findings should be evaluated longitudinally and in minority populations. Second, developing measures for the Processes of Change will be a key step toward building theoretically sound, population-based, computer-tailored intervention for managing anxiety. Finally, this study calls for further investigation into potential differences in the change process for behaviors aimed at improving emotional health, especially in the pattern observed in Decisional Balance variables.

Conclusions

Anxiety disorders are a major public health concern both in terms of personal and societal cost. Exposure-based therapy for anxiety disorders, which involves reducing avoidance or approaching successively more anxiety-provoking stimuli, is effective, but only a minority of the population of individuals with anxiety disorders engage in such treatment. This study developed and applied constructs from the TTM to approaching anxiety-provoking stimuli as an individual would do in evidence-based psychotherapy for anxiety.

Results show considerable consistency with observations from other behaviors in that a two-factor Decisional Balance scale and one-factor Self-efficacy scale provided the best fit to the data. Also consistent with theory-based predictions, participants in

later Stages of Change scored higher on Pros and higher on Self-efficacy than individuals in earlier Stages of Change. Scales also showed a sound relationship with anxiety severity. The scales developed in this study may be useful for a variety of purposes, including assessing readiness to engage in exposures in the context of intervention and research. Computerized interventions that provide feedback tailored to Stage of Change and other TTM constructs like Decisional Balance and Self-efficacy, have been found to be an effective population-based intervention in a variety of other areas of behavior change.^{42,68-70} Such an approach may be necessary to improve the impact of evidence-based treatments for anxiety such that we are intervening on the full population of individuals with anxiety disorders.

SO WHAT?

What is already known on this topic?

Exposure-based treatment for anxiety is effective, but reach of these treatments is limited owing to limited access and other individual variables like beliefs about treatment and motivation. Research efforts to date have focused on increasing access and less on understanding motivational influences and how to intervene on them.

What does this article add?

This article described development and validation of Self-efficacy and Decisional Balance scales, two constructs that have been found to mediate behavior change for many behaviors. The relationship between these scales and readiness to change supports their importance in reducing avoidance in anxious individuals.

What are the implications for health promotion, practice, or research?

Utilization of the Transtheoretical model allows the field to move beyond treatment studies based on an action-ready paradigm and traditional modes of in-person treatment that are not likely to dramatically increase utilization. These measures can be used as the basis for a population-based CTI.

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Table 1.

Robust Method Fit Indices for Evaluated Decisional Balance and Self-Efficacy Confirmatory Models

	χ^2 (df)	CFI	RMSEA (CI)
Decisional Balance			
Model 1: null model	788.80 (45)*	--	--
Model 2: uncorrelated two factor model	80.82 (35)*	.938	.066 (.047, .084)
Model 3: correlated two factor model	68.23 (34) *	.954	.058 (.037, .077)
Self-efficacy			
Model 1: null model	907.42(15) *	--	--
Model 2: one factor model	30.39(9) *	.976	.088 (.055, .124)

Note. N = 305; χ^2 = chi square; df = degrees of freedom; CFI = comparative fit index; RMSEA = root mean square error or approximation; CI = confidence interval; *p<0.01.

Table 2.

Summary of Raw Scores on Pros, Cons, and Self-Efficacy by Stage

Stage	N	Pros		Cons		Self-Efficacy	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
Precontemplation	84	18.21	4.64	15.76	3.99	12.85	5.68
Contemplation	23	19.30	4.03	14.96	4.45	14.13	3.31
Preparation	123	20.58	4.28	15.72	4.10	13.49	4.24
Action	101	20.71	3.63	15.91	4.54	16.28	5.21
Maintenance	263	20.78	3.44	16.25	4.40	15.82	5.21

Note. Mean = average sum score, higher scores indicate more importance for Pros and Cons and more confidence for Self-Efficacy; S.D. = standard deviation.

Figure 1.

Decisional Balance Structural Model (N=305)

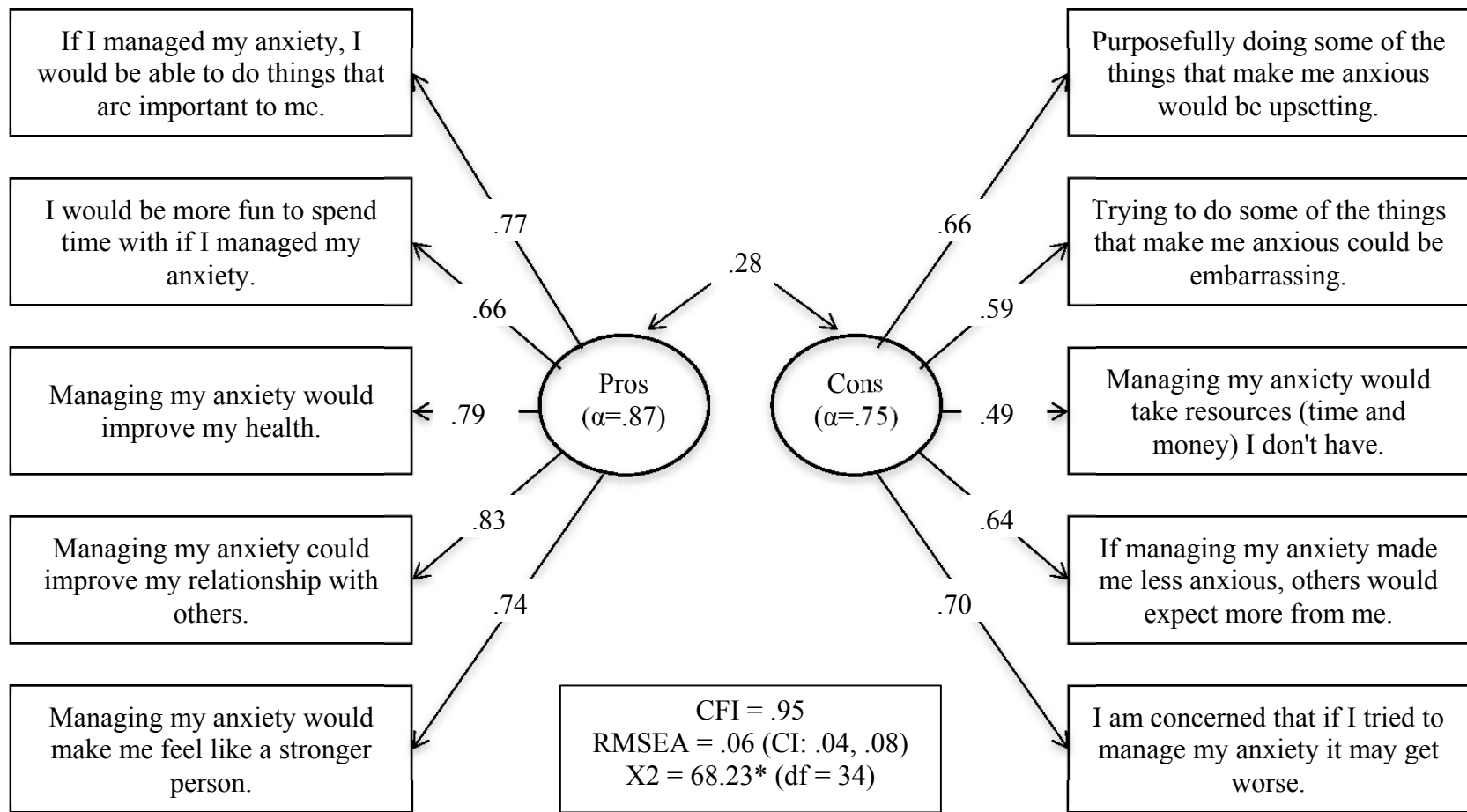


Figure 2.

Self-Efficacy Structural Model (N=305)

