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How Does Brief Cognitive Behavioral Therapy Work? Potential Mechanisms of Action for Veterans with Physical and Psychological Comorbidities

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HOW DOES BRIEF COGNITIVE BEHAVIORAL THERAPY WORK? POTENTIAL MECHANISMS OF ACTION FOR VETERANS WITH PHYSICAL AND PSYCHOLOGICAL COMORBIDITIES

by

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ABSTRACT

Depression and anxiety are commonly comorbid among patients with chronic medical conditions. These comorbidities are associated with negative outcomes including poorer quality of life and worse physical functioning. Evidence that traditional cognitive behavioral therapy (CBT) is less effective for these populations has led to the development of brief CBT protocols that incorporate physical health self-management skills and are delivered in primary care. To continue refining treatment packages, it is important to understand how brief CBT works. The present study used the transactional model of stress and coping as a framework for investigating potential mechanisms of action of brief CBT. Veterans with chronic obstructive pulmonary disease and/or heart failure and elevated symptoms of depression and/or anxiety were randomized to receive brief CBT (n =180) or enhanced usual care (EUC; n = 122). At 4-month follow-up, depression and anxiety symptoms were significantly lower in veterans who received brief CBT, compared to EUC. Multiple mediation analyses revealed that brief CBT was associated with higher self-efficacy and less avoidant coping at 4-month follow-up, which were in turn associated with less depression and anxiety symptoms. Illness intrusiveness was also a significant mediator of the relationship between brief CBT and anxiety symptoms, but not depression symptoms. In contrast, increases in active coping attributable to brief CBT were not associated with improvements in depression or anxiety symptoms. These results demonstrate the utility of the transactional model of stress and coping as a framework for understanding mechanisms of action of brief CBT in patients with comorbid physical and psychological conditions.

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INTRODUCTION

There is ample evidence that Cognitive Behavioral Therapy (CBT) is effective for multiple populations and problems (Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012). These studies have answered the important question of *if* CBT is effective and have begun to elucidate *for whom* CBT is effective. What is less clear is *how* or *why* CBT works. Thus, the National Institute of Mental Health has called for studies examining potential mechanisms of therapeutic change (Insel & Gogtay, 2014).

Preliminary evidence from mediation studies suggests that changes in cognitive and behavioral patterns such as dysfunctional thoughts and active coping account for therapeutic improvements in depression and anxiety (Gallagher-Thompson, Gray, Dupart, Jimenez & Thompson, 2008; Kaufman et al., 2005; Smits, Julian, Rosenfield, & Powers, 2012). However, most studies on the effectiveness and mediators of CBT have been conducted in traditional mental health settings. It is possible that processes of change vary based on the target population or therapeutic setting. For example, studies demonstrate that traditional CBT is less effective for patients with physical and psychological comorbidities (Rutledge, Reis, Linke, Greenberg, & Mills, 2006). This underscores a need to clarify mechanisms of change for this population.

Of particular interest are patients with chronic obstructive pulmonary disease (COPD) and heart failure (HF), as there are high rates of comorbid depression and anxiety in these populations (Konstam, Moser, & De Jong, 2005; Yohannes, Willgoss, Baldwin, & Connolly, 2010), with correspondingly high functional impairment (Burgel et al., 2013; Giardino et al., 2010). To increase access to mental health care and to better meet the unique needs of these patients, researchers have developed brief CBT protocols that integrate physical health

components and that are delivered in the primary care setting (Cully et al., 2017). There is preliminary evidence that brief CBT is associated with high rates of treatment completion and improvements in depression and anxiety. However, mechanisms of brief CBT have yet to be examined and may differ from traditional CBT packages.

Study of potential mechanisms of action should be guided by theory (Kazdin, 2007). The transactional model of stress and coping is one theoretical model (Lazarus & Folkman, 1984), the components of which have been helpful for explaining the relationship between chronic medical conditions and psychological adjustment (Wethington, Glanz, & Schwartz, 2015). There is evidence that CBT impacts components of the model, including appraisals of illness intrusiveness (i.e., the degree to which illness interferes with functioning; Edworthy et al., 2003), self-efficacy appraisals (i.e., beliefs about ability to cope with disease symptoms; O'Leary, Shoor, Lorig, & Holman, 1988), and coping (i.e., strategies used to address medical illness; Moorey, Frampton, & Greer, 2003). The potential role of these components in explaining therapeutic changes in psychological adjustment has yet to be tested.

Therefore, the purpose of this study is to examine potential mechanisms of action of brief CBT for patients with COPD and/or HF and comorbid depression and/or anxiety, using the transactional model of stress and coping as a framework. Understanding how brief CBT works in this population may suggest future avenues for modification of treatment packages.

COGNITIVE BEHAVIORAL THERAPY: IT WORKS, BUT HOW?

Cognitive behavioral therapy (CBT) is based on the science of behavior (for a history, see Craske, 2017) and the cognitive model, which posits that psychological disorders are developed and maintained by dysfunction beliefs and patterns of thoughts (Clark & Beck, 2010). Therefore, CBT seeks to change unhelpful thoughts and behaviors in order to improve mood and functioning. As it is most broadly defined, CBT encompasses both cognitive therapy, which specifically targets thinking patterns and core beliefs, and behavioral interventions, which focus on skill-building, problem-solving, and increasing enjoyable and meaningful activities. Because of the strong evidence base for its practice, CBT is considered by many to be the gold standard for treating depression and anxiety disorders. One review of 16 methodologically rigorous meta-analyses concluded that CBT is an effective treatment, not only for depression and anxiety, but also for other mental health conditions, such as substance use disorders and posttraumatic stress disorder (PTSD; Butler, Chapman, Forman, & Beck, 2006). A more recent review of 106 meta-analyses established that CBT is effective for many different disorders and also for individuals across the lifespan, from children and adolescents to older adults (Hofmann, et al., 2012).

While it is clear that CBT works for many populations and problems, understanding how it works is a more complex question with important implications. Understanding the mechanisms of action of CBT may help suggest avenues to improve treatment. For example, treatment packages may be modified to emphasize interventional elements that affect critical cognitive or behavioral processes to produce better outcomes. It is timely to examine mechanisms by which CBT leads to improvements, given that abbreviated protocols are being implemented in primary care (Cully et al., 2017). Knowledge of critical change processes may suggest avenues for

tailoring traditional CBT protocols to patients with comorbid medical and mental health conditions in this setting. The present study focuses on potential mechanisms of action of brief CBT for patients with comorbid medical and mental health conditions, contributing to a growing body of literature that examines how CBT works.

Methods of Inquiry

There are two primary ways in which the question of how CBT works has been examined: component studies and mediation studies. Component studies compare effect sizes of outcomes when treatment packages include or exclude key intervention components. Two types of component studies are dismantling studies, which compare the effect of individual components with a full treatment package, and additive studies, which build interventions by examining the added effect of an additional treatment component (Papa & Follette, 2015). In contrast, mediation studies measure potential mechanisms of action and test whether outcomes are changed through these processes (Kazdin, 2007). Though both methodologies aim to understand how therapy works, these approaches answer slightly different questions. Component studies address which therapeutic components are most strongly associated with changes in outcomes. On the other hand, mediational studies address the processes by which outcomes change. In summary, component studies answer the question of what treatment components work, while mediational studies answer the question of how a treatment package works.

Component Studies

Component studies are important for continued development and refinement of CBT given that their focus is on building effective treatment packages. However, a summary of the literature provides few clear conclusions regarding necessary treatment components. A meta-analysis of 27 component studies supported the general therapeutic efficacy of CBT, but found

no significant differences in outcomes for treatment packages with and without hypothesized critical components (Ahn & Wampold, 2001). These results suggest that, though psychotherapy is effective, ostensibly important treatment components do not alone account for therapeutic benefits. A more recent meta-analysis attempted to elucidate the contribution of specific treatment components by examining dismantling studies and additive studies separately (Bell, Marcus, & Goodlad, 2013). With regard to dismantling studies, there were no significant differences in outcomes between full and dismantled treatments. In contrast, additive studies revealed small but significant effects of added components for specific, targeted outcomes.

Nonetheless, it is difficult to draw broad conclusions about CBT using component studies because treatment emphases vary widely by target population and setting. More novel approaches that emphasize the use of treatment modules to customize interventions introduce the possibility that emphases could even vary on an individual basis. Furthermore, the ability of component studies to elucidate how certain treatment components work is limited because underlying processes of change are not examined. The lack of consistent, critical components coupled with limited generalizability suggest that there is further opportunity to understand how CBT works. A return to theory to examine the processes by which CBT improves outcomes may suggest future avenues of investigation to identify critical components of therapy.

Mediation Studies

In contrast to component studies, which look at what elements of treatment work, mediation studies examine the processes by which therapeutic change in depression and anxiety occurs. Investigation of potential mediators of CBT for depression and anxiety has broadly been guided by cognitive theory, which holds that dysfunctional attitudes and patterns of thinking are responsible for the development and maintenance of depression and anxiety (Clark & Beck,

2010). Thereby, the cognitive mediation hypothesis posits that CBT improves depression and anxiety by changing various dysfunctional thinking patterns. Dysfunctional attitudes that have been shown to significantly mediate therapeutic reductions in depression symptoms include automatic negative thoughts (Kaufman et al., 2005; Kwon & Oei, 2003), depressive ruminations (Watkins et al., 2011), hopelessness (Kuyken, 2004), and absolutist, dichotomous thinking (Teasdale et al., 2001). Two studies have also demonstrated that cognitive changes temporally precede and predict sudden treatment gains, supporting the cognitive mediation hypothesis (Tang & DeRubeis, 1999; Tang, DeRubeis, Beberman, & Pham, 2005).

Cognitive mechanisms have been supported with anxiety disorders as well. One that has received particular attention is threat reappraisal. Individuals with anxiety disorders tend to misappraise threat by overestimating the likelihood of harm and by magnifying the negative consequences of anticipated harms (Clark & Beck, 2010). According to the threat reappraisal mediation hypothesis, CBT leads to reductions in anxiety by modifying inaccurate threat appraisals (Smits et al., 2012). Threat reappraisal has been established as a statistical mediator of therapeutic reductions in anxiety in many studies (see Smits et al., 2012 for a review). Overall, there is strong support that changes in dysfunctional attitudes and threat reappraisal are mediators of CBT for both depression and anxiety.

As noted previously, mediation studies focus on theoretical mechanisms of change to explain how CBT works. The robust evidence for mediation models coupled with lack of clear findings in component studies suggest that a continued emphasis on mediation studies may be most fruitful for understanding how CBT works, before returning to component studies to examine which elements of therapy contribute most to therapeutic change. While mediation studies demonstrate that cognitive processes account for changes in depression and anxiety, to

definitively establish a causal mechanism, specificity of change processes must be established (Kazdin, 2007). Returning to theory to illustrate this point, a fundamental assumption underlying the cognitive and threat reappraisal mediation hypotheses is that these cognitive changes are specific to cognitive interventions (Whisman, 1993). Establishing specificity of a given mediator to a particular intervention lends strength to the argument that it is a therapeutic mechanism of action of that intervention. Consequently, researchers have begun to examine whether cognitive changes are uniquely related to CBT or due to nonspecific processes found across therapies.

Specificity of Cognitive Mediation

Early studies comparing CBT to pharmacotherapy found that changes in cognition were comparable across therapies (Imber et al., 1990; Simons, Garfield, & Murphy, 1984). Based on these findings, researchers concluded that improvements in depression produced cognitive changes, rather than the reverse. However, these studies measured cognitive change and depression concurrently. Other studies with more rigorous designs have found that changes in cognition mediate improvements in depression and anxiety for individuals treated with CBT but not pharmacotherapy (DeRubeis, Evans, Hollon, Garvey, Grove, & Tuason, 1990; Hofmann et al., 2007). In particular, Quilty, McBride, and Bagby (2008) measured depression and dysfunctional attitudes at multiple time points and found that changes in dysfunctional attitudes preceded and predicted changes in depression for CBT, while the reverse was true for pharmacotherapy.

In contrast, research comparing CBT to other psychotherapeutic interventions has produced mixed evidence as to the specificity of cognitive mediation. Studies comparing CBT to problem-solving therapy (Warmerdam, van Straten, Jongsma, Twisk, & Cuijpers, 2010) and acceptance and commitment therapy (ACT; Arch, Wolitzky-Taylor, Eifert, & Craske, 2012;

Forman, Chapman, Herbert, Goetter, Yuen, & Moitra, 2012) have not found evidence that cognitive mediation is specific to CBT. Conversely, Quilty and colleagues (2008) found that dysfunctional attitude change mediated reductions in depressive symptoms for patients treated with CBT but not interpersonal therapy (IPT). These variations in outcome may be explained by the degree of overlap between CBT and the comparison treatments. While ACT and problem-solving therapy differ in terms of the types of cognitive processes targeted, they may be subsumed under the umbrella of CBT, using its broadest definition (Hofmann, Sawyer, & Fang, 2010). In comparison, IPT focuses on interpersonal problems and attachment processes and is therefore more dissimilar (Klerman, Weissman, Rounsaville, & Chevron, 1994). In summary, there is preliminary evidence that change in cognition serves as a specific mediator of CBT.

Other Potential Mechanisms of Action

Taken together, there is strong evidence that cognitive change is a mechanism of action CBT, though there is variability in the particular cognitive process targeted across studies. Although changes in threat reappraisal and various dysfunctional attitudes are well-studied potential mechanisms of action, there are other potential change processes targeted by CBT. In particular, behavioral variables that significantly mediate therapeutic change in psychological functioning include increases in positive and/or meaningful activities and use of active coping skills (Carvalho & Hopko, 2011; Gallagher-Thompson et al., 2008; Losada, Márquez-González, & Romero-Moreno, 2010; Strunk, DeRubeis, Chiu, & Alvarez, 2007). Other variables that significantly mediate therapeutic gains in depression and anxiety include cognitive reactivity and self-appraisal of problem-solving and coping abilities (Beevers & Miller, 2005; Chen, Jordan, & Thompson, 2006; Goldin et al., 2012; Segal, Kennedy, Gemar, Hood, Pedersen, & Buis, 2006; Strunk et al., 2007), and use of adaptive coping skills (Gallagher-Thompson et al., 2008; Strunk

et al., 2007). It is important to replicate these results in other samples to gain confidence that these processes may be mechanisms of action of CBT (Kazdin, 2007).

Summary

Overall, there is ample evidence that CBT leads to improvements in mental health conditions, such as depression and anxiety. The question of how CBT produces therapeutic change still needs to be answered. Guided by cognitive theory, mediation studies have provided strong evidence that changes in dysfunctional cognitions partially account for improvements in depression and anxiety. Continuing to investigate these and other potential mechanisms of action should provide a more thorough understanding of how CBT works. Next steps in this line of research include examining models that incorporate multiple potential mediators; doing so may help elucidate the relative importance of various change mechanisms, suggesting potential avenues for treatment modification. As suggested by Kazdin (2007), these models should be driven by a plausible, coherent theory. The transactional model of stress and coping is one framework which may be used to understand mediators of CBT and which holds particular relevance for patients with comorbid medical and mental health conditions. Future studies also need to examine whether mediators vary by population and setting. To date, most studies examining potential mechanisms of CBT have been conducted in outpatient specialty mental health care settings. It is unclear how mechanisms of action may vary for CBT delivered in other settings such as primary care and for other populations, such as patients with comorbid medical conditions.

TAILORING INTERVENTIONS TO MEET THE UNIQUE NEEDS OF PATIENTS WITH PHYSICAL AND PSYCHOLOGICAL COMORBIDITIES

Depression and anxiety are frequently comorbid with chronic medical conditions (Brenes, 2003; Katon, 2003; Kunik et al., 2005; Mikkelsen, Middleboe, Pisinger, & Stage, 2004; Rutledge et al., 2006). Some medical conditions have particularly high rates of comorbidity. For example, up to 40% of patients with cardiopulmonary conditions such as COPD and HF meet criteria for major depression and up to 63% meet criteria for an anxiety disorder (De Jong, Moser, An, & Chung, 2004; Konstam et al., 2005; Yohannes, Baldwin, & Connolly, 2000; Yohannes, et al., 2010). These comorbidities are associated with increased healthcare costs (Maurer et al., 2008), higher healthcare utilization rates (Jiang et al., 2001; Kim et al., 2000), worse quality of life (Burgel et al., 2013; Giardino et al., 2010; Juenger et al., 2002), and earlier mortality (Domingo-Salvany et al., 2002; Rumsfeld et al., 1999). However, only 41% of individuals with a mental health condition receive any psychiatric or psychological intervention (Wang et al., 2005).

Many patients with comorbid medical and mental health conditions first present to primary care, often during an annual visit (Wang et al., 2005). However, depression and anxiety often go unrecognized and undiagnosed due to overlap of symptoms with physical illnesses and because screening for mental illness is still not standard practice in many primary care settings (Ballenger et al., 2001; Cafarella, Effing, Usmani, & Frith, 2012). Even when psychological illness is recognized, patients often will not accept a referral to specialty mental health care (Kessler et al., 2001; Regier et al., 1993). Lack of follow-up could be due to the patients' misattributions of all physical and emotional symptoms to comorbid medical conditions (Dickinson et al., 2005; Keeley et al., 2004; Sarkisian, Lee-Henderson, & Magnione, 2003). Low

rates of follow-up also may be due to stigma associated with mental healthcare or other barriers to following up on referrals (Corrigan, 2004; Mojtabai et al., 2011). Regardless of the reason, this lack of recognition and follow-up care may be especially problematic for patients with chronic medical conditions that are exacerbated by psychological disorders.

Primary Care Mental Health Integration

While the continuity, comprehensiveness, and coordination of the primary care model are ideal for patients with mental illnesses such as depression and anxiety disorders, few patients treated with usual practices in primary care receive adequate mental health care (Young, Klap, Sherbourn, & Wells, 2001). For example, in a study of 366 patients with anxiety disorders treated medically in primary care over 3 months, only 40% received appropriate antianxiety medications and only 25% of these patients received them at a minimally adequate dosage (Stein et al., 2004). Determinations about the appropriateness of medications and dosage were made a priori based on evidence-based literature and consensus statements. In a similar series of studies examining patients with major depression, only 40% received any psychiatric medication (Sturm et al., 1995; Wells et al., 1994). In addition to inadequate pharmacological intervention, less than 25% of patients who receive mental health care receive any psychotherapy (Wang et al., 2005). This gap in care is critical, as psychological interventions such as CBT are associated with lower relapse rates for depression and greater maintenance of treatment gains for patients with anxiety disorders (Otto, Smits, & Reese, 2005).

In response to this problem of inadequate mental health care, there has been a movement toward integrating psychological services into primary care settings (Blount, 2003). For example, the Veterans Healthcare Administration Initiative (Post & Van Stone, 2008) calls for integration of mental health services in primary care to increase access to and quality of mental health care

for veterans. While CBT is the gold standard for treating anxiety and depression (Hofmann et al., 2012), evidence-based treatments have primarily been tested in traditional mental healthcare settings. The intensity of these treatment packages, typically consisting of 12 or more one-hour, weekly sessions, does not fit well with the primary care model, which emphasizes brief, episodic care for specific issues and annual preventive care. Critically, evidence suggests that individuals with comorbid physical health conditions may benefit from less intensive interventions (Cape, Whittington, Buszewicz, Wallace, & Underwood, 2010; Nieuwsma et al., 2012). Cully, Paukert, Falco, and Stanley (2009) also hypothesize that traditional forms of CBT may be less effective for medically ill patients because they do not address physical health concerns. This may limit buy-in and engagement, particularly for patients with chronic illnesses like COPD and HF, which significantly impact physical functioning (Polsky et al., 2005). Indeed, traditional psychologically based interventions do not have a significant impact on depression and anxiety in these patients (Brenes, 2003; Rose et al., 2002; Rutledge et al., 2006). Current priorities of integrating mental health into primary care, coupled with evidence that the gold standard of treatment does not meet the needs of this population, suggest that future work to tailor interventions in this area is warranted.

Brief CBT for Comorbid Physical and Psychological Conditions

Recently, researchers have begun to investigate treatment packages delivered in primary care that incorporate evidence-based treatment elements in an abbreviated format, typically consisting of four to six 30-minute sessions. Preliminary evidence suggests that abbreviated CBT is effective for treating depression and anxiety in primary care settings and for patients with comorbid physical health conditions (Cape et al., 2010; Nieuwsma et al., 2012; Roy-Byrne et al., 2005; Roy-Byrne et al., 2010; Stanley et al., 2009; Willemse, Smit, Cuijpers, & Tiemens, 2004).

Preliminary evidence suggests that brief CBT is associated with significant improvements in depression and anxiety among patients with cardiopulmonary conditions (Freedland et al., 2009, 2015; Kunik et al., 2008). While promising, dropout rates tended to be high. Further, despite the relationships between mental and physical health, these interventions did not directly address physical health concerns. This missing physical health component could contribute to drop out, as many patients view their symptoms as physical, not mental health concerns (Dickinson et al., 2005).

To address these limitations, Cully and colleagues (2012a) integrated behavioral health intervention approaches to adapt traditional evidence-based treatments for depression and anxiety. Focusing on veterans with COPD and HF, they trained mental health providers working in a primary care setting to deliver a brief CBT protocol that includes physical health self-management skills. This flexible, modular intervention was associated with significant improvements in depression and anxiety (Cully et al., in 2017). Additionally, patient engagement and retention was high.

Interestingly, receiving physical health modules earlier in treatment was associated with greater likelihood of treatment completion (Brandt et al., in preparation). Lack of perceived need or relevance of mental health treatment is the most prominent reason for drop-out (Kessler et al., 2001). Thus, it appears that addressing physical health may increase the perceived relevance of mental health treatment among patients with comorbid medical illness. Taken together, these findings indicate that incorporating physical health early in treatment is critical for buy-in among chronic illness populations. In summary, a brief, modular approach to CBT that incorporates physical health self-management skills shows promise for patients with comorbid medical and mental health conditions being treated in primary care.

Mechanisms of Brief CBT

As these protocols develop, an important consideration will be to include the most effective treatment components. Knowledge of the processes which account for therapeutic change can help identify which components to include in abbreviated treatment packages. Although it is increasingly clear that brief CBT works, how it works has not been fully explored. It is unclear whether brief CBT and traditional CBT share mechanisms of action or if they lead to change in different ways. There are several reasons that mechanisms of action of brief CBT may differ from traditional CBT. First, abbreviated interventions may emphasize different cognitive and behavioral processes than full CBT protocols. Therefore, the relative impact of these processes on therapeutic outcomes may vary. Second, because the target populations differ, particular change processes may account for more or less improvement in symptoms. For example, increases in perceived self-efficacy to address symptoms may be relatively more important for patients with comorbid medical and mental health conditions, who are managing multiple illness symptoms. Likewise, while the presence of a medical illness is a real stressor, inaccurate appraisals of the impact that illness has on functioning can contribute to further impairment. Therefore, addressing these cognitive distortions may be even more critical in a medically ill population. Finally, brief CBT protocols which incorporate physical health self-management skills may act through different pathways to improve outcomes. Therefore, it is important to examine mediators of brief CBT for patients with comorbid medical and mental health conditions to begin to identify potential mechanisms of action.

Summary

In summary, anxiety and depression are commonly comorbid with chronic medical conditions such as COPD and HF. These mental health comorbidities have traditionally have

been under-addressed in the primary care setting, where most patients with medical illness receive their mental health care. There is mounting evidence that abbreviated CBT delivered in the primary care setting is an effective intervention for patients with comorbid medical and mental health conditions. Also, interventions that are adapted to address physical health may be important for maximizing engagement in this population, particularly for patients with chronic illnesses, such as COPD and HF, that significantly impact physical functioning. It is critical to understand what processes lead to therapeutic change in this population, and in what ways these mediators may differ from traditional CBT protocols. Similar to the investigation of change mechanisms in traditional CBT, a return to theory to guide these empirical questions is warranted. The transactional model of stress and coping is one framework which holds particular relevance for patients with comorbid medical and mental health conditions and which may be used to understand mediators of brief CBT.

THE TRANSACTIONAL MODEL OF STRESS AND COPING

The transactional model of stress and coping was first developed by Lazarus (1966) and later expanded upon by Lazarus and Folkman (1984) as a framework for understanding stressful events. In particular, Lazarus was interested in the individual differences in stress reactions (i.e., why the same event may be stressful to one person and not so to another). The model posits that humans 1) evaluate potentially stressful events as harmful, threatening, or challenging, 2) assess their ability to cope with the event, and 3) employ coping strategies. These processes occur in sequence to impact an individual's physical and psychological well-being. Over time, the transactional model of stress and coping has emerged as an important framework for understanding chronic diseases (Wethington et al., 2015). Pieces of this model have helped to examine individual differences in psychological adjustment and health behaviors among chronically ill patients.

Primary Appraisal

Lazarus and Folkman (1984) used the term primary appraisal to describe the evaluation of whether a stressor is relevant and whether it poses a threat, "harm-loss," or challenge. If a situation is appraised as threatening, the individual views potential for future harm. For example, an individual newly diagnosed with congestive heart failure may perceive this disease as threatening because he anticipates having a heart attack. A harm-loss appraisal occurs when it is perceived that a harm or loss has already transpired. For instance, a patient with chronic pain may view this condition as a loss of independence and functional ability. In contrast to threat and harm-loss appraisals, challenge appraisals are a more positive perspective on potential stressors. To illustrate, a patient who is told that she is pre-diabetic may view this as an opportunity to

improve her health and prevent the illness from progressing. Primary appraisal may also involve perceptions about the relevance and importance of disease symptoms. In particular, individuals may differ in their evaluations of how intrusive symptoms are and how much they interfere with functioning. These appraisals of symptoms and perceptions of vulnerability to disease partially account for the psychological adjustment of chronically ill individuals (Leventhal & Patrick-Miller, 1993); they also appear to be linked to physical health outcomes (Bigatti, Steiner, & Miller, 2012).

The association between primary appraisals and outcomes such as psychosocial adjustment and health status has been examined in several medically ill populations. In patients with cancer, primary appraisals of threat and harm-loss are associated with poor psychological adjustment (Bigatti et al., 2012; Jenkins & Pargament, 1988) and worse quality of life (Song, Rini, Ellis, & Northouse, 2016). Similarly, primary appraisals of threat and loss due to cardiac disability are significant predictors of depression and anxiety 3-4 years after hospitalization for myocardial infarction (Waltz, Badura, Pfaff & Schott, 1988).

With regard to perceptions of symptom severity and illness intrusiveness, there is a consistently high correlation between appraised severity of neuropsychological symptoms and emotional dysfunction among patients with traumatic brain injuries (TBIs; Godfrey, Partridge, Knight, & Bishara, 1991; Fordyce & Roueche, 1986). Greater perception of illness intrusiveness is also predictive of psychological distress among patients with renal failure (Devins, 1994) and multiple sclerosis (Mullins, Cote, Fuemmeler, Jean, Beatty, & Paul, 2001). In terms of physical health outcomes, cardiac patients with poorer self-perceptions of health and higher illness intrusiveness are at higher risk of major adverse cardiac and cerebrovascular events (Cserép et al., 2010). Likewise, belief that pain unavoidably interferes with normal functioning is associated

with physical disability among patients with chronic pain (Riley, Ahern & Follick, 1988; Slater, Hall, Atkinson, & Garfin, 1991). Overall, negative primary appraisals of disease symptoms are associated with poorer psychological and physical functioning among patients with chronic medical conditions.

Secondary Appraisal

According to Lazarus and Folkman (1984), secondary appraisal involves evaluation of whether an individual has the resources necessary to cope with a stressor and the perceived ability to deploy these resources. One type of secondary appraisal involves an individual's belief in their ability to produce desired changes. This self-efficacy belief varies across contexts, but has also been examined in a global manner. In a review of studies on general beliefs of efficacy, Jerusalem and Mittag (1995) concluded that, in the face of a stressor, low self-efficacy is associated with strong negative emotional reactions and somatic complaints. High rates of depression and anxiety found in patients with chronic medical conditions suggest that self-efficacy may play an important role for this population. Therefore, self-efficacy to engage in health behaviors and manage disease symptoms has been a particularly salient construct for capturing the secondary appraisal process. Cohen and Rodriguez (1995) suggest that distorted thinking patterns linked to physical illness may predict decreased self-efficacy, which is in turn associated with affective disturbance (Beck, Rush, Shaw & Emery, 1979). For example, patients with COPD who have low self-efficacy may lack confidence in their ability to avoid breathing difficulty while engaging in activities. Consequent inactivity and attention to somatic symptoms may then lead to depression and anxiety. Thus, appraisal of capacity to cope with symptoms has potentially important implications for psychological and physical health outcomes in patients with chronic illness. Secondary appraisal of ability to manage disease symptoms has been

examined as a predictor of psychological adjustment and physical functioning in individuals with various medical conditions. In terms of physical functioning, patients with low self-efficacy are less able to tolerate pain (Litt, 1988; Manning & Wright, 1983) and have worse overall physical functioning (Arnold et al., 2005), whereas higher self-efficacy is associated with implementation of health behaviors (Joekes, Van Elderen, & Schreurs, 2007) and enhanced recovery of cardiovascular functioning (Taylor, Bandura, Ewart, Miller, & DeBusk, 1985).