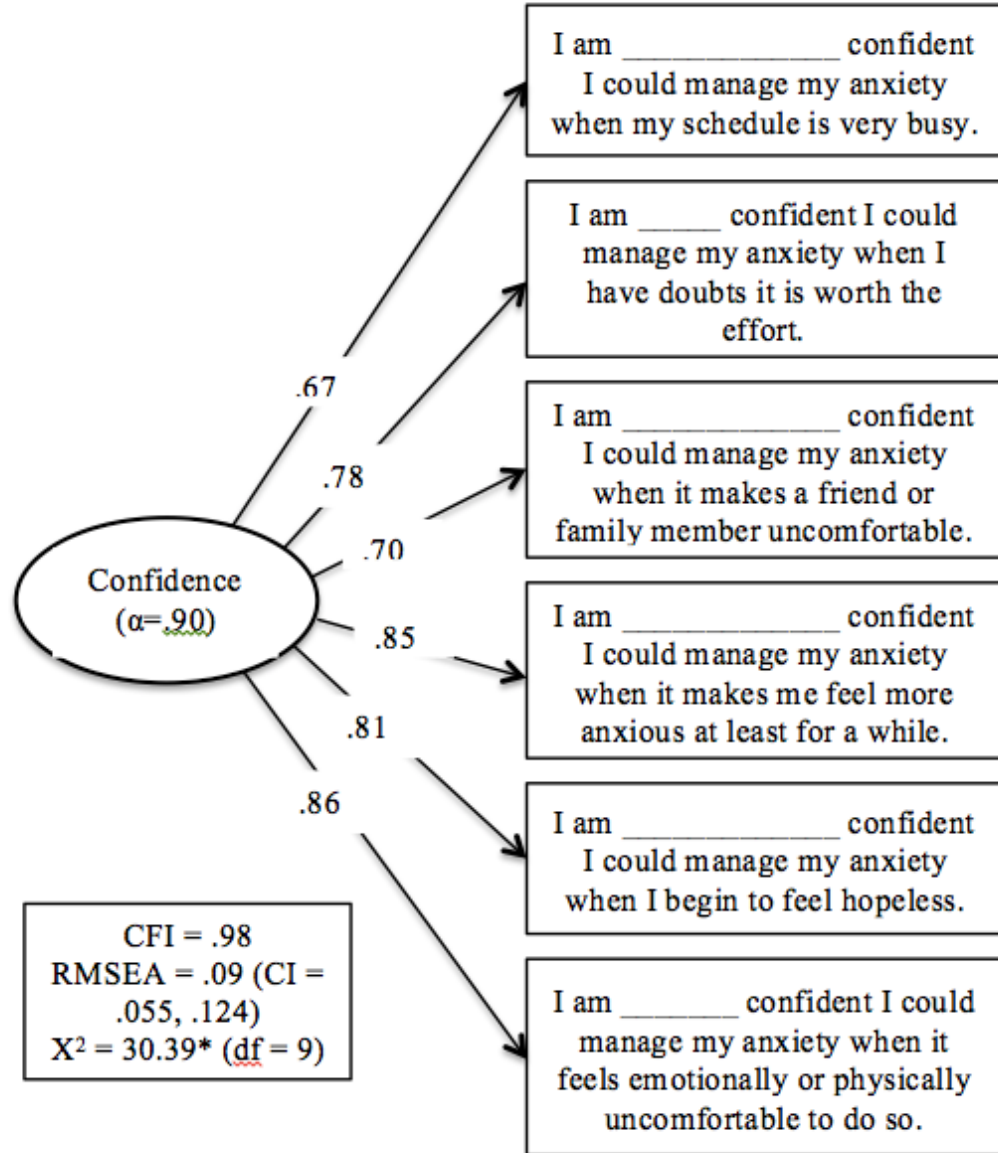
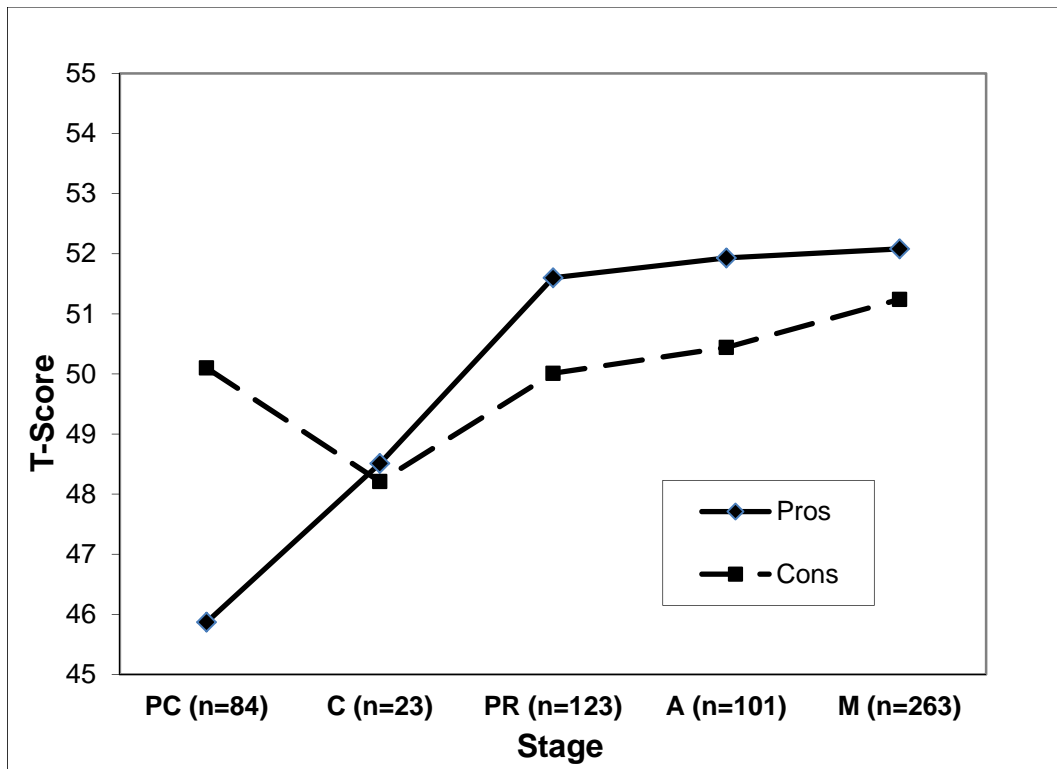


Figure 3.

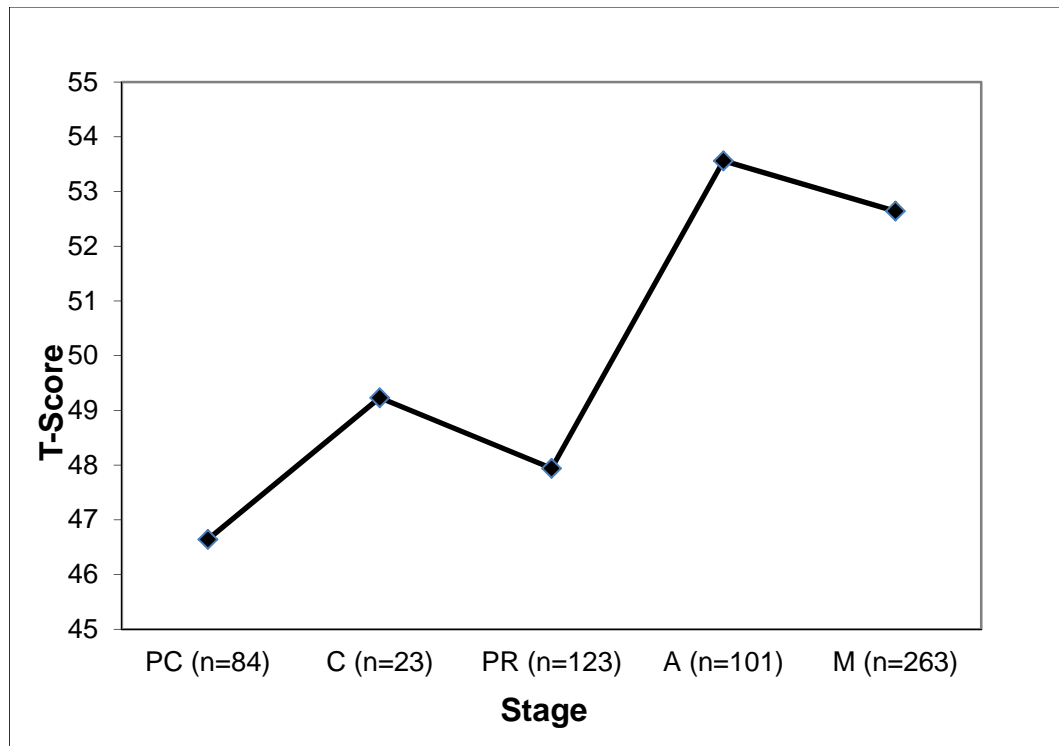
Stage of Change by Decisional Balance



Note. PC = Precontemplation; C = Contemplation; PR = Preparation; A = Action; M = Maintenance.

Figure 4.

Stage of Change by Self-efficacy



Note. PC = Precontemplation; C = Contemplation; PR = Preparation; A = Action; M = Maintenance.

MANUSCRIPT 3

Measuring the Processes of Change for Reducing Anxiety-Based Avoidance in
Anxious Adults

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submitted)

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Abstract

Anxiety is the most prevalent form of mental illness. Effective treatments exist, but are underutilized. Treatments vary but uniformly involve reducing avoidance of anxiety-producing stimuli. The Transtheoretical Model (TTM) provides a theoretical framework for designing interventions that improve reach. This study describes the development and validation of a measure of Processes of Change (POC), a core TTM construct representing the emotional, cognitive and behavioral elements of the change process. Cross-sectional measurement development with online survey dissemination was used in 594 adults reporting clinically significant anxiety. Confirmatory analyses replicated the theoretically-expected structure of the POC scales. Most effect sizes were in the medium range, indicating that POC represent important behavior change strategies for reducing anxiety-based avoidance. Relative effect sizes for the POCs indicate which POCs individuals with low readiness may need to focus on. The resulting measure can be used to design interventions that both increase readiness and guide those ready to take action.

Keywords

Transtheoretical Model, Processes of Change, Anxiety, Exposure, Readiness

Anxiety is the most prevalent form of mental illness in the United States. Lifetime prevalence estimates indicate that a quarter of the general population in the United States will experience an anxiety disorder at some point in his or her life (Kessler et al., 2005). Compared to the general population, individuals with anxiety disorders experience lower quality of life as well as educational and occupational impairment (Barrera & Norton, 2009; Breslau, Lane, Sampson, & Kessler, 2008; Comer et al., 2011; R C Kessler, 2003; Lee et al., 2009; Olatunji, Cisler, & Tolin, 2007; Patel, Knapp, Henderson, & Baldwin, 2002). They are also more likely to develop comorbid medical problems and more likely to commit suicide (Bolton et al., 2008; Comer et al., 2011; Harter, Conway, & Merikangas, 2003; Katon, Lin, & Kroenke, 2007; Sareen et al., 2005). Alongside these substantial personal costs, anxiety disorders have a large public health cost. They account for approximately a third of total expenditures on mental illness and have an annual estimated cost in the US ranging from \$42 to \$46 billion dollars (DuPont et al., 1998; Greenberg et al., 1999; Stein et al., 2005)

Many randomized control trials indicate that cognitive-behavioral treatments (CBTs) for anxiety are effective. Effect sizes for these treatments are consistently large ($d = 1.14$ to 1.98 ; Norton & Price, 2007), and a majority of patients show a positive response to these treatments (Barlow, Allen, & Choate, 2004). Exposure—the process of confronting stimuli that the patient would usually avoid because of anxiety, starting with less anxiety-provoking stimuli and working up to more difficult stimuli—is a key component of evidence-based behavioral treatments for anxiety (Norton & Philipp, 2008). Dismantling studies aimed at determining the active components of evidence-based treatments for anxiety indicate that exposure-only

treatments often perform as well as evidence-based therapies with exposure plus cognitive components (Deacon & Abramowitz, 2004; Eddy, Dutra, Bradley, & Westen, 2004; Feske & Chambless, 1995; Foa et al., 2005; Gould, Otto, Pollack, & Yap, 1997; Hope, Heimberg, & Bruch, 1995; Lovell, Marks, Noshirvani, Thrasher, & Livanou, 2001; Ougrin, 2011; Paunovic & Ost, 2001; Rosa-Alcazar, Sanchez-Meca, Gomez-Conesa, & Marin-Martinez, 2008; Scholing & Emmelkamp, 1993).

Unfortunately, most individuals with anxiety disorders do not receive exposure-based therapy. Only 4-11% of individuals with anxiety disorders seek mental health treatment at all (Mojtabai, Olfson, & Mechanic, 2002; Young, Klap, Sherbourne, & Wells, 2001). Research suggests that the main reasons for not getting treatment are: poor access (encountering logistical barriers such as cost and availability) and intra-individual variables that affect readiness (not being receptive to treatment or not believing one's symptoms warrant treatment; Weisberg, Dyck, Culpepper, & Keller, 2007). Intra-individual barriers are particularly relevant in exposure therapy because approaching feared stimuli is a difficult and counterintuitive way to address anxiety (Gunter & Whittal, 2010). To date, efforts to improve the reach of evidence-based treatments for anxiety have focused on increasing access, for example by training more providers, providing group treatment, making treatments available in non-specialty settings (Gunter & Whittal, 2010; McHugh, Murray, & Barlow, 2009), rather than reducing intra-individual barriers.

The Transtheoretical Model Of Behavior Change (TTM)

The TTM provides an integrative framework for developing interventions that are relevant to the full population of individuals exhibiting a particular problem behavior

(e.g., anxiety-based avoidance) rather than the smaller segment of the population who are ready to take action (Prochaska & DiClemente, 1983). Numerous randomized controlled trials support the effectiveness of interventions that provide both tailored feedback based on individuals' use of particular readiness-matched behavioral and cognitive elements of the change process. Such TTM-tailored interventions have been used to promote behavior change in a variety of areas ranging from engaging in physical activity to managing depressive symptoms to reducing domestic violence (Levesque, Ciavatta, Castle, Prochaska, & Prochaska, 2012; Levesque et al., 2011; Marcus et al., 1998).

The TTM posits that individuals differ in their readiness to make changes. Readiness is classified within five dynamic Stages of Change: Precontemplation (not intending to take action in the foreseeable future), Contemplation (intending to take action in the near future, but not immediately), Preparation (intending to take action in the immediate future), Action (initiating the new behavior pattern) and Maintenance (>6 months of successful behavior change). These stages are conceptualized as dynamic in that individuals frequently migrate between stages both in the direction of progress toward change and in the direction of regression away from change.

Alongside this temporal classification of change are two other constructs—Decisional Balance and Self-efficacy—which represent the “why” part of the change process. Decisional Balance refers to an individual's perception of the relative weights of advantages and disadvantages of change (Velicer, DiClemente, Prochaska, & Brandenburg, 1985). Self-efficacy refers to an individual's level of confidence in his

or her ability to change a target behavior in a variety of challenging situations (Velicer, DiClemente, Rossi, & Prochaska, 1990).

The TTM also specifies ten Processes of Change (POC) that describe the “how” part of behavior change. The POC are a set of cognitive, emotional and behavioral experiences or strategies in which individuals engage at different points of the change process (DiClemente & Prochaska, 1982; Prochaska, Velicer, DiClemente, & Fava, 1988). These POC are conceptualized as ten independent but interrelated variables that influence Decisional Balance and Self-efficacy and can be used to promote successful change. The 10 POC include two groups: experiential POC which are the cognitive and emotional aspects of the change process and behavioral POC which are the overt activities that facilitate change (DiClemente & Prochaska, 1982; Prochaska, DiClemente, & Norcross, 1992). Experiential POCs include Consciousness Raising (increasing information about how change could impact one’s life), Dramatic Relief (emotional reactions to the problem behavior), Environmental Reevaluation (assessing how the problem behavior affects one’s environment), Self-reevaluation (assessing conflicts between one’s sense of self and the problem behavior), and Social Liberation (increasingly recognizing alternatives to the problem behavior). Behavioral POCs include Self Liberation (affirming one’s commitment to change), Reinforcement Management (rewarding oneself or receiving rewards for taking steps toward change), Helping Relationships (increasing social support for behavior change), Counterconditioning (substituting problem behaviors with healthier behaviors), and Stimulus Control (increasing cues for positive behaviors and removing cues for the behavior one is trying to change; Prochaska et al., 1992).

The relationship between Stage of Change and POC is not uniform across problem behaviors. For example, in smoking and substance abuse, experiential POC are used more frequently in pre-Action stages of change and behavioral POC are used more frequently in Action and Maintenance (Prochaska, Velicer, Diclementa, & Fava, 1988; Rosen, 2000). In behaviors such as insufficient exercise and unhealthy dietary habits, use of both behavioral POC and experiential POC seem to either remain steady or increase from earlier to later stages of change (Gorely & Gordon, 1995; Beth H Marcus, Rossi, Selby, Niaura, & Abrams, 1992; Oliveira, Anderson, Auld, & Kendall, 2005). One theory on these differences is that the type of behavior (e.g., acquisition behaviors where a new activity is being initiated versus cessation behaviors where a problematic behavior is being stopped) may determine the pattern of POC use across stage (Rosen, 2000). Creating interventions tailored to individuals' readiness to change a given behavior requires an understanding of which POCs are most important at each level of readiness.

Current Study

Applications of the TTM to anxiety have been limited. Several studies have evaluated the relationship between various treatment factors (initiation, dropout and treatment outcomes) and Stage of Change (Al-Asadi, Klein, & Meyer, 2014; Pinto, Pinto, Neziroglu, & Yaryura-Tobias, 2007; Reid, Nair, Mistry, & Beitman, 1996; Woolf et al., 2006). Also, while not directly related to the TTM, several recent studies have shown improved treatment engagement and clinical outcomes when readiness-enhancing interventions like Motivational Interviewing and Motivational

Enhancement Therapy (MET) are used as pretreatments for CBT (Buckner & Schmidt, 2009; Westra, Arkowitz, & Dozois, 2009; Westra & Dozois, 2006).

In order to design anxiety interventions using a TTM framework, core constructs of the TTM as they relate to anxiety must be defined and measurable. The current study builds upon existing literature (which suggests that readiness affects treatment outcomes) by defining a core TTM construct, Processes of Change, as it relates to anxiety. Specifically, in this study a POC measure for anxiety-based avoidance—the central behavior change target for evidence-based treatments for anxiety—was developed and evaluated for validity. Secondary aims were to evaluate the relationship between the TTM POCs and readiness to address anxiety-based avoidance and to develop data-driven guidelines for POC use across stages. This could guide tailoring algorithms for a computer-delivered, readiness enhancing, intervention for anxiety.

METHODS

Measure Development Process

A sequential process of measurement development was used in this study (Jackson, 1970; Redding, Maddock, & Rossi, 2006). This approach involves item development and refinement via literature review, expert interviews and qualitative interviews with individuals in the population of interest. Data are then collected on the items developed, and a series of structural equation modeling analyses are used to refine the POC scales. Finally, external validation analyses are conducted. These involve testing for predicted relationships between POC use and other TTM constructs such as stage, Decisional Balance and Self-efficacy.

Item Development. For this study, item development involved interviews with two anxiety experts. Items generated were then blindly rated for construct consistency by six TTM experts. Items that were not classified as measuring the intended Process of Change by a majority of TTM expert raters (i.e., at least 4 out of 6) were excluded from final survey used for data collection.

Items developed via expert interviews were further evaluated via qualitative interviews with individuals from the population of interest. Qualitative interviews were intended to check items for clarity, acceptability, and face validity. Items that consistently raised questions or other problems among the interviewees were discussed by the project team and eliminated or modified. Interviews were conducted until data saturation was reached (n=10).

Data Analyses. Data for structural equation modeling analyses were collected by Survey Sampling International (SSI), an online survey sampling company, using FluidSurveys™ online survey software. Data were extracted from FluidSurveys™ into both EQS for structural equation modeling analyses and SPSS for external validation analyses.

Iterative Confirmatory Factor Analyses (CFAs) were the primary tool used for measurement development. The aims of these analyses were to (1) generate estimates factor loadings and (2) evaluate internal consistency for each factor using Cronbach's alpha. Item selection was an iterative process in which items with poor loadings (<.40), complex loadings (>.40 on more than one factor), as well as items with lower loadings and content redundancy were removed. Analyses were then repeated. Final item selection was also based on item clarity and conceptual breadth.

Once the final set of items was selected, alternative measurement models were compared using CFA to determine which factor structure provided the best fit to the data. Robust estimation methods (as opposed to maximum likelihood methods) were used given the ordinal nature of measurement data. In order to determine the model with the best fit, three fit indices were used: the Satorra-Bentler scaled chi-square statistic (X^2), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA). Traditionally, CFI values of 0.90 and above are considered to indicate good fit (Hu & Bentler, 1999). RMSEA values between .05 and .08 suggest reasonable error of approximation, and values ≥ 1 indicate poor fit (Browne & Cudeck, 1993).

External validation involved evaluating the degree to which data confirmed the TTM-based prediction that (i) individuals in different Stages of Change will differ significantly on their scores for the POC subscales and (ii) POCs will be correlated with other TTM constructs. Multivariate Analysis of Variance (MANOVA) was conducted to evaluate differences in POC across stage. To facilitate comparison between the magnitude of differences across stage in scores among the different subscales and the results of the current and previous studies, raw scores were converted to T-scores ($M = 50$, $SD = 10$). Correlations between POC subscales and other TTM variables (Pros, Cons and Self-Efficacy) were also examined.

Participants

Recruitment. To be eligible for either phase of the study (qualitative interviews or online survey administration), individuals had to be over the age of 18 and score an 8 or above on the Overall Anxiety Severity and Impairment Scale

(OASIS), which has been found to indicate clinically significant anxiety (Campbell-Sills et al., 2009). Participants for qualitative interviews were recruited through flyers placed at universities, community centers, and mental health treatment centers. Flyers directed interested participants to call the primary investigator, at which point they were consented to engage in a screening questionnaire for eligibility (age and OASIS score). Twenty individuals called to express interest in participating. Thirteen of these individuals were eligible to participate and ten opted to come in for qualitative interviews. Qualitative interview participants were reimbursed \$20 for their participation. The sample for the online survey administration was recruited through Survey Sampling International, an online survey sampling company.

Sample Characteristics. Ten individuals participated in qualitative interviews. The average age of cognitive interview participants was 36.6 and the average OASIS score was 11.3. Three of the qualitative interview participants were recruited from a local mental health treatment center, four were recruited from a community support center, and three were recruited from the University of Rhode Island community. Seven of the qualitative interview participants were male and three were non-white.

SSI recruited 594 eligible adults to participate in the online survey portion of this study. The sample was primarily female (69.4%, $n=412$), and ages ranged from 18 to 80 ($M = 38.6$, $SD = 13.8$). The majority of the sample was White ($n=454$, 76.4%), 12.8% were Black ($n=76$), 3.7% were Asian ($n=22$), and 7.1% classified themselves as not fitting any of these racial categories ($n=42$). Of the 594 participants, 14.1% were in Precontemplation ($n=84$), 3.9% were in Contemplation ($n=23$), 20.7% were in

Preparation (n=123), 17.0% were in Action (n=101), and 44.3% were in Maintenance (n=263).

Measures

Measures Used

Overall Anxiety Severity and Impairment Scale (OASIS; Norman, Hami-Cissell, Means-Christensen, & Stein, 2006). The OASIS was used to determine eligibility for participation. The OASIS is a 5-item self-report measure that evaluates severity and impairment associated with any anxiety disorder. Participants rate the degree to which each item describes them over the past week on a 5-point scale ranging from 0 (None) to 4 (Extreme/All the Time). A cutoff score of 8 or greater has been found to accurately classify 87% of individuals as having an anxiety diagnosis (Campbell-Sills et al., 2009). This scale was selected based on its strong psychometric properties, adequate coverage of symptoms relevant for all anxiety diagnoses, and ease of use (i.e., short length, free access, and easy scoring). Good internal ($\alpha=0.80$) and one-month test-retest reliability ($\kappa = 0.82$) have been reported. Research shows strong convergent validity with other measures of anxiety (Norman, Hami-Cissell, Means-Christensen, & Stein, 2006).