Self-efficacy is also positively related to psychological adjustment in individuals with chronic illness. A review of studies examining self-efficacy in patients with chronic pain demonstrated that stronger beliefs in ability to perform activities of daily living and to manage pain and other symptoms are associated with better psychological adjustment (Jensen, Turner, Romano, & Karoly, 1991). Likewise, higher self-efficacy is positively related to psychological adjustment and quality of life for individuals with cardiac disease (Joekes et al., 2007; van Jaarsveld, Ranchor, Sanderman, Ormel, & Kempen, 2005). In contrast, lower self-efficacy of symptom management predicts higher levels of depression and anxiety among patients with COPD (McCathie, Spence & Tate, 2002). In sum, secondary appraisal of self-efficacy is an important predictor of physical and psychological functioning in patients with chronic illness.

Coping

Coping strategies are the tactics that individuals employ to address a perceived stressor (Lazarus & Folkman, 1984). There are many coping strategies that researchers have categorized in various ways over time. One conceptualization categorizes coping strategies as emotion-focused and problem-focused (Lazarus & Folkman, 1984). Problem-focused coping strategies consist of attempts to directly confront a stressor while emotion-focused coping strategies focus on moderating emotional reactions to a stressor (Folkman & Lazarus, 1980; Lazarus & Folkman,

1984). Another prevailing approach to examining coping strategies categorizes these same strategies as approach/active or avoidant. Active coping is the process of addressing a stressor to reduce its intensity or potentially harmful effects; strategies employed may be cognitive, behavioral, or emotionally-focused (Roth & Cohen, 1986). Avoidant coping involves attempts to evade or deflect a stressor by means such as ignoring, discounting, or psychological distancing (Roth & Cohen, 1986).

To parse the literature on coping, this review will focus on the categorization of coping strategies as active and avoidant, for the following reasons. First, literature on the utility of emotion-focused coping is mixed, with some strategies yielding positive outcomes and others producing negative results (Bombardier, D'Amico, & Jordan, 1990; Worthington & Scherer, 2004). This is likely a reflection that the umbrella of emotion-focused coping includes coping strategies that fall within both avoidant and active categories. Second, the helpfulness of problem-focused and emotion-focused coping is thought to be dependent on the context and characteristics of the stressor, such as controllability (Forsythe & Compas, 1987). In contrast to the contextual conceptualization of problem- and emotion-focused coping, avoidant coping has been fairly consistently conceptualized as maladaptive, with active coping serving as more adaptive responses to stressors (Holahan & Moos, 1985; Roth & Cohen, 1986). Therefore, to provide parsimony and enhance clarity, all studies will be interpreted in terms of active and avoidant coping.

According to Sachs (1991), "failure to cope well with stress can enhance illness" whereas "adequate coping reflects psychological strength that promotes health" (p. 61). Physical illnesses have come to be recognized as stressors that place demands on a person and require the deployment of coping strategies (Endler, Parker, & Summerfeldt, 1993; Moos & Tsu, 1977). The

more that changes in health behavior require a departure from routine, the more likely the illness will be perceived as a significant stressor, resulting in emotional distress (Mandler, 1984). Additionally, use of maladaptive coping strategies in response to physical illness, such as increased alcohol consumption, illicit substance use, and behavioral disengagement, can intensify negative emotional responses (Cohen & Rodriguez, 1995). This resultant emotional distress may then enhance illness. Therefore, it is important to understand how coping strategies may impact the physical and psychological health of individuals living with medical illness, as adaptive coping strategies may promote good health.

Reviews of the literature have taken an integrative approach in their examination of avoidant and active coping in order to understand how each uniquely contributes to health and dysfunction. In meta-analyses of individuals with HIV (Moskowitz, Hult, Bussolari, & Acree, 2009) and diabetes (Duangdao & Roesch, 2008), avoidant coping strategies were associated with poorer outcomes across domains for individuals with HIV and with poorer psychological adjustment for patients with diabetes. Active coping strategies were positively associated with psychological health, physical health, and health behaviors in both populations. A review of the literature on coping and adjustment to chronic pain reveals associations between avoidant coping strategies and negative psychological and physical health (Jensen et al., 1991). In contrast, active coping strategies were associated with positive outcomes in these domains.

In addition to broad associations, research in specific populations supports these relationships. For example, avoidant coping is associated with higher levels of depression and anxiety in patients with chronic medical conditions such as COPD (McCathie et al., 2002) and breast cancer (Bigatti et al., 2012), even after controlling for physician-rated disease severity (Bombardier et al., 1990). In contrast, cognitive reappraisal, an active coping strategy, is

associated with better emotional adjustment following TBI (Moore, Stambrook, & Peters, 1989). Additionally, cancer survivors who implement active coping strategies are more likely to engage in positive health behavioral changes than those who use avoidant coping approaches (Parelkar, Thompson, Kaw, Miner, & Steinl, 2013). In summary, coping strategies are significantly related to adjustment in the face of chronic illness as a stressor. In particular, avoidant coping is negatively associated with outcomes, while active coping is predictive of positive outcomes.

Impact of Psychological Intervention on Appraisals and Coping

Consistent with the transactional model of stress and coping, appraisals and coping are broadly predictive of adjustment to chronic illness. Based on these associations, researchers have recommended that psychological interventions be implemented to target appraisals and coping in an effort to improve psychological and physical health outcomes (Godfrey et al., 1996). However, few studies have explicitly considered whether interventions lead to changes in appraisals and coping. One study of brief supportive-expressive group psychotherapy for women with lupus found significant reductions in perceived illness intrusiveness (Edworthy et al., 2003). Similarly, self-efficacy increased among patients with rheumatoid arthritis (RA) after participation in a self-management program (Holman & Lorig, 1992). In terms of CBT, studies have demonstrated improvements in self-efficacy for patients with COPD and RA (Kaplan, Atkins, & Reinsch, 1984; O'Leary et al., 1988). Many studies that examine interventions to improve coping focus on changes in disease-specific health behaviors, rather than broader patterns of avoidant and active coping. For example, CBT leads to decreases in substance use and improvements with compliance to medical regimens (McHugh, Hearon, & Otto, 2010; Safren et al., 2009), which may be categorized as avoidant and active coping strategies, respectively (Cooper, Frone, Russell, & Mudar, 1995; Weaver et al., 2005). In a notable

departure from this focus on specific behaviors in the coping literature, a study conducted with patients who participated in cognitive therapy for cancer found general increases in active coping skills (Moorey et al., 2003). Although this literature is in its infancy, there is preliminary support that psychological interventions impact components of the transactional model.

Summary

The transactional model of stress and coping provides a strong theoretical framework for understanding the relationship between physical illness and psychological health, where illness is conceptualized as a stressor. This model is particularly helpful for explaining the high rates of comorbidity between chronic medical conditions, such as COPD and HF, and psychological disorders, including depression and anxiety. There is a burgeoning body of literature supporting the role of appraisals and coping in psychological adjustment to medical illness. Thus, researchers have begun to investigate psychological interventions which may change appraisals and coping, in an effort to improve psychological and physical health outcomes. There is preliminary evidence that psychological interventions can positively impact appraisals and coping strategies. Coupled with the literature demonstrating that CBT improves depression and anxiety among individuals with chronic illness, there is some suggestion that the processes of appraisal and coping posited by the transactional model may be involved in therapeutic change in this population. Notably, this has yet to be tested.

Overall, strong theory and clear linkages among posited constructs suggest that appraisal and coping may serve as mediators of CBT for depression and anxiety in patients with chronic illness. However, there are several gaps in the literature that must be addressed before this conclusion can be definitively drawn. In particular, there is a dearth of studies that examine all components of the transactional model to understand unique linkages between components and

outcomes. It is important to examine the complete model within a single sample to begin to understand the relationships among each of these processes and their relative impact on outcomes. Additionally, the transactional model of stress and coping has been more thoroughly examined in some populations (e.g., chronic pain) than others. The full transactional model should be examined in other medical illnesses, such as COPD and HF, in which highly comorbid depression and anxiety exacerbate illness and lead to greater functional impairment. Finally, there is encouraging literature that intervention may impact components of the transactional model of stress and coping. However, there are no studies to date that test whether therapeutic changes in psychological outcomes are accounted for by changes in primary appraisals, secondary appraisals and coping. The present study aims to address these gaps in the literature.

THE PRESENT STUDY

The purpose of this study was to examine potential mechanisms of action of brief CBT for patients with COPD and/or HF and comorbid mental health concerns. To effectively establish these causal mechanisms, mediation analyses must go beyond demonstration of a strong relationship between the intervention, the proposed mediator of change, and the intervention outcome. According to Kazdin (2007), hypothesized mechanisms of change should be plausible and coherent, meaning they are reasonably supported by other research and driven by theory. Therefore, the present study used the transactional model of stress and coping as a framework for understanding the processes by which brief CBT leads to improvements in depression and anxiety. It was posited that several theoretical constructs might account for therapeutic change. First, brief CBT might impact primary appraisals, decreasing the perceived threat of the stressor (i.e., COPD and/or HF). Second, brief CBT might impact secondary appraisals, increasing the perceived ability to address the stressor. Third, brief CBT might impact strategies used to cope with the stressor.

In the present study, primary appraisal was operationalized as illness intrusiveness, or the degree to which COPD and/or HF symptoms are perceived to interfere with functioning. Secondary appraisal was operationalized as self-efficacy for managing chronic illness, or the perceived ability to cope with COPD and/or HF symptoms and prevent them from impairing functioning. In terms of coping, both avoidant and active coping strategies were examined in this study, since each type of coping may uniquely predict dysfunction and health.

Participants in the current study were randomly assigned to receive brief CBT or enhanced usual care (EUC). Brief CBT was flexible, allowing the patient and provider to

collaboratively choose content from several optional treatment modules, and consisted of four to six sessions. EUC consisted of documentation of significant symptoms of depression and anxiety in the medical record. Previous analyses conducted with this sample indicated that participants who received brief CBT experienced significant improvements in depression and anxiety symptoms compared to participants who received EUC (Cully et al., 2017). To better understand how these changes occurred, the present study examined how post-intervention measures of illness intrusiveness, self-efficacy, and coping might account for post-intervention differences in depression and anxiety symptoms across treatment conditions. Specifically, mediators measured at 4-month follow-up (immediately post-treatment) were included as predictors of depression and anxiety symptoms at 4-month follow-up.

Using multiple mediation analyses with depression and anxiety as the outcome variables and treatment condition (brief CBT vs EUC) as the predictor variable, the following hypotheses were tested:

1) illness intrusiveness mediates the relationship between treatment condition and depression and/or anxiety, such that brief CBT is associated with lower perceived illness intrusiveness, which is in turn associated with lower symptoms of depression and anxiety;
2) self-efficacy mediates the relationship between treatment condition and depression and/or anxiety, such that brief CBT is associated with higher perceived self-efficacy, which is in turn associated with lower symptoms of depression and anxiety;
3) avoidant coping mediates the relationship between treatment condition and depression and/or anxiety, such that brief CBT is associated with less avoidant coping, which is in turn associated with lower symptoms of depression and anxiety;

4) active coping mediates the relationship between treatment condition and depression and/or anxiety, such that brief CBT is associated with more active coping, which is in turn associated with lower symptoms of depression and anxiety.

METHODS

The current study used data from a randomized controlled trial which compared enhanced usual care (EUC) to brief CBT in the context of primary care for veterans with comorbid cardiopulmonary conditions and significant symptoms of depression and/or anxiety (Cully et al., 2017). The study was approved by local Veterans Affairs Medical Center Research and Development Committees as well as institutional review boards at Baylor College of Medicine and the University of Oklahoma Health Science Center. Recruitment lasted from February 2011 to November 2013. Participants provided informed consent and were followed for one year. Participants in both treatment conditions were compensated up to $110 for study assessments ($20 for baseline, and $30 each for 4-, 8-, and 12-month follow-ups).

Participants

Recruitment. Medical records at the Houston and Oklahoma City Veterans Affairs Medical Centers were reviewed by research assistants to identify veterans with an International Classification of Disease (ICD-10) diagnosis of COPD and/or HF who had received care in the past year. Opt-out letters were mailed to eligible participants and study staff contacted individuals who did not opt out up to three times to assess interest in participating in the study. Interested participants completed a telephone screening process.

Inclusion/Exclusion Criteria. To be included in the parent trial, veterans had to report mild or greater functional impairment associated with COPD, as measured by the Medical Research Council (MRC; Fletcher, 1960; Bestall et al., 1999) dyspnea scale (score ≥ 3), or HF, as measured by the New York Heart Association (NHYA; Bennett, Riegel, Bittner, & Nichols, 2002) classification (class 2 or greater). Severity ratings were reviewed by consultant

cardiologists and pulmonologists. Participants were also required to report at least moderate symptoms of depression (PHQ-9 score ≥ 10) and/or anxiety (BAI score ≥ 16) at baseline. Though participants were required to report significantly elevated symptoms of depression and anxiety, they were not required to meet full DSM-IV diagnostic criteria for a depression or anxiety disorder. Veterans who screened positive on the Mini-International Neuropsychiatric Interview (MINI; Sheehan et al., 1998) for cognitive impairment, current substance use, psychotic, or bipolar disorders were excluded. Participants with suicidal ideation without intent or plan were included, while those with active intent or plan to commit suicide were excluded. A medical records review was completed prior to randomization to ensure that participants were not actively engaged in psychotherapy and to confirm eligibility to receive primary care mental health services.

Randomization. Participants were randomized at a central location by the overall study coordinator using sealed envelopes. For each group of participants (COPD, HF, and both conditions), random number lists with blocks of 10 were used to allocate 60% of participants to brief CBT and 40% to EUC. This unequal randomization procedure was used to increase the number of participants receiving the clinical intervention and to increase the power of the trial.

Sample Selection and Attrition. Medical records were reviewed for 8835 eligible participants. Of these veterans, 1387 were screened and 432 went on to receive baseline assessments (Figure 1). Several veterans were excluded prior to randomization due to experiencing a crisis/emergency (n = 3), moving to another VA (n = 1), or declining to participate (n = 2). After exclusions for subthreshold BAI and PHQ-9 (n = 122), the total sample included 302 participants, 180 randomized to brief CBT and 122 to EUC.

For the purposes of this study, attrition was defined as being lost to follow-up. At 4-months follow-up, the overall attrition rate was 22.85% (n = 69), with slightly higher attrition in the brief CBT condition (n = 48; 26.67%) than the EUC condition (n = 21; 17.21%). See Figure 1 for details of attrition at each time point and reasons for dropout.

Treatment Conditions

Enhanced Usual Care. EUC consisted of an assessment of anxiety and depression (e.g., MINI and baseline BAI and PHQ-9) with documentation in patients' medical records recommending that symptoms be addressed according to standard clinical practices. If participants reported suicidal ideation, their primary care provider was notified.

Brief Cognitive Behavioral Therapy. The clinical intervention was designed to include six weekly or bi-weekly sessions of brief CBT delivered over a 4-month period. Sessions lasted 30 to 45 minutes and were delivered in person or via phone. Additionally, participants received two brief (10- to 15-minute) "booster" sessions delivered via phone. All sessions included core elements of CBT such as agenda setting, homework assignments, goal setting, and action planning. The first two introductory sessions were required for all participants and were designed to set initial treatment goals. Thereafter, participants and providers collaboratively chose content from a range of elective skill modules based on participant need. Participants were allowed to receive the same skill modules more than once, as needed. The sixth session was a "wrap up" session. Content for the required sessions and elective skill modules are described below.

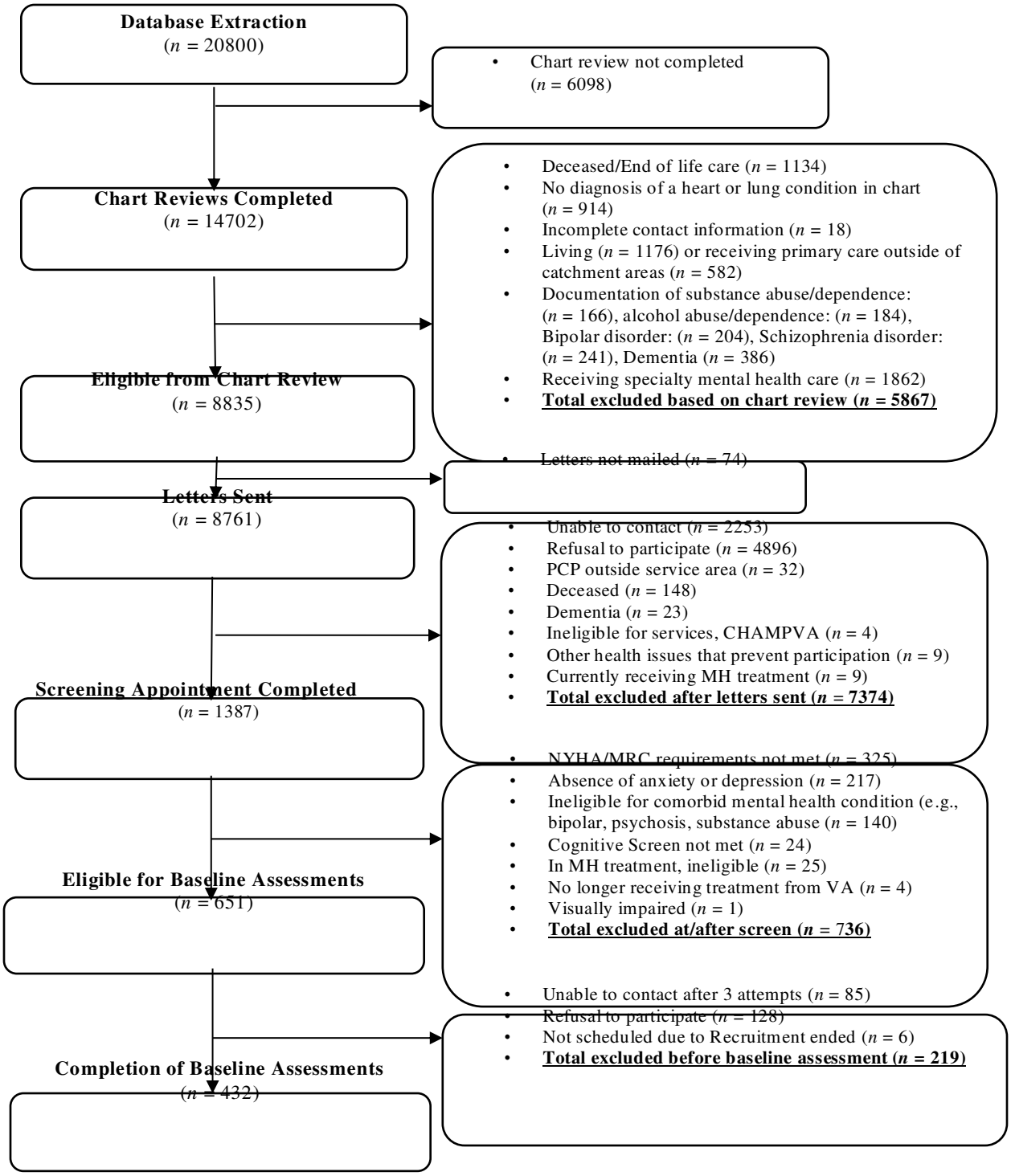

Figure 1. CONSORT Flow Chart demonstrating flow of participants through study from recruitment to follow-up.

PCP = primary care provider; CHAMPVA = Civilian Health and Medical Program of the Department of Veterans Affairs; MH = mental health; NYHA = New York Heart Association Classification; MRC = Medical Research Council Dyspnea Scale; BAI = Beck Anxiety Inventory; PHQ-9 = Patient Health Questionnaire.

(Continued)

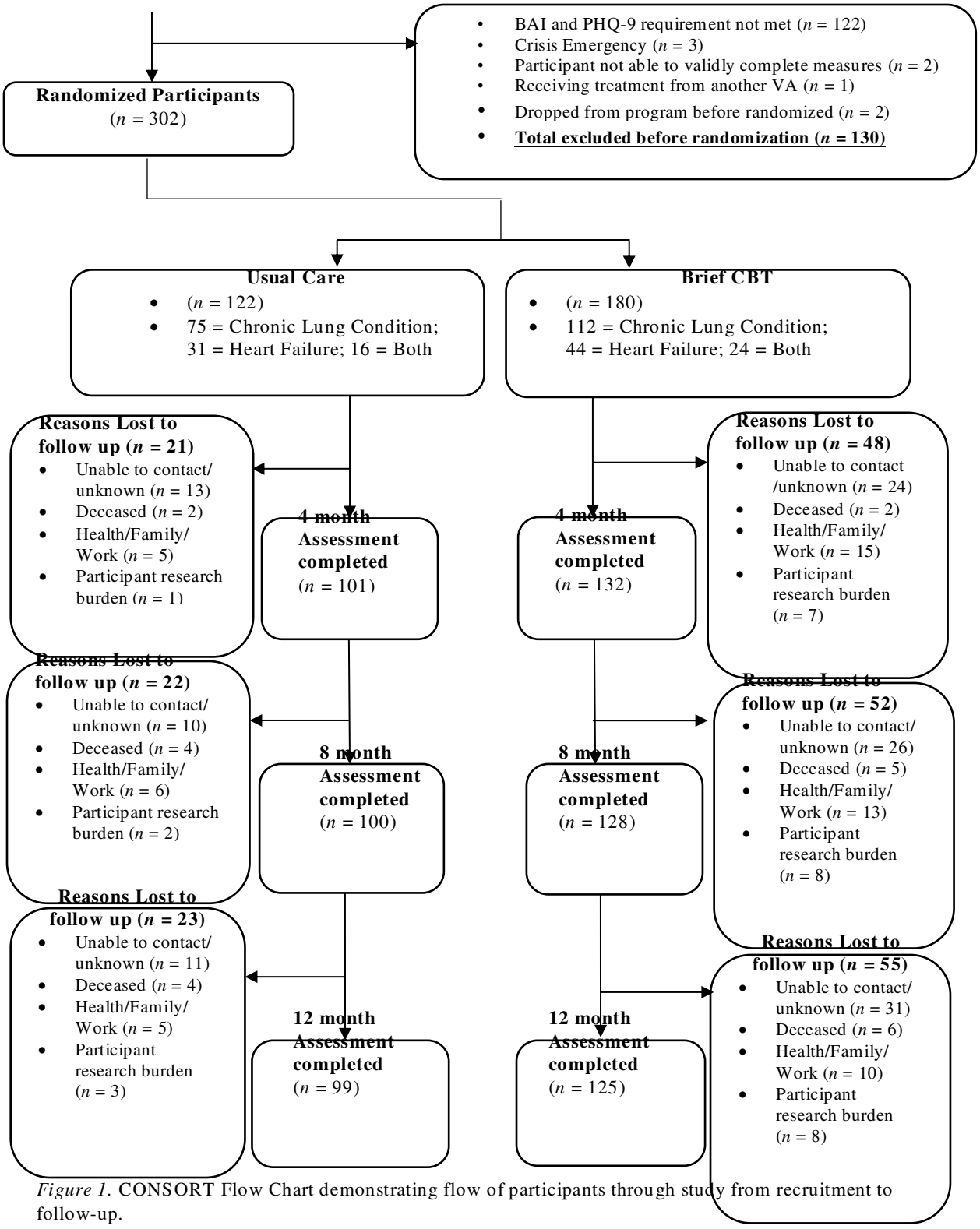

Figure 1. CONSORT Flow Chart demonstrating flow of participants through study from recruitment to follow-up.

Session 1: Chronic cardiopulmonary disease and stress. This required first session provided psychoeducation about the treatment program, chronic cardiopulmonary disease, stress, and mental health. The focus of this session was on engaging patients in care and on providing empathy as well as structure and support to facilitate self-care. For homework, participants identified their most pressing emotional and physical concerns and past coping techniques.

Session 2: Understanding personal impact and increasing control. In this required second session, participants explored the impact of their illness on functioning, discussed prior coping techniques, established treatment goals, and created an "action plan" to achieve these goals. Providers delivered psychoeducation about the importance of goal-setting and taught effective goal-setting techniques. Directed by the patient's identified goals, providers and participants collaboratively chose elective skill modules for sessions three through five.

Sessions three through five could consist of any of the following modules, in any order. Participants created an action plan to implement the new skills learned at the end of each session.

Module A: Taking control of your physical health. The emphasis of this module was on how healthy behaviors (e.g., exercise, healthy diet) can help to manage chronic illness. Participants could elect to focus on various skills that addressed nutrition, appropriate exercise, communicating with their medical provider, managing medications, and coping with flare-ups.

Module B: Using thoughts to improve wellness. The emphasis of this module was on modifying negative thoughts by identifying and implementing coping statements. Providers helped participants to identify negative thoughts and unhelpful thinking patterns. Participants then practiced modifying negative thoughts to be more realistic and practiced generating helpful self-statements.

Module C: Increasing pleasant activities. The emphasis of this module was behavioral activation. Psychoeducation about the link between activities and mood was provided, enjoyable activities were discussed, barriers to engaging in these activities were identified, and providers suggested strategies to address these barriers. Participants were provided with a log to record their daily activities and subsequent mood.

Module D: Learning how to relax. The emphasis of this module was relaxation techniques. Providers delivered psychoeducation about the role of relaxation in improving physical and mental health and guided participants in two relaxation exercises: deep breathing and guided imagery.

Wrap-up session. Providers reviewed the skills participants had learned and reviewed their treatment progress. Continued use of skills in daily life was discussed and therapy was closed.

Booster sessions. The aim of booster sessions was to reinforce skills learned during treatment. Booster sessions were offered 1- and 2-months after treatment and were delivered via phone.

Brief CBT Providers. Mental health providers who were affiliated with the primary care clinic and who provided psychotherapy as part of their scope of practice were recruited to deliver the brief CBT intervention. Providers (n = 19) were existing clinical staff or advanced trainees and included psychologists (n = 6), social workers (n = 2), physician assistants (n = 2), psychology fellows (n = 6), and psychology interns (n = 3). To provide basic knowledge of the intervention, therapists received a clinician manual and patient workbook. Therapists also participated in a comprehensive, online training program (www.vaprojectaccess.org) which included narrated slides and audio vignettes to illustrate the application of key intervention

components. The provider manual and patient workbook are available through the VA South Central Mental Illness Research, Education, and Clinical Center website (at http://www.mirecc.va.gov/visn16/docs/ACCESS_Clinician_Manual.pdf and http://www.mirecc.va.gov/visn16/docs/ACCESS_Patient_Workbook.pdf, respectively). External facilitators with expertise in brief CBT communicated with providers regularly throughout the trial to convey information about implementation and address questions or concerns about the intervention. Primary care mental health integration (PCMHI) clinic directors were engaged to internally facilitate the adoption of brief CBT by providing resources and streamlining clinical processes.

Fidelity

To assess intervention fidelity, all sessions were audio recorded and reviewed by two licensed clinical psychologists who were not providing the intervention. An established scale (Cully et al., 2012b) ranging from 1 to 8 (excellent) was used to rate intervention adherence and provider competence. Recordings were also used to deliver feedback to providers. Each provider's first therapy patient was reviewed; feedback was provided after the second session and at the end of treatment. Thereafter, a random selection of sessions was audited and feedback was provided to each provider for at least two sessions every four months. For each provider, raters audited an average of 7.2 sessions. Adherence (M = 7.2) and competence (M = 6.2) ratings generally fell in the "good" to "very good" range for all providers.

Measures

Following initial screening, assessments were conducted at baseline and 4-, 8-, and 12-month follow-up periods. Baseline assessment occurred within a month of initial screenings. For

a complete index of measures collected in the parent trial and for the assessment schedule, see Table 1.

Table 1
Assessment Schedule

Measure	Screen	Baseline	4wks post baseline	4 mo F/U (post tx)	8 mo F/ U	12 mo F/U
Chart Review (confirmation of COPD/ HF)	X					
PRIME – MD	X					
MINI	X					
Cognitive Screen	X					
Demographic Information		X				
NYHA	X			X	X	X
MRC	X			X	X	X
MINI – depression and anxiety modules		X				X
PHQ-9		X		X	X	X
GDS		X		X	X	X
BAI		X		X	X	X
PSWQ-8		X		X	X	X
CRQ		X		X	X	X
KCCQ		X		X	X	X
SF-12		X		X	X	X
Spirituality Measures – BMMRS		X		X	X	X
Illness Intrusiveness Rating Scale (HF and COPD)		X		X	X	X
Locus of Control		X		X	X	X
Self-Efficacy		X		X	X	X
COPE		X		X	X	X

(continued)

Measure	Screen	Baseline	4wks post baseline	4 mo F/U (post tx)	8 mo F/ U	12 mo F/U
Chart Review (medications)		X		X	X	X
Health Service Use		X				X
Exit Interview w/CSQ *				X		
Working Alliance Inventory (Patient Form)*				X		
Working Alliance Inventory (Therapist Form)*				X		
Therapist Rating of Patient Engagement/ Adherence*				X		
Treatment Expectancy (Expectancy Rating Scale)*			X			

Note. X indicates time-points when measures were administered. wks = weeks; mo = month; F/U = Follow-up; ; tx = treatment; COPD = Chronic Obstructive Pulmonary Disease; HF = Congestive Heart Failure; PRIME – MD = Primary Care Evaluation of Mental Disorders; MINI = MINI International Neuropsychiatric Interview; NYHA = New York Heart Association Classification; MRC = Medical Research Council Dyspnea Scale; PHQ-9 = Patient Health Questionnaire; GDS = Geriatric Depression Scale; BAI = Beck Anxiety Inventory; PSWQ-8 = Penn State Worry Questionnaire; CRQ = Chronic Respiratory Disease Questionnaire; KCCQ = Kansas City Cardiomyopathy Questionnaire; SF-12 = 12-Item Short Form Health Survey; BMMRS = Brief Multidimensional Measure of Religiousness/Spirituality; COPD = Chronic Obstructive Pulmonary Disease; HF = Congestive Heart Failure; CSQ = Client Satisfaction Questionnaire. *Denotes measures administered by research assistants to keep independent evaluators blind to group assignment.