Stage of Change. Participants were asked to answer a series of questions about whether they regularly challenge their tendency to avoid anxiety-producing stimuli. Questions placed participants in one of five mutually exclusive Stage of Change categories. The behavioral target or criterion for assigning an individual to the Action stage, was defined as “at least once a week, you push yourself to approach some of the things that you often avoid (or choose not to do) because of anxiety.” This criterion

was based on evidence that exposure to feared stimuli reduces symptoms of anxiety and impairment from anxiety. For pre-action stages, participants were assigned to Precontemplation if they indicated that they were not currently approaching feared stimuli regularly and did not intend to do so in the next six months; Contemplation if they were not currently approaching feared stimuli regularly, but intended to begin doing so in the next six months; and Preparation if they were not currently approaching feared stimuli regularly, but intended to begin doing so in the next 30 days. Participants were assigned to Action if they reported currently meeting the Action criterion and were assigned to Maintenance if they reported having been engaged in this behavior for at least six months.

Decisional Balance. The Decisional Balance scale included 10 items designed to assess the relative importance of Pros (5 items) and Cons (5 items) of reducing anxiety-based avoidance. Examples of items were “managing my anxiety could improve my relationship with others” (Pro) and “trying to do some of the things that make me anxious could be embarrassing (Con). Ratings were based on 5-point Likert scale ranging from 1 = ‘Not Important at All’ to 5= ‘Extremely Important.’ The score for this scale was the sum of a participant’s responses.

Self-efficacy. Six items were used to develop evaluate Self-efficacy or participants’ confidence in their ability to approach feared stimuli regularly in a variety of challenging situations (e.g., “when my schedule is very busy”). Participants indicated their confidence levels on a 5-point Likert scale, ranging from 1 = “Not at All Confident” to 5 = “Extremely Confident. The total score for this scale consisted of the sum of the participant’s responses.

Measures Developed

Processes of Change. An initial pool of 93 items reflected the 10 POC.

Participants were asked to rate the frequency in which they engaged in an array of cognitive, behavioral and emotional reactions to their anxiety and the avoidance it encourages. Participants indicated the frequency with which they engaged in each activity on a 5-point Likert scale, ranging from 1 = “Never” to 5 = “Frequently” (final items listed in Table 1).

RESULTS

Processes of change

The 10-factor fully correlated model fit the data best, $\chi^2(360)=905.82$, $p<.01$, CFI=.94, RMSEA =.051 (see Table 1). Factor loadings ranged from .53 to .85 and coefficient alphas ranged from .69 to .88. Table 2 shows the fit indices for the models that were evaluated. The null model supports 30 independent variables and no latent factors. The ten-factor model specifies 10 correlated latent factors each with three items loading on them. Finally, the two higher order factor model was a hierarchical model, which specified two, correlated factors, representing experiential and behavioral POC respectively, each with five latent POC variables loading on them and respective items loading on the latent POC variables (see Figure 1 in the appendix).

External validation

POC and Stage of Change. Multivariate Analysis of Variance (MANOVA) found a significant main effect for Stage of Change (Wilk’s $\Lambda=.72$, $F(40, 2201.1) = 4.89$, multivariate $\eta^2 = .08$). This indicates that use of the POC subscales differed significantly by Stage of Change. Follow-up ANOVA values are as follows:

Consciousness Raising $F(4, 589) = 13.03, p < .01, \eta^2 = .08$; Dramatic Relief $F(4, 589) = 5.89, p < .01, \eta^2 = .04$; Environmental Reevaluation $F(4, 589) = 8.26, p < .01, \eta^2 = .05$; Self-Reevaluation $F(4, 589) = 18.81, p < .01, \eta^2 = .11$; Social Liberation $F(4, 589) = 19.23, p < .01, \eta^2 = .12$; Self-liberation $F(4, 589) = 26.83, p < .01, \eta^2 = .15$; Reinforcement management $F(4, 589) = 21.21, p < .01, \eta^2 = .13$; Helping relationships $F(4, 589) = 8.80, p < .01, \eta^2 = .06$; Counterconditioning $F(4, 589) = 30.09, p < .01, \eta^2 = .17$; and Stimulus Control $F(4, 589) = 29.98, p < .01, \eta^2 = .17$. Figures 1 and 2 show the experiential and behavioral POC comparisons by stage respectively.

Table 3 shows the results of post-hoc tests evaluating which stages showed significant differences for each POC subscale. Findings showed that individuals in Precontemplation used experiential POC less than individuals in all other stages with the exception of Consciousness Raising and Social Liberation. Results showed that individuals in Precontemplation, Contemplation and Preparation used behavioral POC less (with the exception of Helping Relationships) than those in Action and Maintenance. All three exceptions to the patterns specified above were differences between individuals in Contemplation and other stages, which may have been a function of the small sample size of participants in Contemplation.

POC, Decisional Balance and Self-efficacy. Experiential POC and behavioral POC were summed and two higher order constructs were created in order to evaluate the relationships between POC, Decisional Balance and Self-efficacy. Correlations among the POC factors (experiential and behavioral), Decisional Balance (Pros and Cons), and Self-efficacy were then evaluated. Experiential POC and behavioral POC

were significantly positively correlated with one another as well as with Pros, Cons and Self-efficacy (Table 4).

DISCUSSION

The primary goal of this study was to develop a psychometrically and conceptually sound measure of TTM Processes of Change relevant for reducing anxiety-based avoidance. To our knowledge, this is the first study to apply the TTM Processes of Change to anxiety. Items had strong content and face validity per expert interviews and qualitative interviews with participants. Confirmatory factor analyses performed on the final set of items supported a correlated, ten-factor model structure, which has been observed in POC measures for a number of other behaviors (Amoyal et al., 2013; Fernandez et al., 2013; Marcus et al., 1992). Items demonstrated strong loadings on factors (ranging from .53 to .85), and POC subscales for the final measures showed good internal consistency (alphas ranged from good .88 for Helping Relationships to acceptable .69 for Environmental Reevaluation; Costello & Osborne, 2005).

This study adds to a base of literature that has compared fit indices between alternative factor structures for the POC. In one hypothesized factor structure, the five experiential and behavioral POCs each load on one of two correlated higher order factors, one representing the experiential POC and the other representing the behavioral POC (see Figure C1 in appendix). The alternative factor structure tested was a 10-factor, fully correlated model. In this study, the 10-factor correlated model was a better fit to the data. Taken together with previous findings that support the 10-factor, correlated model over the two higher order factor model (Amoyal et al., 2013;

Fernandez et al., 2013; Beth H Marcus et al., 1992), these results raise the question of whether the division of POCs into two groups (experiential and behavioral) is more conceptually- than data-driven. Further evaluation of the factor structure that best fits data in different areas of behavior change is needed to determine the empirical distinction between experiential and behavioral POCs.

Similar to studies of POC measures for other behaviors, our findings indicated reliable differences in POC use across Stage of Change. Overall experiential POC use showed the biggest differences between Precontemplation and Contemplation, whereas behavioral POC showed the biggest differences between Preparation and Action. Some experiential POC, namely Dramatic Relief and Environmental Reevaluation, showed flattening after Contemplation, which indicates that intervening to increase use of these processes may be most important in early stages. Additionally, participants in all pre-Action stages use most behavioral POC significantly less than participants in Action/Maintenance. In contrast, significant differences in experiential POC use were mainly between Precontemplation and all other stages. This finding supports a distinction between experiential and behavioral POCs insofar as they appear to be used most frequently in different stages of the change process. Another pattern observed that is consistent with previous literature and supports the external validity of this measure was that Precontemplators reported using POCs significantly less frequently than individuals in Action and Maintenance for all POCs (Prochaska & DiClemente, 1983).

Cross-stage effect sizes were mostly in the small to medium range. As has been observed in some other areas of behavior change, effect sizes were consistently

larger for behavioral POCs than experiential POCs (Marcus et al., 1992). Among experiential POCs, Self-reevaluation and Social Liberation showed the largest effect sizes. Among the behavioral POC, Counterconditioning and Stimulus Control showed the largest effect sizes. Differences in effect size provide insight into which POC may be most useful to intervene on at different levels of readiness.

Relationships between POCs and other TTM constructs were evaluated as a means of external validation. The expectation is that as Decisional Balance and Self-efficacy shift in favor of change, POC will be used more frequently. As hypothesized, experiential and behavioral POCs were positively correlated with the perceived importance of Pros of reducing avoidance as well as with Self-efficacy (that one could maintain a commitment to approaching feared stimuli across a range of challenging situations). This study found a significant positive correlation between POC and perceived importance of Cons of change, a result that has also been found for some other behaviors (e.g., Amoyal et al., 2013). One interpretation of this finding is that Cons do not deter participation in change-related cognitive and behavioral activities and may be keenly experienced throughout the change process.

A few correlations between TTM variables were particularly high and, therefore, warrant additional discussion. Namely, Pros were most highly correlated with experiential POC, and Self-efficacy was most highly correlated with behavioral POC. These correlations may be owing to the relative importance of Pros and experiential POC in earlier stages and the relative importance of Self-efficacy and behavioral POC in the later stages. However, further exploration of potential causal

relationships between these variables (e.g., perception of the importance of Pros producing more frequent of engagement in experiential POC) would be worthwhile.

Several limitations of this study should be acknowledged. First, this study utilized a cross-sectional design. Longitudinal studies will be necessary to evaluate the degree to which increasing POC use drives change and to enhance applicability of findings to intervention development. Second, the participant sample was predominantly white and non-Hispanic, which may limit the generalizability of findings to minority populations. Although factor structures and validity findings for TTM constructs have often generalized well to minority samples, the applicability of this scale to more diverse populations must be evaluated (Blaney et al., 2012). Additionally, the sample consisted of individuals who agreed to be part of a large survey-sampling company's national database, which may have produced self-selection bias. Finally, approximately half of our sample was in the Action or Maintenance Stage of Change. While stage by POC analyses were weighted for differing stage samples sizes, these sample characteristics may have affected the measurement development process. Also the particularly small sample size for individuals in Contemplation, is likely why comparisons between the use of POCs in the Contemplation and other stages were often not significant even when fairly large differences were observed. Future research evaluating findings with a more diverse sample, more equal stage distribution (or even a pre-Action only sample), and proactive recruitment that reaches out to a full population, rather than just those who sought out opportunities to participate in online surveys, is warranted.

The results of the present study have important theoretical and applied implications for treatment of anxiety disorders. Interventions for anxiety disorders need to be designed to treat both individuals who are ready to reduce their avoidance and individuals who are suffering from anxiety, but not ready to take the steps required to address it. This study developed a measure of ten strategies used to facilitate motivation and engagement in behavior change that can help guide clinicians and researchers in tailoring interventions to patients' level of readiness.

This measure can be used in the context of therapy and treatment research to evaluate the cognitive, behavioral, and emotional activities a patient or participant is engaging in and facilitate a more readiness-tailored intervention. Additionally, there is a strong precedent for using the TTM as a framework for developing computer-based interventions that can be used as an adjunct to in-person treatments or alone for those who do not have access to or are unwilling to seek in-person treatment. Such interventions involve administering a POC measure and providing feedback tailored to an individual's score on the instrument as well as Stage of Change. These interventions are low-cost, accessible, and have been found to be effective in producing behavior change relevant for other mental health disorders (e.g., Levesque et al., 2011). Integration of stage-matched POC feedback into existing and new interventions has the potential to allow the field to take a more population-based approach that could help solve the knowledge-dissemination gap plaguing treatment of anxiety disorders.

CONCLUSIONS

This study developed a reliable (internally consistent) and valid instrument for measuring TTM Processes of Change for reducing anxiety-based avoidance in anxious individuals. Findings also support the applicability of the TTM to anxiety-based avoidance insofar as the measurement structure and relationship between TTM constructs adhered to models observed in other behaviors. This POC instrument is appropriate for use in clinical settings and treatment research to design and implement readiness-matched interventions. It could also be used to develop a cost-effective, easy-to-access, TTM-based computer-tailored intervention, which has potential to have a large impact on the population of individuals with anxiety disorders who are not in treatment.

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Table 1.

Item Loadings from Confirmatory Factor Analysis and Coefficient Alpha's for Experiential and Behavioral Processes of Change.

Processes of Change	Factor Loadings
Experiential Processes	
Consciousness Raising ($\alpha=.80$)	
I search the internet for information on how to better manage my anxiety.	0.85
I pay attention to information from the tv, radio, and articles on how to manage my anxiety.	0.70
I Google the effects of anxiety on my health and functioning.	0.75
Dramatic Relief ($\alpha=.73$)	
I am disappointed when I notice that I missed or avoided something because of my anxiety.	0.63
I feel sad when I see how anxiety affects my life.	0.76
I feel frustrated when I compare myself to others who have less anxiety.	0.69
Environmental Reevaluation ($\alpha=.69$)	
I consider that avoiding things because of my anxiety may make me a worse role model.	0.53
I pay attention to how my anxiety affects my family.	0.70
I think that managing my anxiety may prevent me from being a burden on others.	0.74
Self-reevaluation ($\alpha=.71$)	
I imagine a day when anxiety has less control over my life.	0.59
I think that addressing my anxiety would make me feel like a more confident person.	0.69
I feel more like the person I want to be when I take steps to manage my anxiety.	0.74
Social Liberation ($\alpha=.83$)	
I see that more and more people are getting help dealing with their anxiety.	0.76
I notice more opportunities to get support in managing my anxiety.	0.83
I notice the media are more open to covering people's struggles with anxiety.	0.76
Behavioral Processes	
Self-liberation ($\alpha=.80$)	
I believe I can carry through with my goal to do some of the things that make me anxious.	0.71
I renew my commitment to face my fears one step at a time.	0.77
I tell myself that I can approach things that make me anxious if I work at it.	0.78
Reinforcement Management ($\alpha=.83$)	
I give myself credit for the hard work I'm doing to manage my anxiety.	0.80
I do something nice to reward myself when I don't give into the urge to avoid.	0.79
As I approach more things over time, it feels good to see that I'm becoming less anxious.	0.78
Helping Relationships ($\alpha=.88$)	
I am supported by others in my efforts to stop avoiding things that make me anxious.	0.83

Friends or relative let me know they are there to help me manage my anxiety.	0.84
I see that I have someone who encourages me to manage my anxiety.	0.85
<hr/>	
Counter Conditioning ($\alpha=.81$)	
When I start feeling anxious, I take time to practice mindfulness or to practice focusing on the present moment.	0.71
When I start having anxious thoughts, I practice challenging them.	0.78
I practice doing things that make me anxious, rather than avoiding them.	0.81
<hr/>	
Stimulus Control ($\alpha=.81$)	
I organize my schedule in a way that requires me to face my fears.	0.79
I plan activities that encourage me to face the things that make me anxious.	0.81
I use my phone, computer or calendar to remind me to take steps to manage my anxiety.	0.72
<hr/>	

Table 2.

Robust Estimation Method Fit Indices for Processes of Change Confirmatory Models

	χ^2 (<i>df</i>)	CFI	RMSEA (CI)
Full null model	9268.90* (435)	--	--
Ten factor model	905.82* (360)	0.94	.051 (.046, .055)
Two higher order factor model	1334.40* (394)	0.89	.063 (.060, .067)

Note. N= 594; χ^2 = chi square; *df* = degrees of freedom; CFI = comparative fit index; RMSEA = root mean square error of approximation; CI = confidence interval; *p<.01.

Table 3.

Stage Group Comparisons on Each of the Processes of Change

Process	Comparisons of stage-of-change groups
Consciousness raising	PC < PR/A/M
Dramatic relief	PC < All
Environmental reevaluation	PC < All
Self-reevaluation	PC < All
Social Liberation	PC < PR/A/M, PR < A/M
Self Liberation	PC < PR/A/M, C < A/M, PR < A/M
Reinforcement management	PC < PR/A/M, C < A/M, PR < A/M
Helping relationship	PC < A/M, PR < A/M
Counterconditioning	PC < PR/A/M, C < A/M, PR < A/M
Stimulus control	PC < A/M, C < A/M, PR < A/M

Note. PC = Precontemplation; C = Contemplation; PR = Preparation; A = Action; M = Maintenance; ALL = All other stages of change; $p < .05$, using Tukey tests.

Table 4.

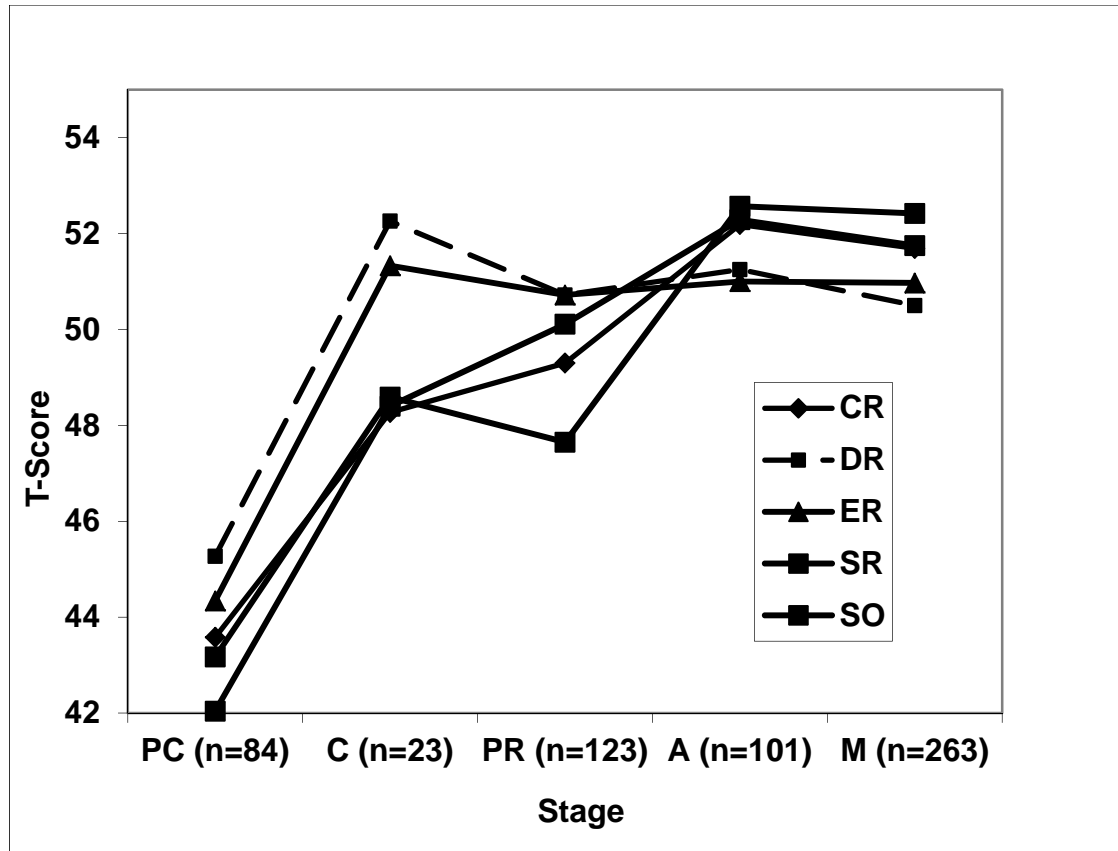
Correlations between Processes of Change and other TTM constructs

	Behavioral Processes	Pros	Cons	Self- Efficacy
Experiential Processes	.659*	.546*	.270*	.312*
Behavioral Processes	--	.210*	.196*	.601*
Pros		--	.275*	.074
Cons			--	.045
Self-Efficacy				--

Note. *p < 0.01 level (2-tailed).