Outcome Measures. The present study examined outcome measures assessed at the 4-month follow-up period. As groups did not differ significantly at baseline in terms of depression or anxiety, baseline scores for these outcomes were not included in analyses.

Depression symptoms were assessed using the Patient Health Questionnaire (PHQ-9), a nine-item self-report measure commonly used in healthcare settings (Kroenke & Spitzer, 2002). Although scores may be inflated in populations of older adults with medical conditions due to overlap in symptoms (Spangenberg, Forkmann, Brähler, & Glaesmer, 2011), the PHQ-9 is one of the most widely used screening tools for depression in primary care (Arroll et al., 2010). On the

PHQ-9, patients rate how often they were bothered by symptoms over the past two weeks on a four-point scale ranging from "Not at all" (0) to "Nearly every day" (3). Total scores range from 0 to 27, with scores ≥10 suggesting the presence of clinically significant symptoms of depression. Scores from the PHQ-9 have demonstrated good psychometric properties (Löwe, Kroenke, Herzog, & Gräfe, 2004; Williams et al., 2005).

Anxiety symptoms were assessed using the Beck Anxiety Inventory (BAI), a 21-item self-report measure with good reliability and validity (Beck, Epstein, Brown & Steer, 1988; Beck & Steer, 1993). The BAI was selected due to its wide use and validity as a screening tool for elevated anxiety symptoms in community mental health settings (Eack, Singer, & Greeno, 2008). On the BAI, patients rate how bothered they were by symptoms over the past two weeks on a four-point scale ranging from "Not at all" (0) to "Severely- it bothered me a lot" (3). Total scores range from 0 to 63, with scores from 16-25 indicating moderate anxiety symptoms and scores ≥ 26 indicating severe anxiety symptoms.

Predictor. Treatment condition served as the predictor variable. EUC was coded as "0" and brief CBT was coded as "1."

Mediators. In the present study, data from the 4-month follow-up assessment was used for mediator variables. *T*-tests were conducted to assess for baseline differences in mediator variables; as mediator variables did not differ significantly by treatment group at baseline, baseline measures of these mediators were not included in analyses.

The Illness Intrusiveness Rating Scale (IIRS; Devins, 2010) was used as a measure of primary appraisal. The IIRS is a 13-item self-report measure with good psychometric properties (Devins, 2010). Using a 7-point scale ranging from "not very much" (1) to "very much" (7), the IIRS assesses the extent to which chronic illness intrudes upon meaningful life activities. For this

study, patients were directed to think about how much their COPD, HF, and/or its treatment interfere with daily life. In addition to a total score, there are three subscales: relationships and personal development, intimacy, and instrumental. The total score was used in the present study.

The Self-Efficacy for Managing Chronic Diseases scale (Lorig, Sobel, Ritter, Laurent, & Hobbs, 2001) was used as a measure of secondary appraisal. This is a 6-item self-report measure that is well-validated and has good psychometric properties (Ritter & Lorig, 2014). On a 10-point scale ranging from "not at all confident" (1) to "totally confident" (10), participants rate their perceived ability to manage the symptoms associated with their chronic disease and prevent these symptoms from impacting their functioning in various domains. The score for this scale is the mean of the six items.

Coping style was assessed using the Brief COPE, a 28-item self-report measure with good reliability and validity (Carver, 1997). On the Brief COPE, patients are presented with statements about various coping strategies they may use when they experience stress and are asked to rate what they usually do on a 4-point scale ranging from "I usually don't do this at all" (1) to "I usually do this a lot" (4). The 28 items form 14 subscales, each composed of two items. Carver (1989) notes that composition of higher-order factors may vary due to characteristics of different samples, and therefore recommends that researchers conduct their own analyses to examine the relationships between subscales. Therefore, a principal components analysis was conducted to reduce the number of components of the Brief COPE. This extraction method was selected to maximize the amount of variance accounted for and to maintain consistency with previous methodology using the Brief COPE in this sample. Parallel analysis indicated a two component solution. Varimax rotation was used to prevent cross-loading of subscales, since theory suggests that avoidant and active coping are non-orthogonal. Results yielded two

components, interpreted to correspond with active coping and avoidant coping (see Table 2). Internal consistency of the active coping and avoidant coping components was acceptable, though the consistency of avoidant coping was lower (Cronbach's α = .78 and .67, respectively). Although the two components accounted for less than half of the variance in the Brief COPE, the two components corresponded to a previous principal component analysis conducted with a subsample of the current study sample (Hundt et al., 2013), and were consistent with the literature more broadly (Holahan & Moos, 1985; Roth & Cohen, 1986).

Table 2
Two components of the Brief COPE

Active Coping	**Avoidant Coping**
Eigenvalue = 4.0	Eigenvalue = 2.1
Planning (.75)	**Behavioral Disengagement (.74)**
Positive Reframing (.75)	**Denial (.74)**
Emotional Support (.74)	**Self-Blame (.74)**
Active Coping (.73)	**Venting (.68)**
Instrumental Social Support (.73)	Self-Distraction (.29)
Acceptance (.55)	Planning (.22)
Religious Coping (.54)	Positive Reframing (.09)
Self-Distraction (.54)	Acceptance (-.15)
Venting (.26)	Instrumental Social Support (.11)
Humor (.22)	Religious Coping (-.11)

(continued)

Active Coping	Avoidant Coping
Eigenvalue = 4.0	Eigenvalue = 2.1
Denial (.10)	Active Coping (.08)
Behavioral Disengagement (-.08)	Emotional Support (-.08)
Self-Blame (.03)	Substance Use (.01)
Substance Use (-.03)	Humor (.00)

Note. Results of a principal components analysis using varimax rotation. Together, the two components explained 43.30 percent of the variance in the Brief COPE. Factors were interpreted to represent active coping (accounting for 28.65% of the variance) and avoidant coping (accounting for 14.66% of the variance). Substance Use and Humor did not load strongly on either factor and were excluded from analyses.

Statistical Analyses

All analyses were conducted in SPSS Version 24 using Hayes's (Darlington & Hayes, 2016) PROCESS Macro, Version 2.16. Hypotheses were examined using multiple mediation analyses, which involve "simultaneous mediation by multiple variables" (Preacher & Hayes, 2008, p. 880). In mediation analyses, the indirect effect is the product of the regression coefficients between the predictor (in this case, treatment condition) and the outcome (i.e., depression or anxiety) through the mediator. According to Preacher and Hayes (2008), there are two steps to testing a multiple mediation model: a) analysis of the combined effect of all mediators in the model, or the total indirect effect, and b) analysis of the effects of each mediator individually, or the specific indirect effects. In the present study, the specific indirect effect was defined as the indirect effect of a particular mediator ($a_i b_i$). The total indirect effect was defined as the sum of the indirect effects of all mediators in the model $\sum_i (a_i b_i)$, $i = 1$ to j mediators.

Two models were examined: 1) the relationship between treatment condition and depression, as mediated by illness intrusiveness, self-efficacy, and coping, and 2) the relationship between treatment condition and anxiety, as mediated by illness intrusiveness, self-efficacy, and

coping. Participants with significant depression symptoms only or significant symptoms of both depression and anxiety at baseline were included in analysis of the first model and participants with significant anxiety symptoms only or significant symptoms of both depression and anxiety at baseline were included in analysis of the second model. Therefore, there was considerable overlap between the participants included in analyses of both models.

Bootstrapping, a nonparametric resampling procedure, was used to test the significance of indirect effects. Bootstrap analyses draw randomly with replacement from the initial sample, creating thousands of random samples of the same size as the initial sample. This distribution of random samples is then used to repeatedly calculate the statistic of interest and generate a confidence interval. Bootstrapping has several advantages: it does not assume multivariate normality, provides greater statistical power, and allows for parsimonious analysis of multiple mediators (Mallinckrodt, Abraham, Wei, & Russell, 2006; Preacher & Hayes, 2008).

RESULTS

Sample Characteristics

Overall, the full sample (N = 302) was older in age (M = 65.53 years) and predominantly male (94.4%). A majority of participants were white (67.9%), with African Americans representing the largest racial minority in the sample (22.8%). Over half of participants (59.3%) had completed more than 12 years of education and 61.3% were married. Regarding chronic health conditions, 61.9% of participants had only COPD, 24.8% had only HF, and 13.2% had both. Of those randomized, 24.5% (n = 74) had elevated symptoms of depression only (PHQ-9 $\geq$ 10), 12.6% (n = 38) had elevated anxiety symptoms only (BAI $\geq$16), and 62.9% (n = 190) had both. As assessed by the MINI, 180 (59.6%) participants met full diagnostic criteria for a depression or anxiety disorder based on DSM-IV-TR criteria. For a description of the sociodemographic and clinical characteristics of patients with significant anxiety and/or depression symptoms at baseline in comparison to the full sample, see Table 3 (page 44).

Chi-square goodness-of-fit and t-tests indicated that sociodemographic and clinical characteristics did not differ significantly between participants in the brief CBT and EUC treatment conditions at baseline (Table 4 on page 46). For the clinical intervention group, treatment completion was *a priori* defined as receiving at least 4 sessions of brief CBT. Chi-square goodness-of-fit and t-tests also revealed that treatment completers and non-completers did not differ significantly in terms of sociodemographic or clinical characteristics including depression, anxiety, and chronic illness severity.

Table 3
Sociodemographic and Baseline Clinical Characteristics of Participants with Significant Depression and Anxiety Symptoms

	Significant Baseline Anxiety Only (*n* = 38)		**Significant Baseline Depression Only** (*n* = 74)		**Significant Baseline Anxiety and Depression** (*n* = 190)		**Full Sample** (*N* = 302)	
	N	%	*N*	%	*N*	%	*N*	%
Gender								
Male	35	92.1	69	93.2	181	95.3	284	94.4
Female	3	7.9	5	6.8	9	4.7	17	5.6
Education								
<12 years	5	13.2	4	5.4	15	7.9	24	8.0
12 years	10	26.3	28	37.8	61	32.1	99	32.8
>12 years	23	60.5	42	56.8	114	67.9	179	59.3
Race								
White	25	65.8	54	73.0	126	66.3	205	67.9
African American	10	26.3	14	18.9	45	23.7	69	22.8
Hispanic	2	5.3	0	0.0	6	3.2	8	2.6
Other	1	2.6	6	8.1	13	6.8	20	6.6
Health Condition(s)								
COPD only	24	63.2	41	55.4	122	64.2	187	61.9
HF only	9	23.7	21	28.4	45	23.7	75	24.8
COPD & HF	5	13.2	12	16.2	23	12.1	40	13.2
Marital Status								
Married	24	63.2	38	51.4	123	64.7	185	61.3
Divorced/Separated	9	23.7	22	29.7	46	24.2	77	25.5
Widowed	4	10.5	12	16.2	13	6.8	29	9.6
Never Married	1	2.6	2	2.7	8	4.2	11	3.6

(continued)

	Significant Baseline Anxiety Only (n = 38)		Significant Baseline Depression Only (n = 74)		Significant Baseline Anxiety and Depression (n = 190)		Full Sample (N = 302)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Age	67.92	9.20	66.74	9.01	64.55	8.19	65.53	8.60
MRC Grade	4.00	0.87	3.88	0.74	4.08	.71	4.02	0.74
NYHA Class	3.07	0.73	3.18	0.68	3.21	0.68	3.18	0.68
BAI	20.92	4.97	20.89	3.20	26.59	8.33	22.03	9.64
PHQ-9	7.03	1.79	12.93	2.91	16.19	18.30	14.24	4.83
Illness Intrusiveness	47.63	12.52	52.45	15.61	59.85	15.27	56.50	15.68
Self-Efficacy	4.97	1.90	4.71	1.70	4.28	1.76	4.48	1.78
Avoidant Coping	9.32	3.29	10.59	3.17	11.85	4.16	11.22	3.92
Active Coping	20.40	4.84	18.83	4.36	21.12	4.51	20.46	4.60

Note. Demographic characteristics and baseline clinical characteristics are described in frequencies and percentages or means and standard deviations, as appropriate, for patients with significant baseline anxiety symptoms only, patients with significant baseline depression symptoms only, patients with significant baseline symptoms of both depression and anxiety, and for the full sample. Significant baseline anxiety is defined as BAI ≥ 16 at baseline assessment. Significant baseline depression is defined as PHQ-9 ≥ 10 at baseline assessment. *n* = frequency; % = percentage; *M* = mean; *SD* = standard deviation; MRC = Medical Research Council Dyspnea Scale; NYHA = New York Heart Association Functional Classification; BAI = Beck Anxiety Inventory; PHQ-9 = Patient Health Questionnaire.

Multiple Mediation Analyses

Per Hayes' (2013) recommendation for multiple mediation models, 10,000 bootstrap samples were generated to produce parameter estimates for total and specific indirect effects. If the 95% bias-corrected confidence interval around the parameter estimate did not contain zero, this indicated that the indirect effect was statistically significant and demonstrated mediation (Mallinckrodt et al., 2006; Preacher & Hayes, 2008). At baseline, there were no significant differences in illness intrusiveness, self-efficacy, active coping, avoidant coping, anxiety, or

depression between treatment groups; therefore, no covariates were included in multiple mediation models.