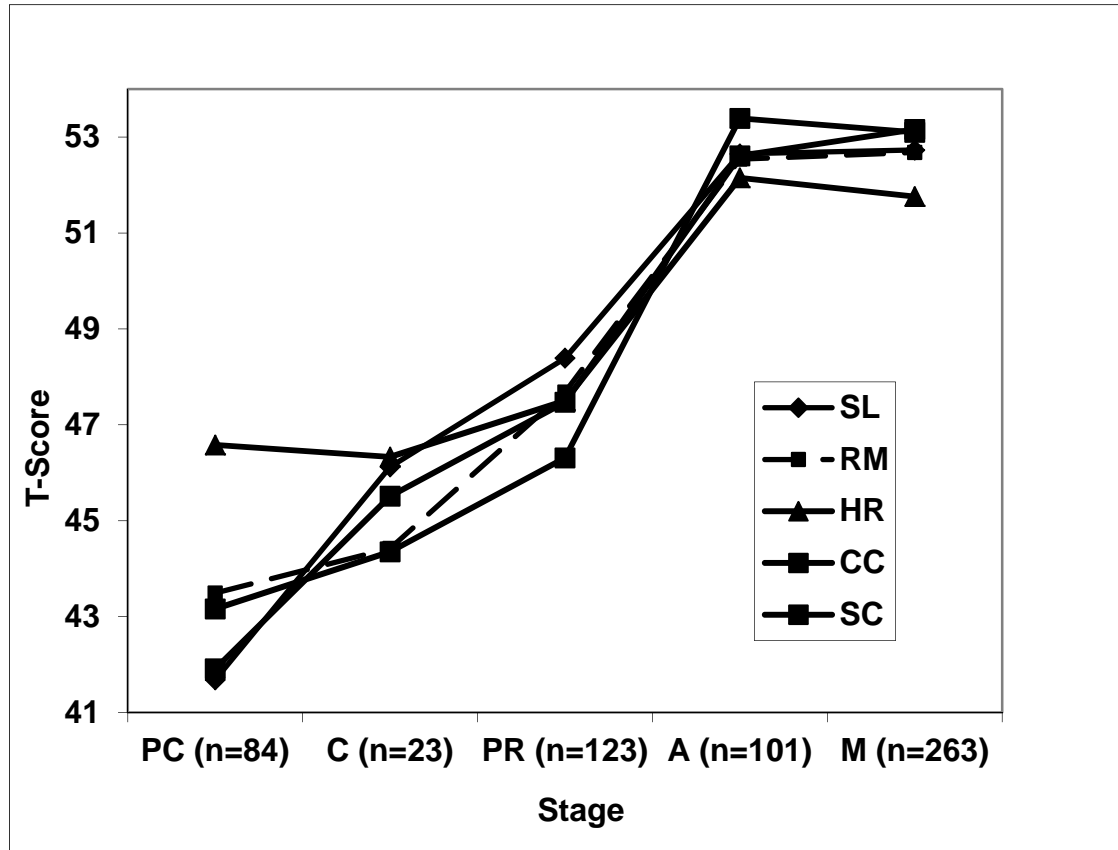
Figure 1.

Experiential Processes of Change by Stage



Note. PC = Precontemplation; C = Contemplation; PR = Preparation; A = Action; M = Maintenance; CR = Consciousness Raising; DR = Dramatic Relief; ER = Environmental Reevaluation; SR = Self-reevaluation; SO = Social Liberation.

Figure 2. Behavioral Processes of Change by Stage



Note. PC = Precontemplation; C = Contemplation; PR = Preparation; A = Action; M = Maintenance; SL = Self Liberation; RM = Reinforcement Management; HR = Helping Relationships; CC = Counterconditioning; SC = Stimulus Control.

APPENDICES

Appendices Outline

- A. SUPPLEMENTAL TABLE FOR MANUSCRIPT 1
- B. SUPPLEMENTAL TABLE FOR MANUSCRIPT 2
- C. SUPPLEMENTAL TABLES AND FIGURES FOR MANUSCRIPT 3
- D. TTM CONSRUCTS ACROSS TREATMENT STATUS GROUPS
- E. DESCRIPTIVE DATA ON REASONS PARTICIPANTS ENDORSED FOR NOT SEEKING TREATMENT FOR ANXIETY
- F. CROSS-RACIAL COMPARISONS OF STAGE OF CHANGE AND MEAN SCORES ON TTM CONSTRUCTS
- G. CROSS-GENDER COMPARISONS OF STAGE OF CHANGE AND MEAN SCORES ON TTM CONSTRUCTS
- H. REFERENCES CITED IN APPENDICES

APPENDIX A: SUPPLEMENTAL TABLE FOR MANUSCRIPT 1

Table A1.

2 x 2 Contingency Table for Reported Chi-Square Test

		In Treatment	
		No	Yes
Stage	Pre-Action	38.3% (88)	61.7% (142)
	AM	25.8% (94)	74.2% (270)

Note. Pre-Action = Precontemplation, Contemplation or Preparation; AM = Action or Maintenance.

APPENDIX B: SUPPLEMENTAL TABLE FOR MANUSCRIPT 2

Table B1.

Maximum Likelihood Method Fit Indices for Decisional Balance and Self-Efficacy Confirmatory Models

	χ^2 (df)	CFI	GFI	RMSEA (CI)
Decisional Balance				
Model 1: null model	1113.78 (45)*	--		--
Model 2: uncorrelated two factor model	112.94 (35)*	.927	.930	.086 (.068, .103)
Model 3: correlated two factor model	96.48 (34)*	.942	.938	.078 (.060, .096)
Self-efficacy				
Model 1: null model	862.67 (15) *	--		--
Model 2: one factor model	37.82(9)*	.973	.957	.103 (.070, .137)

Note. N = 305; χ^2 = chi square; df = degrees of freedom; CFI = comparative fit index; GFI = Goodness of fit index; RMSEA = root mean square error or approximation; CI = confidence interval; *p<0.01

APPENDIX C: SUPPLEMENTAL TABLES AND FIGURES FOR MANUSCRIPT 3

Table C1.

Maximum Likelihood Method Fit Indices for Processes of Change Confirmatory Models

	χ^2 (<i>df</i>)	CFI	RMSEA (CI)
Full null model	11017.91 (435)	--	--
Ten factor model	1251.74 (360)	0.92	.065 (.061, .068)
Two higher order factor model	1802.76 (394)	0.87	.078 (.074, .081)

Note. N= 594; χ^2 = chi square; *df* = degrees of freedom; CFI = comparative fit index; RMSEA = root mean square error of approximation; CI = confidence interval; *p<.01.

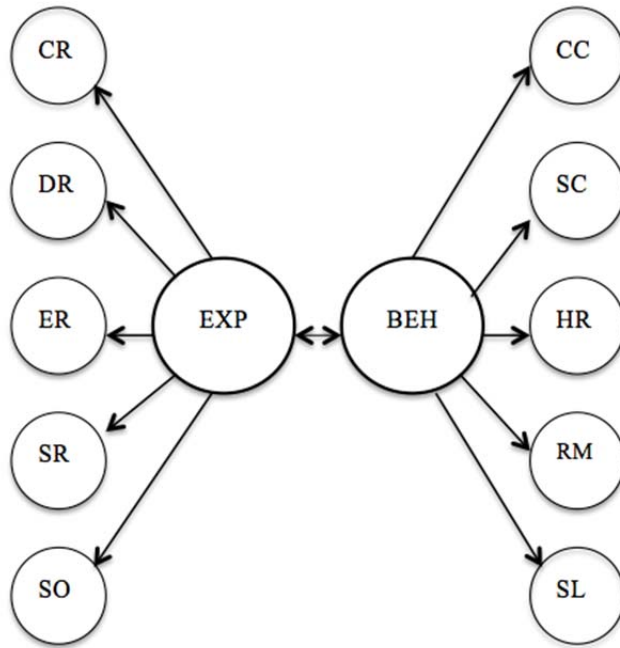
Table C2.

Correlations Between Processes of Change

	CR	DR	ER	SR	SO	CC	SC	HR	RM	SL
CR	--	.33	.39	.42	.62	.53	.59	.42	.55	.48
DR		--	.61	.53	.23	.17	.13	.15	.19	.18
ER			--	.56	.39	.37	.30	.35	.33	.38
SR				--	.56	.53	.41	.41	.54	.59
SO					--	.65	.60	.58	.66	.63
CC						--	.78	.57	.79	.80
SC							--	.58	.78	.71
HR								--	.63	.56
RM									--	.75
SL										--

Note. CR = Consciousness Raising; DR = Dramatic Relief; ER = Environmental Reevaluation; SR = Self-reevaluation; SO = Social Liberation; CC = Counterconditioning; SC = Stimulus Control; HR = Helping Relationships; RM = Reinforcement Management; SL = Self Liberation.

Figure C1. Two Higher Order Factor Model Diagram



Note. The above diagram illustrates the alternative to the 10-factor fully correlated model. In the 10-factor fully correlated model, all POC latent variables were correlated. In this model only the disturbances of the two higher order factors were correlated (marked by the two way arrow).

APPENDIX D: TTM CONSRUCTS ACROSS TREATMENT STATUS GROUPS

As specified in the above chapters, data was collected on participants' current treatment status. Participants were asked to select one of four mutually exclusive categories: (a) I am NOT currently in treatment for anxiety; (b) I currently take medication for anxiety (prescribed by a health professional like a doctor, nurse or psychiatrist); (c) I currently go to therapy or counseling for anxiety (meeting for 30 minutes to an hour to discuss your feelings with a professional); (d) I currently take medication and go to therapy for anxiety.

ANOVAs were conducted to evaluate differences in scores on the OASIS and continuous TTM constructs (Pros, Cons, Self-efficacy, behavioral Processes of Change and experiential Processes of Change) across treatment status group. A chi-square test was conducted to evaluate the association between Stage of Change and treatment status group.

Descriptive statistics are summarized in Table D1, ANOVA results are summarized in Table D2 below, and the distribution of stage within each treatment status group is displayed in Figure D1. A significant difference in level of anxiety across treatment status group was observed ($F(3, 590) = 13.52, p < .01, \eta^2 = .06$). Post hoc comparisons using the Tukey HSD test indicated that the mean OASIS score of participants in combined medication and therapy treatment ($M = 13.93, SD = 3.50$) was significantly higher than that of participants taking medication only ($M = 11.69, SD = 2.95$), in therapy only ($M = 12.39, SD = 2.89$) and even those not in treatment at all ($M = 12.02, SD = 3.00$). ANOVA also indicated a significant difference in reported frequency of behavioral Process of Change use across treatment status group ($F(3,$

590) = 4.31, $p < .01$, $\eta^2 = .02$). Post hoc comparisons using the Tukey HSD test showed that the mean behavioral Process of Change score for those in psychotherapy only ($M = 46.17$, $SD = 11.44$) was significantly higher than for those not in any treatment ($M = 39.37$, $SD = 14.59$). No other significant group differences were observed. Finally, a chi-square test indicated that there was a significant association between stage and treatment status group, $\chi^2 (12, n = 594) = 25.25$, $p = .014$, $\phi = .21$.

The finding that individuals in combined treatment showed the highest level of anxiety is counterintuitive, but consistent with existing literature that indicates that individuals with higher levels of anxiety tend to seek more treatment than those with lower levels of anxiety (Weisberg, Dyck, Culpepper, & Keller, 2007).

Findings of differences in scores on TTM constructs across treatment status groups warrant some discussion. One possible interpretation of the observed difference in behavioral Process of Change use is that behavioral Processes of Change are encouraged in psychotherapy. Medication, while it may reduce symptoms equivalently to psychotherapy, does not entail discussion and problem solving around behavior change. The group of individuals engaging in psychotherapy and medication reported the most severe symptoms in terms of the OASIS and, therefore, may not have been willing to engage in as many behavioral Processes of Change. It is also interesting that no other significant differences in TTM variable use across treatment status groups were observed. In particular, we would have expected to see similar differences in experiential Processes of Change. Reported frequency of experiential Process of Change use, however, was high across all treatment status groups. The range of mean scores for experiential Processes of Change was 47.62 to 50.57 whereas

the range of mean scores for behavioral Processes of Change was 39.37 to 46.17. Additionally, while not statistically significant, a similar pattern was observed in experiential Process of Change use with those in no treatment reporting the lowest level of use and those in psychotherapy only reporting the highest level of use. One interpretation of this finding is that experiential Processes of Change around reducing avoidance are things that anxious individuals experience naturally (i.e., with or without treatment). With regard to other TTM constructs, differences between treatment status group mean scores on Pros, Cons and Self-efficacy were small in magnitude, which may indicate that more could be done by treatment providers to attend to and modify motivational variables.

Finally, Stage of Change within each treatment status group showed expected patterns. Of particular note, was the similarity between the stage profile of those taking medication only versus those in psychotherapy only. The main descriptive distinction between these two groups was that a higher percentage of those in medication only were in Precontemplation than those in therapy only and a higher percentage of those in psychotherapy only were in Action. This supports the view that it is easier to take medication while not intending to change avoidance patterns than to be in psychotherapy while not be intending to change avoidance patterns, since medication is by definition a more passive approach to addressing anxiety. Another difference of note is the similarity in stage distribution between those not in treatment and those in combined treatment. One possible interpretation of this finding is that more treatment is not necessarily better in terms of readiness to reduce approach behaviors, however this finding may be complicated by the higher level of anxiety

observed for those in combined treatment.

Table D1.

Descriptive Statistics for OASIS and TTM Variables by Treatment Status Group

	No Treatment (n=182)	Medication (n=256)	Psychotherapy (n=54)	Combined (n=102)
OASIS	12.02 (3.00)	11.67 (2.95)	12.39 (2.89)	13.93 (3.50)
Pros	20.32 (3.97)	20.12 (4.05)	19.78 (3.93)	20.99 (3.65)
Cons	15.68 (4.29)	15.77 (4.21)	16.57 (4.03)	16.66 (4.64)
Self-efficacy	14.85 (4.96)	15.08 (5.13)	15.80 (5.23)	14.24 (5.69)
Exp POC	47.62 (11.33)	47.69 (11.23)	50.57 (10.41)	49.17 (9.02)
Beh POC	39.37 (14.59)	42.23 (12.56)	46.17 (11.44)	40.84 (11.74)

Note. Table presents mean scores with standard deviations in parentheses. OASIS = Overall Anxiety Severity and Impairment Scale; Exp POC = Experiential Processes of Change; Beh POC = Behavioral Processes of Change; Medication = taking medication but not psychotherapy for anxiety; Psychotherapy = in psychotherapy but not taking medication for anxiety; Combined = taking medication and in psychotherapy for anxiety.

Table D2.

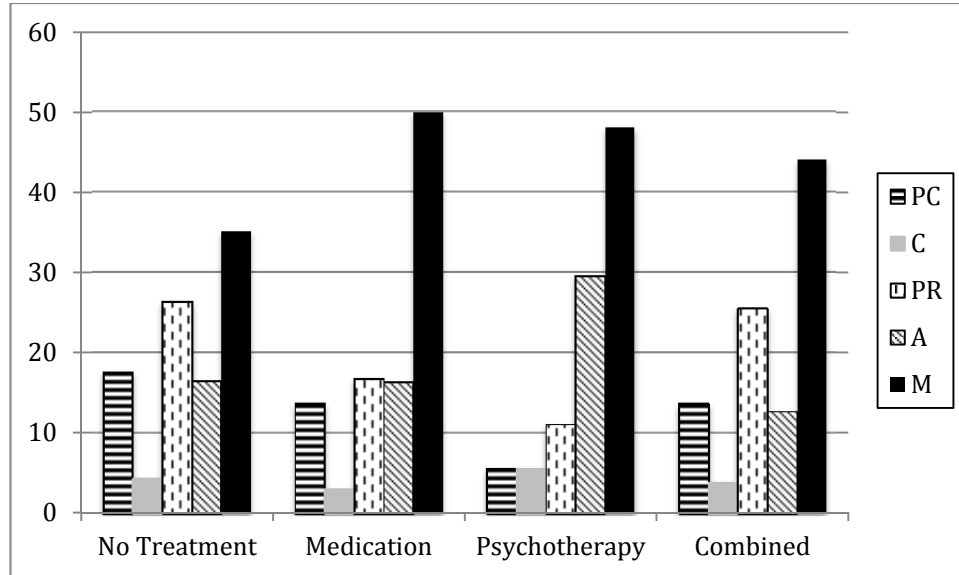
ANOVAS for OASIS and TTM Variables by Treatment Status Group

DV	F	P	η^2
OASIS	13.52*	0.00	0.064
Pros	1.52	0.21	0.008
Cons	1.70	0.17	0.009
Self-efficacy	1.20	.31	0.006
Exp POC	1.50	0.21	0.008
Beh POC	4.31*	0.01	0.021

Note. Between group degrees of freedom for all analyses = 3; Within group degrees of freedom for all analyses = 590; OASIS = Overall Anxiety Severity and Impairment Scale; Exp POC = Experiential Processes of Change; Beh POC = Behavioral Process of Change; df = between group degrees of freedom, within group degrees of freedom; *p<.05.

Figure D1.

Percentage of Participants in each Stage of Change within Each Treatment Status Group



Note. Medication = taking medication but not psychotherapy for anxiety; Psychotherapy = in psychotherapy but not taking medication for anxiety; Combined = taking medication and in psychotherapy for anxiety; PC = Precontemplation; C = Contemplation; PR = Preparation; A = Action; M = Maintenance.

APPENDIX E: DESCRIPTIVE DATA ON REASONS PARTICIPANTS
ENDORSED FOR NOT SEEKING TREATMENT FOR ANXIETY

Part of improving the reach of evidence-based treatments for anxiety is evaluating why many individuals with clinically significant anxiety are not in treatment. Access is one important factor that limits reach, but perceived need and other intra-individual factors have also been found to be key reasons individuals do not seek treatment (Kivelitz, Watzke, Schulz, Harter, & Melchior, in press; Mojtabai et al., 2011; Weisberg et al., 2007). This literature builds a case for the importance of interventions and outreach programs that attend to both access and intra-individual variables.

This study sought to examine possible barriers to treatment-seeking by providing those not taking medication and/or in psychotherapy for anxiety with a checklist of possible reasons for not seeking these treatments. The checklist used was adapted from Weisberg et al. (2007). Table E1 presents the frequency with which reasons for not taking medication and for not being in psychotherapy were endorsed.

The most frequent reasons endorsed for not taking medication were concern about side effects (52.1%) and the cost of medication (36.4%). The most frequent reasons for not engaging in therapy for anxiety were cost (50.0%) and having found therapy ineffective in the past (28.1%). Consistent with these findings, financial concerns have previously been found to be a prominent reason individuals do not seek treatment, especially psychotherapy (Kessler et al., 2001; Mojtabai, Olfson, & Mechanic, 2002; Weisberg et al., 2007). Taken together with previous research, these

findings indicate that cost-effective, evidence-based behavioral interventions have huge potential for reducing impediments to care.

Interestingly, the least frequent reason endorsed for not taking medication and for not seeking therapy was not thinking one had a problem. These findings pose a sharp contrast to previous research indicating that low perceived need for treatment is a leading reason why many people with clinically significant symptoms do not seek mental health treatment. For example, Weisberg et al. (2007) found that in patients with anxiety disorders, not thinking they had a problem and not believing in treatment for emotional problems were two of the more frequently endorsed reasons for not taking medication and for not engaging in psychotherapy. Broader research on reasons individuals with mental illness choose not to seek treatment also support not recognizing that one has a problem or wanting to solve the problem on their own, as prominent factors that distinguish those who seek treatment from those who do not (Blumenthal & Endicott, 1998; Kessler et al., 2001; Mojtabai et al., 2011). One possible explanation of findings from the present study is that participants in this survey were part of a group of individuals interested in participating in health-related surveys. It may be that this group is more informed about and open to addressing health-related issues. Other studies cited above used proactive recruitment methods, which may better capture the full population of individuals with anxiety disorders. Nevertheless, this discrepancy in findings calls for further investigation of the degree to which individuals with anxiety perceive a need for treatment.

Table E1.

Reasons Endorsed for not Receiving Medication (n=236) and Psychotherapy (n=438) for Anxiety

	Reasons for not Receiving Medication	Reasons for not Receiving Psychotherapy
didn't know how to obtain	14.8% (n=35)	14.6% (n=64)
financial reasons	36.4% (n=86)	50.0% (n=219)
worried about stigma/embarrassment	10.6% (n=25)	15.8% (n=69)
inconvenient/too busy	4.2% (n=10)	19.9% (n=87)
ineffective in the past	17.8% (n=42)	28.1% (n=123)
Concerned about side effects	52.1% (n=123)	--
Didn't think s/he had a problem	2.5% (n=6)	2.3% (n=10)
Didn't believe in medication/therapy for emotional problems	14.4% (n=34)	3.4% (n=15)
Not recommended by doctor	8.1% (n=19)	10.3% (n=45)
Didn't think it would help	16.5% (n=39)	19.2% (n=84)
Concerned about having mental health treatment on record	5.9% (n=14)	7.5% (n=33)

Note. Responses provided above were not mutually exclusive. That is, participants could select any options that applied to them.

APPENDIX F: CROSS-RACIAL COMPARISONS OF STAGE OF CHANGE AND MEAN SCORES ON TTM CONSTRUCTS

Minority groups are less likely to receive appropriate treatment than mainstream populations (U.S. Department of Health and Human Services, 2001). One overarching goal of the present program of research is to develop interventions that would be accessible to underprivileged groups who are not currently receiving appropriate services.

Based on U.S. Census data, racial minorities constitute approximately 28% of the population in the United States (approximately 13% Black/African American, 5% Asian, and 1% American Indian/Alaska Native, <1% Native Hawaiian/Other Pacific Islander, 9% Other/Mixed race). 2010 U.S. Census data indicate that approximately 16% of the U.S. population is Hispanic or Latino. The racial distribution of the sample in this study approximated US census data. In this sample, 23.6% (n=140) identified as a racial minority (12.8% Black/African American, 3.7% Asian, 1.2% American Indian/Alaska Native, 0.2% Native Hawaiian/Other Pacific Islander, 5.7% Other/Mixed race). Additionally, 14.8% of this sample identified as Hispanic or Latino.

In this early, measurement development, phase of this program of research, cross-racial differences were not a focus. Nevertheless, preliminary evaluations of differences in TTM constructs and treatment seeking between minority participants and non-minority participants were conducted to begin exploring important racial factors that may affect measurement and, ultimately, intervention.