Table 4
Comparison of baseline sociodemographic and clinical characteristics by treatment condition

	Brief CBT (*n* = 180)		**EUC** (*n* = 122)		χ^2	*p*
	N	%	*N*	%		
Gender						
Male	168	93.3	116	95.1	0.21	.65
Female	11	6.1	6	4.9		
Education						
<12 years	11	6.1	13	10.7		
12 years	62	34.4	37	30.3	3.32	.65
>12 years	106	58.9	72	59.0		
Race						
White	119	66.1	85	69.7		
African American	42	23.3	27	22.1	3.77	.29
Hispanic	3	1.7	5	4.1		
Other	15	8.3	5	4.1		
Health Condition(s)						
COPD only	111	61.7	75	61.5		
HF only	44	24.4	31	25.4	0.03	.99
COPD & HF	24	13.3	16	13.1		
Marital Status						
Married	115	63.9	69	56.6		
Divorced/Separated	43	23.9	34	27.9	3.87	.42
Widowed	14	7.8	15	12.3		
Never Married	7	3.9	4	3.3		

(continued)

	Brief CBT (n = 180)		**EUC** (n = 122)		T	p
	M	*SD*	*M*	*SD*		
Age	64.78	8.71	66.51	8.30	1.72	.09
MRC Grade	3.97	0.76	4.11	0.70	-0.16	.87
NYHA Class	3.19	0.70	3.17	0.67	1.39	.17
BAI	21.41	8.87	22.91	10.67	1.28	.20
PHQ-9	13.80	4.64	14.88	5.07	1.90	.06
Illness Intrusiveness	56.92	15.06	55.83	16.63	-0.59	.56
Self-Efficacy	4.64	1.74	4.22	1.81	-1.87	.06
Avoidant Coping	11.09	3.92	11.40	3.95	0.68	.50
Active Coping	20.21	4.45	20.82	4.82	1.13	.26

Note. χ^2 and *t*-tests indicated no significant differences in baseline characteristics of participants randomized to brief cognitive behavioral therapy (CBT) or enhanced usual care (EUC). Demographic and baseline clinical characteristics are described in frequencies and percentages or means and standard deviations, as appropriate, for both treatment groups. COPD = chronic obstructive pulmonary disease; HF = heart failure; MRC = Medical Research Council Dyspnea Scale, NYHA = New York Heart Association Functional Classification, BAI = Beck Anxiety Inventory, PHQ-9 = Patient Health Questionnaire.

Depression. Of the 264 participants with significant symptoms of depression (including those with significant symptoms of depression only (n = 74) and those with significant symptoms of both depression and anxiety (n = 190) at baseline, 67 were lost to follow-up (see Figure 1), for a total of 197 participants included in the multiple mediation analysis. The total effect was statistically significant (95% CI [-4.75, -1.71]), indicating that participants who received brief CBT had less severe symptoms of depression at 4-month follow-up than those who received EUC (c = -3.23).[1] The total indirect effect of treatment condition through the four mediators was significant (ab = -1.58, SE = .48; 95% CI [-2.62, -0.66]). Therefore, the specific

[1] A multiple mediation analysis was also conducted with a dichotomous treatment response variable as the outcome. Patients with a 50% reduction in PHQ-9 and/or PHQ-9 < 10 at 4-month follow-up were considered treatment responders and coded as '1' while non-responders were coded as '0.' Results were consistent with the primary analyses, with self-efficacy and avoidant coping significantly mediating the relationship between treatment condition and treatment response for depression (see Appendix B for a summary of results).

indirect effects of treatment condition on depression through each of the four mediators was examined. For 4-month follow-up means of depression, illness intrusiveness, self-efficacy, active coping, and avoidant coping for patients with elevated symptoms of depression at baseline, see Table 5.

Table 5
Means and standard deviations of outcomes and mediators at 4-month follow-up for patients with significant baseline depression

	Brief CBT (*n* = 180)		**EUC** (*n* = 122)		**Full Sample** (*n* = 197)	
	M	*SD*	*M*	*SD*	*M*	*SD*
BAI	17.77	8.92	23.39	11.39	20.13	10.53
PHQ-9	10.65	5.00	13.93	5.82	12.14	5.69
Illness Intrusiveness	52.64	17.13	56.76	15.97	54.62	16.86
Self-Efficacy	5.14	1.82	4.63	1.84	4.92	1.83
Avoidant Coping	13.07	3.67	15.10	5.02	13.92	4.45
Active Coping	42.96	9.95	41.07	9.09	42.10	9.59

Note. Means and standard deviations of outcomes and mediators at 4-months follow-up were calculated for patients with significant baseline depression symptoms only. Descriptive statistics are reported for patients randomized to brief CBT, to EUC, and for the full sample. Significant baseline depression is defined as PHQ-9 $\geq$ 10 at baseline assessment. *M* = mean; *SD* = standard deviation; BAI = Beck Anxiety Inventory; PHQ-9 = Patient Health Questionnaire.

The specific indirect effects of treatment condition through illness intrusiveness and active coping were not statistically significant, as demonstrated by confidence intervals that contained zero. In contrast, the specific indirect effects of treatment condition through self-efficacy and avoidant coping were significant (95% CIs [-0.93, -0.05] and [-1.32, -0.24], respectively). Participants who received brief CBT had higher self-efficacy at 4-month follow-up (a_2 = 0.51), which in turn was associated with less severe depressive symptoms (b_2 = -0.80). Additionally, participants who received brief CBT engaged in less avoidant coping at 4-month

follow-up (a_4 = -1.98), and participants who engaged in less avoidant coping had less severe depressive symptoms (b_4 = 0.34).

The direct effect was significant (c' = -1.65, 95% CI [-2.95, -0.35]), indicating that the mediators in the model did not fully account for improvements in depression associated with brief CBT. Table 6 contains the parameter estimates for the total effect, direct effect, total indirect effect, and specific indirect effects of the relationship between treatment condition and depression as mediated by illness intrusiveness, self-efficacy, active coping, and avoidant coping. For a visual representation of the multiple mediation model for depression, see Figure 2.

Table 6
Total, direct, and indirect effects of treatment condition on symptoms of depression

			95% BC CI	
	Effect	**SE**	**Lower**	**Upper**
Total Effect	-3.23	.77	-4.75	-1.71
Direct Effect	-1.65	.66	-2.95	-0.35
Total Indirect Effect	-1.58	.44	-2.62	-0.66
Specific Indirect Effects				
Illness Intrusiveness	-0.36	.23	-0.94	0.01
Self-Efficacy	-0.41	.22	-0.93	-0.05
Avoidant Coping	-0.68	.27	-1.32	-0.24
Active Coping	-0.14	.13	-0.52	0.02

Note. The total effect of treatment condition on symptoms of depression is equal to the sum of the direct effect of treatment condition and the total indirect effect of treatment condition. The total indirect effect of treatment condition on symptoms of depression is equal to the sum of the specific indirect effects of treatment condition through illness intrusiveness, self-efficacy, active coping, and avoidant coping. All reported effects are unstandardized, as recommended by Hayes (2013). BC CI = bias corrected confidence interval; SE = standard error.

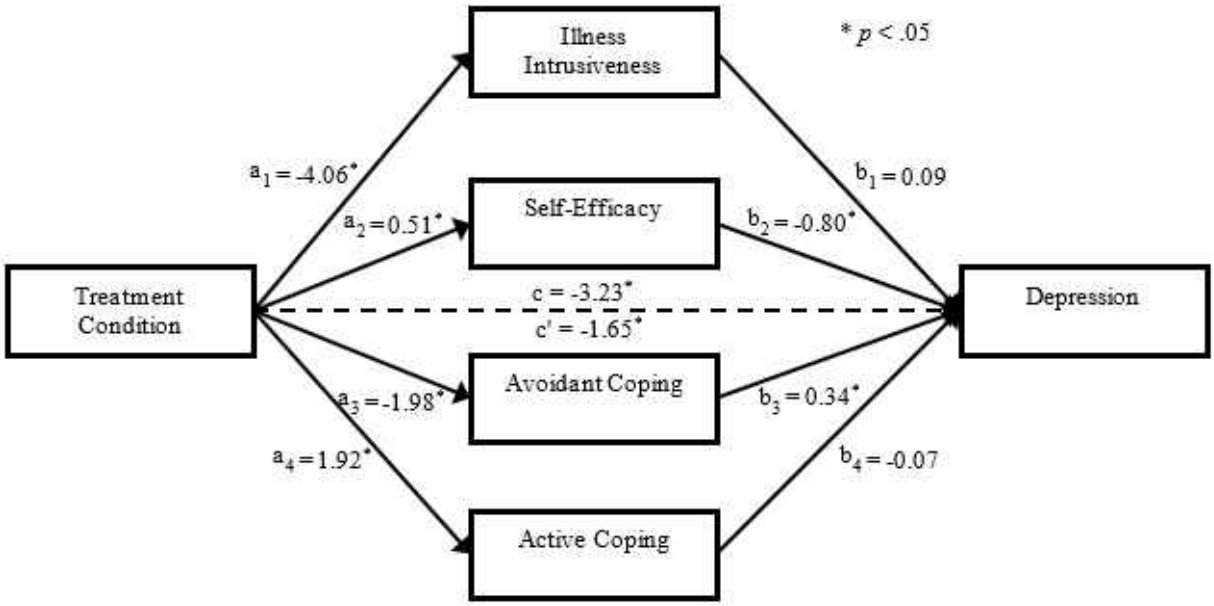

Figure 2. Multiple Mediation Model for Depression with Unstandardized Path Coefficients

Anxiety. Of the 228 participants with significant symptoms of anxiety (including those with significant symptoms of anxiety only (n = 38) and those with significant symptoms of both depression and anxiety (n = 190) at baseline, 55 were lost to follow-up (see Figure 1), for a total of 173 participants included in the multiple mediation analysis. The total effect was significant (95% CI [-9.68, -4.05]). This indicated that participants who received brief CBT had less severe anxiety symptoms at 4-month follow-up than those who received EUC (c = -6.87).[2] The total indirect effect of treatment condition through the four mediators was significant (ab = -2.73; 95% CI [-4.75, -1.06]). Therefore, the specific indirect effects of treatment condition on anxiety symptoms through each of the mediators was examined. For 4-month follow-up means of

[2] A multiple mediation analysis was also conducted with a dichotomous treatment response variable as the outcome. Patients with a 50% reduction in BAI and/or BAI < 16 at 4-month follow-up were considered treatment responders and coded as '1' while non-responders were coded as '0.' Results were mostly consistent with the primary analyses, with self-efficacy and avoidant coping significantly mediating the relationship between treatment condition and treatment response for anxiety (see Appendix C for a summary of results). However, illness intrusiveness did not significantly mediate the relationship between treatment condition and treatment response for anxiety.

depression, illness intrusiveness, self-efficacy, active coping, and avoidant coping for patients with elevated symptoms of anxiety at baseline, see Table 7.

Table 7
Means and standard deviations of outcomes and mediators at 4-month follow-up for patients with significant baseline depression

	Brief CBT (*n* = 180)		**EUC** (*n* = 122)		**Full Sample** (*n* = 174)	
	M	*SD*	*M*	*SD*	*M*	*SD*
BAI	19.14	8.36	26.03	10.41	22.03	9.90
PHQ-9	10.14	5.02	14.29	5.75	12.01	5.78
Illness Intrusiveness	53.20	16.74	57.56	14.52	55.14	15.93
Self-Efficacy	5.25	1.79	4.62	1.69	4.97	1.77
Avoidant Coping	12.87	3.87	15.00	5.06	13.74	4.54
Active Coping	42.97	9.78	42.49	8.82	42.77	9.36

Note. Means and standard deviations of outcomes and mediators at 4-months follow-up were calculated for patients with significant baseline anxiety symptoms only. Descriptive statistics are reported for patients randomized to brief CBT, to EUC, and for the full sample. Significant baseline anxiety is defined as BAI $\geq$ 16 at baseline assessment. *M* = mean; *SD* = standard deviation; BAI = Beck Anxiety Inventory; PHQ-9 = Patient Health Questionnaire.

The specific indirect effect of treatment condition through active coping was not significant, as demonstrated by a confidence interval that contained zero. In contrast, the specific indirect effects of treatment condition through illness intrusiveness, self-efficacy, and avoidant coping were significant (95% CIs [-1.39, -0.01], [-1.65, -0.17], and [-3.11, -0.49], respectively). Participants who received brief CBT perceived their chronic illness to be less intrusive at 4-month follow-up (a_1 = -4.29); illness intrusiveness was positively associated with anxiety symptoms (b_1 = 0.12), so the overall indirect effect through illness intrusiveness was negative. Brief CBT was also associated with higher self-efficacy at 4-month follow-up (a_2 = 0.63), and higher self-efficacy was related to less anxiety (b_2 = -1.13). Additionally, participants who received brief CBT engaged in less avoidant coping at 4-month follow-up (a_3 = -2.08), which was related to less severe anxiety symptoms (b_3 = 0.74).

The direct effect was significant (*c'* = -4.13, *SE* = 1.24; 95% CI [-6.58, -1.69]), indicating that the mediators in the model did not fully account for improvements in anxiety symptoms associated with brief CBT. Table 8 contains the parameter estimates for the total effect, direct effect, total indirect effect, and specific indirect effects of the relationship between treatment condition and anxiety as mediated by illness intrusiveness, self-efficacy, active coping, and avoidant coping. For a visual representation of the multiple mediation model for anxiety, see Figure 3.

Table 8
Total, direct, and indirect effects of treatment condition on symptoms of anxiety

			95% BC CI	
	Effect	**SE**	**Lower**	**Upper**
Total Effect	-6.87	1.43	-9.68	-4.05
Direct Effect	-4.13	1.24	-6.58	-1.69
Total Indirect Effect	-2.73	.93	-4.75	-1.06
Specific Indirect Effects				
Illness Intrusiveness	-0.50	.34	-1.39	-0.01
Self-Efficacy	-0.72	.36	-1.65	-0.17
Avoidant Coping	-1.54	.66	-3.11	-0.49
Active Coping	0.02	.12	-0.13	0.44

Note. The total effect of treatment condition on symptoms of anxiety is equal to the sum of the direct effect of treatment condition and the total indirect effect of treatment condition. The total indirect effect of treatment condition on symptoms of anxiety is equal to the sum of the specific indirect effects of treatment condition through illness intrusiveness, self-efficacy, active coping, and avoidant coping. All reported effects are unstandardized, as recommended by Hayes (2013). BC CI = bias corrected confidence interval; SE = standard error.