ANOVA showed significant differences in Cons, Self-efficacy, experiential Processes of Change and behavioral Processes of Change between minority and non-minority participants (Table F1). All differences were in the direction of minority participants scoring higher (i.e., greater perceived importance of Cons, higher Self-efficacy and more frequent use of behavioral and experiential Processes of Change).

A chi-square test supported association between race and Stage of Change, χ^2 (4, $n= 594$) = 14.78, $p<.01$, $phi=.16$. Descriptive evaluations of percentages of minority and nonminority participants in each Stage of Change are displayed in Figure F1. The pattern of stage distribution by minority status indicates that the significant chi-square may be attributed to the greater percentage of minority participants in Action and Maintenance compared to white participants and the greater percentage of white participants in Precontemplation and Preparation compared to minority participants.

A chi-square test did not support an association between race and treatment seeking in general, χ^2 (1, $n= 594$) = 0.05, $p=.82$, $phi=-.01$. However, an additional chi-square test that involved dividing treatment seeking into categories (no treatment, medication only, therapy only, and combined) did support an association between race and type of treatment χ^2 (3, $n= 594$) = 17.97, $p<.01$, $phi=.17$. As shown in Figure F2, this finding is likely attributable to two trends. First, the percentage of white participants taking medication only was higher than the percentage of minority participants taking medication only. Second, the percentage of minority participants in psychotherapy only or combined (psychotherapy and medication) treatment was greater than the percentage of white participants in these treatment categories.

These findings indicate that racial differences in use of TTM constructs needs to be studied further. Findings may be an artifact of the specific and small sample of minority participants recruited in this study. In particular, this study recruited minority participants who were part of a national survey company's database of individuals interested in survey research. It is not clear whether this segment of the population is representative of the entire population of individuals with clinically significant levels of anxiety for either minorities or non-minorities. Nevertheless, if differences hold up in future studies, tailoring algorithms that differ by race (e.g., higher cutoffs for tailored feedback) may be important.

The finding that there was no difference in rates of treatment-seeking between minority and non-minority participants is not consistent with predictions based on existing literature. Previous research indicates that individuals from minority groups are less likely to receive treatment and more likely to report feeling uncomfortable talking to a professional about personal problems than non-minorities (Shim, Compton, Rust, Druss, & Kaslow, 2009). In contrast to existing research, this study evaluated whether treatment was sought and the type of treatment sought rather than attitudes toward treatment, which may be a reason findings do not seem to match other research to date. Also, again, it is possible that present findings are a result of potential sampling bias in the present study driven by use of a survey sampling company for recruitment. Nevertheless, further investigation of the nuances of potential differences in treatment-seeking across racial categories will be an important area for future research.

Table F1.

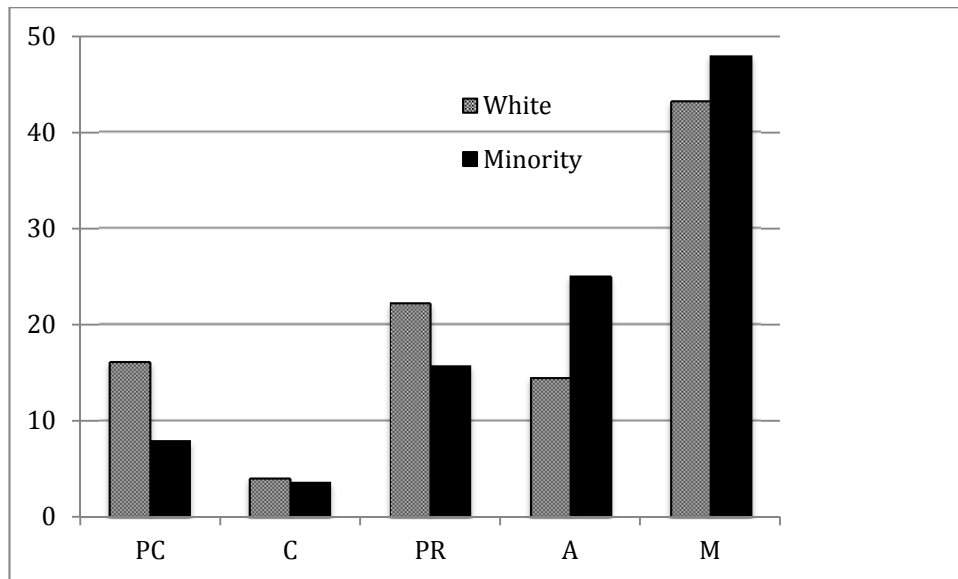
ANOVAS Comparing OASIS and TTM Variables Between White and Minority Participants

DV	White (n=454) M (SD)	Minority (n=140) M (SD)	F	p	η^2
OASIS	12.13 (3.16)	12.56 (3.13)	1.95	0.16	<0.01
Pros	20.39 (3.88)	20.02 (4.20)	0.94	0.33	<0.00
Cons	15.72 (4.23)	16.77 (4.46)	6.50*	0.01	0.01
Self-efficacy	14.56 (4.91)	16.14 (5.88)	10.05*	<.01	0.02
Exp POC	47.59 (10.53)	50.10 (11.69)	5.76*	0.02	0.01
Beh POC	40.25 (12.60)	45.45 (13.92)	17.34*	<.01	0.03

Note. between group degrees of freedom for all analyses =1; within group degrees of freedom for all analyses = 592; OASIS = Overall Anxiety Severity and Impairment Scale; Exp POC = Experiential Processes of Change; Beh POC = Behavioral Process of Change; *p<.05.

Figure F1.

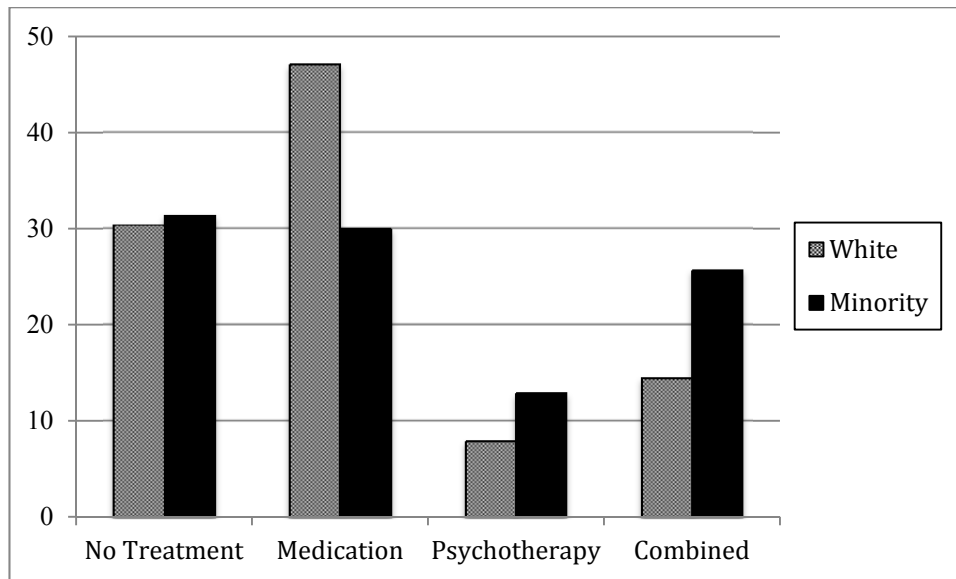
Percentage of White and Minority Participants in Each Stage of Change



Note. PC = Precontemplation; C = Contemplation; PR = Preparation; A = Action; M = Maintenance.

Figure F2.

Percentage of White and Minority Participants in Each Treatment Status Group



Note. Medication = taking medication but not psychotherapy for anxiety; Psychotherapy = in psychotherapy but not medication for anxiety; Combined = taking medication and in psychotherapy for anxiety.

APPENDIX G: CROSS-GENDER COMPARISONS OF STAGE OF CHANGE AND MEAN SCORES ON TTM CONSTRUCTS

Anxiety disorders have been found to be more prevalent in woman than in men (Bruce et al., 2005). For example the National Comorbidity survey found that the lifetime prevalence of any anxiety disorders was 30.5% in women and 19.2% in men (Kessler et al., 2005). Given these prevalence rates, it is not surprising that the sample recruited for this study included more women (69.4%, $n = 412$) than men (30.6%, $n=182$). In this early, measurement development, phase of this program of research, gender differences were not a focus. Nevertheless, investigation of differences in scores on TTM constructs and treatment-seeking between male and female participants were conducted to begin to examine whether gender differences may impact measurement and, ultimately, intervention.

ANOVA showed a significant difference in perceived importance of the Pros with women rating perceived importance as significantly higher than men (see Table G1). ANOVA also indicated that men reported greater Self-efficacy (that they could engage in approach behaviors even in challenging situations) than women (see Table G1). It should be noted, that effect sizes of both of these differences were small, so, while they are statistically significant, the practical or clinical implications may be limited.

A chi-square test did not support an association between gender and Stage of Change, $\chi^2 (4, n= 594) = 3.98, p=.41, phi=.08$. Similarly, a chi-square test did not support an association between gender and treatment status group, $\chi^2 (3, n= 594) = 7.21, p=.065, phi=.11$.

These findings indicate limited differences across gender. The majority of variables evaluated did not show cross-gender differences. Differences that were observed had small effect sizes. These results do not, therefore, necessarily indicate that different tailoring cutoffs or strategies should be used for males and females. Nevertheless, future research with different recruitment methods and longitudinal data should continue to evaluate the potential for differences in TTM construct use across gender.

Table G1.

ANOVAS Comparing OASIS and TTM Variables Between Male and Female Participants

DV	Male (n=182) M (SD)	Female (n=412) M (SD)	F	p	η^2
OASIS	12.37 (3.15)	12.18 (3.16)	0.48	0.49	<0.01
Pros	19.63 (4.02)	20.60 (3.89)	7.81*	<0.01	0.01
Cons	16.46 (4.35)	15.75 (4.27)	3.44	0.06	<0.01
Self-efficacy	15.84 (5.60)	14.53 (4.95)	8.19*	<.01	0.01
Exp POC	47.33 (10.90)	48.56 (10.83)	1.63	0.20	<0.01
Beh POC	41.91 (12.46)	41.28 (13.39)	0.29	0.59	<0.01

Note. between group degrees of freedom for all analyses =1; within group degrees of freedom for all analyses = 592; M = mean; SD = standard deviation; OASIS = Overall Anxiety Severity and Impairment Scale; Exp POC = experiential Processes of Change; Beh POC = behavioral Process of Change; *p<.05.

APPENDIX H: REFERENCES CITED IN APPENDICES

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