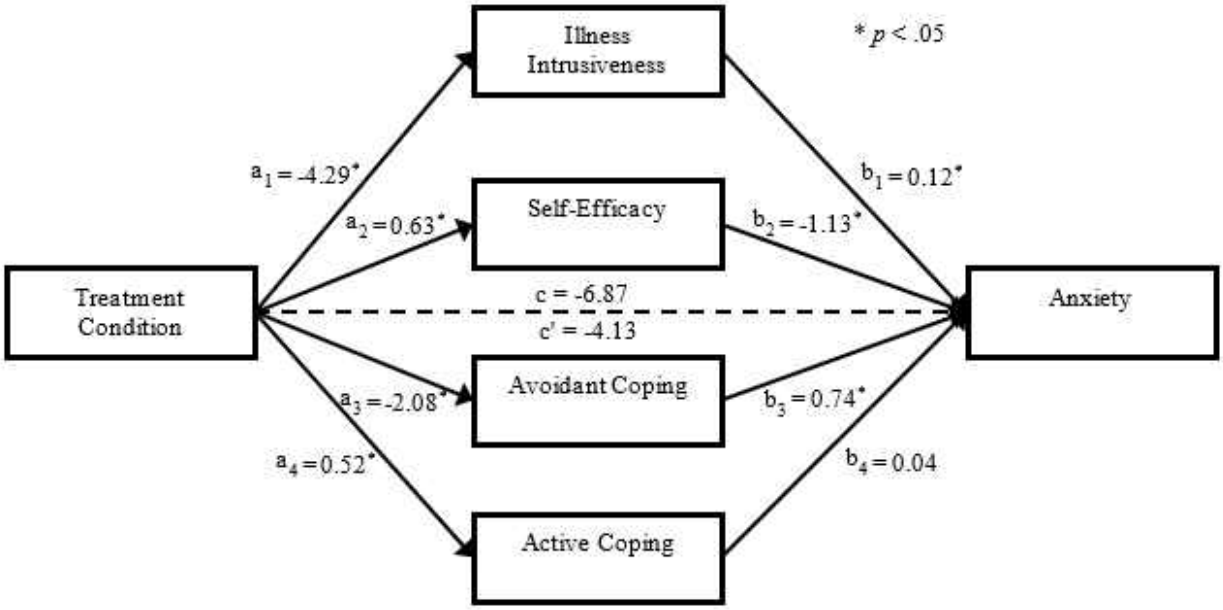

Figure 3. Multiple Mediation Model for Anxiety with Unstandardized Path Coefficients

DISCUSSION

The purpose of this study was to use the transactional model of stress and coping as a framework to examine potential mechanisms of action of brief CBT for veterans with physical and psychological comorbidities. Participants who received brief CBT tended to experience lower symptoms of depression and anxiety at 4-month follow-up than participants randomized to EUC. Further, supplemental analyses revealed that those who received brief CBT were more likely to be considered treatment responders (i.e., PHQ-9 < 10, BAI < 16, or 50% or greater reduction in PHQ-9 or BAI scores) at 4-month follow-up. These results suggest that brief CBT leads to clinically significant change in symptoms of depression and anxiety.

Consistent with the hypotheses, the relationships between treatment condition and symptoms of depression and anxiety were mediated by appraisals and coping. In particular, brief CBT was associated with higher appraisals of self-efficacy and less avoidant coping, which were related to clinically significant improvements in depression and anxiety. Brief CBT was also associated with lower anxiety symptoms through lower appraisals of illness intrusiveness. However, illness intrusiveness did not predict clinically significant changes in anxiety symptoms. These results suggest that, for patients with elevated symptoms of anxiety and/or depression and comorbid medical conditions, brief CBT may work by increasing self-efficacy and reducing use of avoidant coping strategies. Additionally, changing perceptions about the intrusiveness of chronic illness symptoms appears to be another pathway by which brief CBT reduces anxiety, but not depression. However, these reductions may not be clinically meaningful. Although preliminary, these results reflect the promise of the transactional model of stress and

coping as a framework for understanding mechanisms of brief CBT for patients with medical and mental health comorbidities.

Primary Appraisals

In accordance with the transactional model of stress and coping (Lazarus & Folkman, 1984), previous literature suggests that appraisal of chronic illness as more intrusive or as posing a loss, a potential harm, or a threat is associated with poorer psychological adjustment (Bigatti et al., 2012). Further, prior psychological interventions among medically ill populations led to reductions in perceived illness intrusiveness (Edworthy et al., 2003). In combination, these relationships suggest that clinical improvements may result from changes in primary appraisal of chronic illness symptoms.

In the present study, brief CBT was associated with lower perceived intrusiveness of chronic illness symptoms among patients with elevated symptoms of depression and anxiety. Interestingly, this translated to lower anxiety symptoms, but not depressive symptoms. Lower illness intrusiveness was not associated with clinically meaningful changes in anxiety symptoms, however. These results suggest that, while brief CBT does improve anxiety symptoms by reducing perceptions of illness intrusiveness, these changes in anxiety may not be appreciable. It is possible that illness intrusiveness may not have meaningfully impacted anxiety symptoms because it was not sufficiently emphasized in the current brief CBT protocol.

It is also important to consider how the specific type of appraisals associated with typical maladaptive cognitive patterns in depression and anxiety may help to explain the association of illness intrusiveness with lower symptoms of anxiety but not depression. There is a strong link between threat appraisal and anxiety, such that individuals with anxiety disorders tend to be biased to perceive stimuli as more threatening (e.g., with the potential for causing future harm)

compared to those without anxiety disorders (Britton, Lissek, Grillon, Norcross, & Pine, 2011). Threat re-appraisal is also one of the most well-studied mediators of CBT and anxiety (Smits et al., 2012). Although the constructs of illness intrusiveness and threat re-appraisal are distinct, perceptions of the degree to which chronic illness symptoms interfere with functioning are conceptually related to appraisals of threat to health, employment, relationships, and other valued roles and abilities. These ties between threat appraisal, illness intrusiveness, and anxiety, combined with the results of this study, suggest that brief CBT may lead to re-appraisal of chronic illness symptoms as less intrusive and threatening, which is then associated with fewer symptoms of anxiety.

Another construct that may further elucidate the relationship between illness intrusiveness and anxiety symptoms is anxiety sensitivity. Those high in anxiety sensitivity are more aware of, attuned to, and distressed by both cognitive and physical symptoms of anxiety (Taylor, 2014). Therefore, brief CBT may help attenuate anxiety sensitivity, reducing both perceptions of illness intrusiveness and anxiety symptoms.

In contrast to anxious cognitions about threat and future harm, depressive ruminations are more closely related to perceptions of loss of past identity and functional ability among those with chronic illness (Chan, Brooks, Erlich, Chow, & Suranyi, 2009). While this may partially explain the lack of association between illness intrusiveness and depression, other studies indicate that CBT decreases depressive symptoms through changes in ruminative cognitions (Watkins et al., 2011). Therefore, it is possible that brief CBT impacts depression through primary appraisals of chronic illness, but that the construct of illness intrusiveness does not capture the type of appraisal (e.g., loss) characteristic of depression. Consequently, appraisal of loss warrants study as a mediator of therapeutic change in depressive symptoms.

Secondary Appraisals

The transactional model of stress and coping holds that secondary appraisals about one's ability to employ strategies to effectively manage chronic illness should have an impact on psychological adjustment. In addition to demonstrating a strong link between self-efficacy and mental health (Joekes et al., 2007; McCathie et al., 2002), previous studies have suggested that self-efficacy may be increased through psychological intervention in patients with chronic medical conditions (Kaplan et al., 1984; O'Leary et al., 1988). Therefore, the present finding that brief CBT was associated with clinically significantly lower depression and anxiety symptoms through greater self-efficacy is consistent with both theory and past research. Tentatively it appears that enhancing self-efficacy may be one of the mechanisms by which brief CBT leads to improvements in depression and anxiety symptoms among patients with COPD and HF.

Coping

The strategies employed to cope with a stressor are related to psychological adjustment, per the transactional model of stress and coping (Lazarus & Folkman, 1984). For individuals with medical illness, avoidant coping strategies, which tend to ignore or discount problems, have been consistently linked to poorer psychological health (Duangdao & Roesch, 2008; Jensen et al., 1991; Moskowitz et al., 2009). CBT helps to reduce avoidance behavior, and this change is associated with improved mood and functioning (Deale, Chalder & Wessely, 1998). In keeping with prior research, avoidant coping was a significant mediator of the relationship between brief CBT and clinically meaningful reductions in depression and anxiety symptoms in the present study. This result lends credence to the hypothesis that reducing avoidant coping is one of the mechanisms by which brief CBT improves psychological health.

In addition to avoidant coping strategies, the present study examined use of active coping strategies, which include strategies such as positive reframing, planning, and acceptance. Among individuals with cancer, CBT is linked to greater active coping (Moorey et al., 2003). Consistent with this finding, brief CBT was associated with increased use of active coping strategies. Greater active coping did not correspond to lower depression or anxiety, though. This finding is inconsistent with prior research that has found active coping to significantly predict psychological adjustment among patients with diabetes, HIV, and chronic pain (Duangdao & Roesch, 2008; Jensen et al., 1991; Moskowitz et al., 2009). It is possible that, in contrast to other chronic medical conditions, active coping is not an important pathway through which brief CBT improves psychological adjustment for patients with COPD and HF. However, there are several lines of research that help elucidate the present findings.

First, research on positive affect and coping may provide insight into the role of active coping in psychological functioning. Folkman and Moskowitz (2000) have argued that positive affect is an understudied and important aspect of coping with chronic illness. Positive affect still occurs within the context of comorbid physical and psychological disorders and may serve an important role in alleviating distress (Folkman, 1997). Indeed, there is evidence that positive affect helps to buffer the harmful physiological effects of stress by regulating neural, endocrine, and immune responses, as well as cardiovascular functioning (Epel, McEwen & Ickovics, 1998; Fredrickson & Levenson, 1998). Specific active coping strategies such as positive reappraisal and problem-focused coping have been linked to increased positive affect (Moskowitz, Folkman, Collette, & Vittinghoff, 1996). Therefore, it may be that active coping is more closely related to increased positive affect than decreased negative affect among patients with COPD and/or HF.

The goodness of fit hypothesis also provides important suggestions about the relationship between active coping and psychological symptoms among those with chronic medical conditions. According to this hypothesis (Folkman & Lazarus, 1980), appraisal of a situation as controllable should be linked to problem-focused coping strategies (e.g., planning), while appraisal of a situation as uncontrollable should be linked to emotion-focused coping strategies (e.g., positive reframing). Good fit between appraisal of controllability and the type of coping strategies used should theoretically be associated with better psychological functioning. In a study of individuals with physical health conditions (Vitaliano, DeWolfe, Maiuro, Russo & Katon, 1990), problem-focused coping was only associated with fewer depressive symptoms when health condition was perceived as controllable. Similarly, emotion-focused coping was associated with more severe depression when health condition was perceived as controllable. Goodness of fit between appraised controllability and type of coping strategy used may also play an important role in the psychological adjustment of patients with COPD and HF. This relationship is difficult to parse in the present study, though, because perceived controllability was not measured and the active coping factor consisted of both emotion-focused and problem-focused coping strategies.

Finally, there is precedent for a significant relationship between functioning and avoidant, not active, coping in individuals with medical illness. In a study of men with cancer (Hoyt, Thomas, Epstein, & Dirksen, 2009), avoidant coping was a significant predictor of poor sleep quality, while active coping was not significantly related to sleep. Hoyt and colleagues (2009) found that depressive symptoms partially mediated the relationship between avoidant coping and sleep problems. In their explanation of this finding, the authors noted significant conceptual overlap between avoidant coping and depressive symptoms. Avoidance is also one of

the core features of anxiety (Mkrtchian, Aylward, Dayan, Rosier, & Robinson, 2017). The strong link between avoidant coping and psychological symptoms may contribute to the nonsignificant relationship between active coping and psychological adjustment.

Limitations

Measurement, intervention, and sample characteristics of the study limit the conclusions which may be drawn from the results. Due to concurrent measurement of mediators and outcome variables, causal relationships between components of the transactional model and depression and/or anxiety cannot be established. It is possible that brief CBT leads to simultaneous changes in these variables or that reciprocal relationships exist. Additionally, there are some limitations to the outcome measures used in the present study. The PHQ-9 and BAI both have several items that may correspond to both physical and mental health symptoms. For older adults with chronic medical conditions, scores may be inflated and may not change with intervention because physical health symptoms have not changed. Therefore, these measures may not capture the full impact of the intervention on mental health symptoms.

Regarding the intervention, it is difficult to know which components contributed to changes in mediators and outcomes. Brief CBT was highly customizable, allowing providers and participants to collaboratively select modules that best fit the participant's unique concerns. This flexible protocol mirrors real-world delivery of brief psychological interventions in primary care and provides a high degree of external validity; however, it limits the links that may be drawn between treatment elements and potential mechanisms of action, since not every participant received every treatment module. Additionally, the treatment dose received varied among participants, including those who completed brief CBT. Some participants who completed treatment received only 4 sessions, while others received 5 or 6. The length of sessions also

ranged from 30-45 minutes, which could further contribute to differences in depth of exposure to intervention elements. These differences make it difficult to pinpoint the minimum dose of brief CBT necessary to elicit change in potential mechanisms of action and outcomes. It is also important to note that the intervention was delivered by providers from different training backgrounds, ranging from physician assistants to psychologists, with varying levels of experience with CBT. As therapist experience has a small but significant effect on treatment outcomes (Di Giulio, 2007), this may have contributed to changes in depression and anxiety.

Finally, the characteristics of the study sample should be considered, as results may not generalize to other populations. Participants in the present sample were veterans, primarily Caucasian, mostly men, and generally older in age. The role of appraisals and coping may differ for other populations. For example, a study examining women with breast cancer suggests that appraisals of illness intrusiveness may play a more important role in the psychological adjustment of younger adults (Lebel, Beattie, Arès, & Bielajew, 2013).

Treatment Implications

Despite these limitations, this study provides initial evidence that brief CBT effectively targets both cognitive and behavioral processes that are related to depression and anxiety in the context of medical illness. Based on the results of this study, enhancing self-efficacy to manage chronic illness and decreasing avoidant coping should be goals of intervention for those with physical and psychological comorbidities. It may also be important to target perceptions of illness intrusiveness for individuals with anxiety, but further evidence is needed to determine if this will result in clinically meaningful change. The value of active coping is also less immediately apparent, though it is possible that increasing active coping may lead to more positive affect.

Though not the focus of primary analyses, it is noteworthy that brief CBT had high rates of treatment engagement and completion. These high rates of engagement and completion are particularly noteworthy, given the typically low engagement rates for men and high dropout rates for individuals with physical health conditions (Bertakis, Azari, Helms, Callahan, & Robbins, 2000; Freedland et al., 2009, 2015; Kunik et al., 2008). This finding provides further evidence that delivery of psychological interventions in the primary care setting reduces stigma and barriers to accessing care. The collaborative and customizable approach of brief CBT may also contribute to treatment engagement and retention. Finally, incorporation of physical health self-management skills appears to be particularly critical for patients with medical and mental health comorbidities (Brandt et al., in preparation).

Future directions

This study represents an important first step in establishing a connection between brief CBT, the transactional model of stress and coping, and psychological adjustment among patients with chronic medical conditions. Ideally, future studies should take repeated measurements of both proposed mediators and outcomes at timepoints across the study, to establish the directionality of relationships (Kazdin, 2007). Confirmatory evidence of changes in appraisals and coping occurring before changes in depression and anxiety would strongly support the argument that these mediators are mechanisms of action of brief CBT. Establishing specificity of these mediators through comparison of brief CBT to other interventions such as IPT would provide further reinforcement that components of the transactional model are mechanisms of action (Kazdin, 2007). Replicating the study in samples with other chronic medical conditions would also increase confidence in the role of appraisals and coping as mechanisms of action of brief CBT (Kazdin, 2007). To provide greater depth of understanding of the transactional model

of stress and coping as a model for therapeutic change, the role of specific coping strategies should be examined in further depth, as should the fit between appraisals of controllability and coping strategies. Potential moderators such as gender and age should also be investigated.

The effect of brief CBT on depression and anxiety was only partially mediated by components of the transactional model of stress and coping. This indicates that the effect of brief CBT on depression and anxiety was not fully explained by this model, as operationalized in the present study. Additional measures of primary appraisal and secondary appraisal should be included in future investigations of the transactional model. For example, a measure of threat, harm-loss, or challenge orientation may provide additional information about primary appraisals of chronic illness. Future studies may also expand beyond the transactional model to include other known mediators of CBT, such as dysfunctional attitudes and threat re-appraisal. Behavior changes not captured by measures of coping, such as medication adherence, should be examined as mediators as well. Understanding the relative contribution of these variables and components of the transactional model could provide suggestions about which skills and aspects of treatment to emphasize. These theories may then be tested using component studies.

Finally, future research on brief CBT for patients with comorbid medical and mental health conditions should examine positive affect, quality of life, and physical functioning as outcomes. For individuals with physical and psychological comorbidities, the movement of mental health services into primary care helps to facilitate a more holistic, integrated approach to care. Another aspect of the movement toward holistic care advocates for an emphasis on increasing quality of life and positive affect, rather than a sole focus on symptom reduction (Asadi-Lari, Tamburini, & Gray, 2004). The transactional model of stress and coping may also serve as a framework for understanding therapeutic changes in these variables.

Conclusions

As the effectiveness of CBT has been well-established, research has increasingly focused on understanding the processes by which CBT reduces psychological symptoms. Another area of emphasis is the adaptation of CBT to new settings and populations. The present study integrates these lines of research and is one of the first to examine potential mechanisms of action of brief CBT for patients with physical and psychological comorbidities. It appears that brief CBT may lead to improvements in depression and anxiety by increasing self-efficacy to manage chronic illness symptoms and by decreasing use of avoidant coping strategies. Furthermore, brief CBT may lead to improvements in anxiety by decreasing perceived intrusiveness of chronic illness symptoms. These results serve as preliminary evidence for the role of illness intrusiveness, self-efficacy, and avoidant coping as mechanisms of action of brief CBT. These findings also illustrate the utility of the transactional model of stress and coping as a framework for understanding how brief CBT works for patients with physical and psychological comorbidities.

The present study contributes to a small but growing body of literature considering mediators of psychological interventions for patients with comorbid medical and mental health conditions. This investigation is exceptional in its examination of all components of the transactional model (e.g., primary appraisals, secondary appraisals, and coping strategies) as parallel mediators. It is also novel in its focus on a psychological intervention delivered in the primary care setting. This line of research is timely, given the need for increased access to quality mental health care, and given the movement toward primary care mental health integration.

In summary, brief CBT appears to be an effective intervention that increases access to care for patients with comorbid medical and mental health conditions. To better understand how

this intervention works and to discover potential methods of enhancing its effectiveness, future research should continue to investigate mechanisms of action of brief CBT for patients with physical and psychological comorbidities, using the transactional model of stress and coping as a framework.

APPENDIX A:
IRB APPROVAL LETTER

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901, 407-882-2012 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

NOT HUMAN RESEARCH DETERMINATION

From : **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To : **Frances Deavers and Co-PI: Jeffrey E. Cassisi**

Date : **June 08, 2017**

Dear Researcher:

On 06/08/2017 the IRB determined that the following proposed activity is not human research as defined by DHHS regulations at 45 CFR 46 or FDA regulations at 21 CFR 50/56:

Type of Review:	Not Human Research Determination
Project Title:	Cognitive Behavioral Therapy in Primary Care: Treating the Medically Ill
Investigator:	Frances Deavers
IRB ID:	SBE-17-13214
Funding Agency:	
Grant Title:	
Research ID:	N/A

University of Central Florida IRB review and approval is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are to be made and there are questions about whether these activities are research involving human subjects, please contact the IRB office to discuss the proposed changes.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by

Kamille Chap

Signature applied by Kamille Chaparro on 06/08/2017 01:05:02 PM EDT

IRB Coordinator

APPENDIX B:
DEPRESSION TREATMENT RESPONSE MULTIPLE MEDIATION RESULTS

Direct and indirect effects of treatment condition on treatment response for depression

			95% BC CI	
	Effect	**SE**	**Lower**	**Upper**
Direct Effect	.36	.36	-0.34	1.06
Total Indirect Effect	.68	.26	0.23	1.22
Specific Indirect Effects				
Illness Intrusiveness	.14	.10	-0.01	0.42
Self-Efficacy	.17	.11	0.01	0.45
Avoidant Coping	.32	.16	0.09	0.71
Active Coping	.05	.06	-0.02	0.24

Note. The total indirect effect of treatment condition on depression treatment response is equal to the sum of the specific indirect effects of treatment condition through illness intrusiveness, self-efficacy, active coping, and avoidant coping. All reported effects are unstandardized, as recommended by Hayes (2013). BC CI = bias corrected confidence interval; SE = standard error.

APPENDIX C:
ANXIETY TREATMENT RESPONSE MULTIPLE MEDIATION RESULTS

Direct and indirect effects of treatment condition on treatment response for anxiety

			95% BC CI	
	Effect	**SE**	**Lower**	**Upper**
Direct Effect	.62	.41	-0.19	1.43
Total Indirect Effect	.56	.25	0.16	1.14
Specific Indirect Effects				
Illness Intrusiveness	.10	.09	-0.01	0.35
Self-Efficacy	.16	.11	0.01	0.46
Avoidant Coping	.31	.18	0.06	0.78
Active Coping	-.01	.04	-0.16	0.04

Note. The total indirect effect of treatment condition on anxiety treatment response is equal to the sum of the specific indirect effects of treatment condition through illness intrusiveness, self-efficacy, active coping, and avoidant coping. All reported effects are unstandardized, as recommended by Hayes (2013). BC CI = bias corrected confidence interval; SE = standard error.

APPENDIX D:
MEDICAL RESEARCH COUNCIL DYSPNEA SCALE

MRC Dyspnea Scale	
Grade	Degree of breathlessness related to activity
1	Not troubled by breathless except on strenuous exercise
2	Short of breath when hurrying on a level or when walking up a slight hill
3	Walks slower than most people on the level, stops after a mile or so, or stops after 15 minutes walking at own pace
4	Stops for breath after walking 100 yards, or after a few minutes on level ground
5	Too breathless to leave the house, or breathless when dressing/undressing

Adapted from Fletcher CM. The clinical diagnosis of pulmonary emphysema—an experimental study. Proc R Soc Med 1952;45:577–584.

APPENDIX E:
NEW YORK HEART ASSOCIATION CLASSIFICATION

New York Heart Association (NYHA) classification

NYHA grading		MET*
Class I	No limitations. Ordinary physical activity does not cause undue fatigue, dyspnoea or palpitations (asymptomatic LV dysfunction).	>7
Class II	Slight limitation of physical activity. Ordinary physical activity results in fatigue, palpitation, dyspnoea or angina pectoris (mild CHF).	5
Class III	Marked limitation of physical activity. Less than ordinary physical activity leads to symptoms (moderate CHF).	2–3
Class IV	Unable to carry on any physical activity without discomfort. Symptoms of CHF present at rest (severe CHF).	1.6

*MET (metabolic equivalent) is defined as the resting VO_2 for a 40-year-old 70kg man.' MET = 3.5ml O_2/min/kg body weight.

Reproduced from: National Heart Foundation of Australia and the Cardiac Society of Australia and New Zealand (Chronic Heart Failure Guidelines Expert Writing Panel). Guidelines for the prevention, detection and management of chronic heart failure in Australia. Updated October 2011

Source: www.heartonline.org.au/resources Reviewed 11/2014

APPENDIX F:
ILLNESS INTRUSIVENESS RATING SCALE

STANFORD
PATIENT EDUCATION
RESEARCH CENTER

Adapted Illness Intrusiveness Ratings

The following items ask about how much your illness(es) and/or its treatment interfere with your life. ***Please circle the one number that best describes your current life situation.*** If an item is not applicable, please check (✓) the box to indicate that this aspect of your life is not affected. Please do not leave any item unanswered.

How much does your illness(es) and/or its treatment interfere with:

1. Your feeling of being healthy? ❑ Not applicable

   Not very much► 1 2 3 4 5 6 7 ◄Very much

2. The things you eat and drink? ❑ Not applicable

   Not very much► 1 2 3 4 5 6 7 ◄Very much

3. Your work, including job, house work, chores, or errands? ❑ Not applicable

   Not very much► 1 2 3 4 5 6 7 ◄Very much

4. Playing sports, gardening, or other physical recreation or hobbies? ❑ Not applicable

   Not very much► 1 2 3 4 5 6 7 ◄Very much

5. Quiet recreation or hobbies, such as reading, TV, music, knitting, etc.? ❑ Not applicable

   Not very much► 1 2 3 4 5 6 7 ◄Very much

6. Your financial situation? ❑ Not applicable

   Not very much► 1 2 3 4 5 6 7 ◄Very much

How much does your illness(es) and/or its treatment interfere with:

7. Your relationship with your spouse or domestic partner? ❑ Not applicable

Not very much► 1 2 3 4 5 6 7 ◄Very much

8. Your sex life? ❑ Not applicable

Not very much► 1 2 3 4 5 6 7 ◄Very much

9. Your relationship and social activities with your family? ❑ Not applicable

Not very much► 1 2 3 4 5 6 7 ◄Very much

10. Social activities with your friends, neighbors, or groups? ❑ Not applicable

Not very much► 1 2 3 4 5 6 7 ◄Very much

11. Your religious or spiritual activities? ❑ Not applicable

Not very much► 1 2 3 4 5 6 7 ◄Very much

12. Your involvement in community or civic activities? ❑ Not applicable

Not very much► 1 2 3 4 5 6 7 ◄Very much

13. your self-improvement or self-expression activities? ❑ Not applicable

Not very much► 1 2 3 4 5 6 7 ◄Very much

Scoring

Code the number circled for each item. If more than one consecutive response is marked, code the higher number (more interference). If responses are not consecutive, do not code. If "Not applicable" is checked, code as one (1).

This scale has 5 subscales:

Physical Well-Being and Diet	Items 1 and 2
Work and Finances	Items 3 and 6
Marital, Sexual, and Family Relations	Items 7, 8, and 9
Recreation and Social Relations	Items 4, 5, and 10
Other Aspects of Life	Items 11, 12, and 13

Subscale scores are the mean of the items within each subscale. To score the scale, average the subscale scores to correct for differences in the numbers of items combined. You may also generate a total Perceived Intrusiveness score by summing the individual items.

APPENDIX G:
SELF-EFFICACY FOR MANAGING CHRONIC DISEASES SCALE

STANFORD
PATIENT EDUCATION
RESEARCH CENTER

Self-Efficacy for Managing Chronic Disease 6-Item Scale

We would like to know how confident you are in doing certain activities. For each of the following questions, please choose the number that corresponds to your confidence that you can do the tasks regularly at the present time.

1. How confident are you that you can keep the fatigue caused by your disease from interfering with the things you want to do?

not at all confident 1 2 3 4 5 6 7 8 9 10 totally confident

2. How confident are you that you can keep the physical discomfort or pain of your disease from interfering with the things you want to do?

not at all confident 1 2 3 4 5 6 7 8 9 10 totally confident

3. How confident are you that you can keep the emotional distress caused by your disease from interfering with the things you want to do?

not at all confident 1 2 3 4 5 6 7 8 9 10 totally confident

4. How confident are you that you can keep any other symptoms or health problems you have from interfering with the things you want to do?

not at all confident 1 2 3 4 5 6 7 8 9 10 totally confident

5. How confident are you that you can do the different tasks and activities needed to manage your health condition so as to reduce you need to see a doctor?

not at all confident 1 2 3 4 5 6 7 8 9 10 totally confident

6. How confident are you that you can do things other than just taking medication to reduce how much you illness affects your everyday life?

not at all confident 1 2 3 4 5 6 7 8 9 10 totally confident

Scoring

The score for each item is the number circled. If two consecutive numbers are circled, code the lower number (less self-efficacy). If the numbers are not consecutive, do not score the item. The score for the scale is the mean of the six items. If more than two items are missing, do not score the scale. Higher number indicates higher self-efficacy.

APPENDIX H:
BRIEF COPE

Brief COPE

These items deal with ways you've been coping with the stress in your life since you found out you were going to have to have this operation. There are many ways to try to deal with problems. These items ask what you've been doing to cope with this one. Obviously, different people deal with things in different ways, but I'm interested in how you've tried to deal with it. Each item says something about a particular way of coping. I want to know to what extent you've been doing what the item says. How much or how frequently. Don't answer on the basis of whether it seems to be working or not—just whether or not you're doing it. Use these response choices. Try to rate each item separately in your mind from the others. Make your answers as true FOR YOU as you can.

1 = I haven't been doing this at all
2 = I've been doing this a little bit
3 = I've been doing this a medium amount
4 = I've been doing this a lot

1. I've been turning to work or other activities to take my mind off things.
2. I've been concentrating my efforts on doing something about the situation I'm in.
3. I've been saying to myself "this isn't real.".
4. I've been using alcohol or other drugs to make myself feel better.
5. I've been getting emotional support from others.
6. I've been giving up trying to deal with it.
7. I've been taking action to try to make the situation better.
8. I've been refusing to believe that it has happened.
9. I've been saying things to let my unpleasant feelings escape.
10. I've been getting help and advice from other people.
11. I've been using alcohol or other drugs to help me get through it.
12. I've been trying to see it in a different light, to make it seem more positive.
13. I've been criticizing myself.
14. I've been trying to come up with a strategy about what to do.
15. I've been getting comfort and understanding from someone.
16. I've been giving up the attempt to cope.
17. I've been looking for something good in what is happening.
18. I've been making jokes about it.
19. I've been doing something to think about it less, such as going to movies, watching TV, reading, daydreaming, sleeping, or shopping.
20. I've been accepting the reality of the fact that it has happened.
21. I've been expressing my negative feelings.
22. I've been trying to find comfort in my religion or spiritual beliefs.
23. I've been trying to get advice or help from other people about what to do.
24. I've been learning to live with it.
25. I've been thinking hard about what steps to take.
26. I've been blaming myself for things that happened.
27. I've been praying or meditating.
28. I've been making fun of the situation.

Scales are computed as follows (with no reversals of coding):

Self-distraction, items 1 and 19
Active coping, items 2 and 7
Denial, items 3 and 8
Substance use, items 4 and 11
Use of emotional support, items 5 and 15
Use of instrumental support, items 10 and 23
Behavioral disengagement, items 6 and 16
Venting, items 9 and 21
Positive reframing, items 12 and 17
Planning, items 14 and 25
Humor, items 18 and 28
Acceptance, items 20 and 24
Religion, items 22 and 27
Self-blame, items 13 and 26

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