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SMOKING CESSATION FOR PATIENTS IN MULTIDISCIPLINARY PAIN TREATMENT SETTINGS: A PRELIMINARY TEST OF ACCEPTANCE AND COMMITMENT THERAPY

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Smoking Cessation for Patients in Multidisciplinary Pain Treatment Settings: A Preliminary Test of Acceptance and Commitment Therapy

Chairperson: Duncan Campbell

Smoking and chronic pain are significant public health concerns. Patients with chronic pain smoke at higher rates than the general population (Zvolensky, McMillan, Gonzalez, & Asmundson, 2009), and the pain-smoking relationship appears to be influenced by factors such as pain-related anxiety (Ditre, Zale, Zvolensky, & Kosiba, 2013) and depression (Goesling, Brummett, & Hassett, 2012). To address a gap in the knowledge base, the current study examined the effectiveness and feasibility of a 5-session, telephone-delivered ACT intervention for smoking cessation among 45 participants recruited from two multidisciplinary pain treatment centers. The ACT intervention was compared to an enhanced treatment-as-usual (TAU) control condition. Rates of depression and PTSD were high in our sample: 40% for depression, and 18% for PTSD. Participants in the ACT condition had higher verified smoking 7-day point prevalence abstinence at the end of treatment, with 33% of those who completed the entire ACT treatment reporting abstinence at this time point. However, at the 3-month follow-up assessment, only two participants in the ACT condition and one participant in the TAU condition had quit smoking. There were no significant differences in smoking intensity by condition, but we did observe a reduction in smoking in both conditions at the end of treatment, and at the 3-month follow-up assessments. Regarding psychological symptoms, all study participants demonstrated increases in depression and psychological inflexibility. There were no differences over time or between groups regarding pain intensity, pain interference, or pain-related anxiety. Contrary to our expectations, changes in psychological flexibility or changes in pain-related anxiety were not predictive of smoking outcomes at 3 months. Our findings suggest that chronic pain patients have higher smoking cessation needs compared to the general population, as evidenced by the high rates of depression and PTSD in our sample and the overall low rates of quitting.

Acknowledgments

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CHAPTER 1: INTRODUCTION

Smoking among Chronic Pain Patients

Both smoking and chronic pain are prevalent health problems in the United States. Research suggests that approximately 22-30% of the adult US population suffers from chronic pain (Johannes, Le, Zhou, Johnston, & Dworkin, 2010; Portenoy, Ugarte, Fuller, & Haas, 2004), with some population based estimates showing these rates to be as high as 64% (Hardt, Jacobsen, Goldberg, Nickel, & Buchwald, 2008). Chronic pain is defined as pain lasting beyond the 3-6 month time frame that is typically required to repair tissue damage (Task Force on Taxonomy of the IASP, 1994). Regarding smoking, prevalence estimates in the US are around 20% in spite of the evidence of its detrimental health effects (Centers for Disease Control, 2009). Smoking is of particular concern among individuals with chronic pain because these persons smoke at higher rates than the general population as evidenced by the 42% smoking prevalence found among individuals with chronic pain from a nationally representative sample (Zvolensky et al., 2009). Moreover, the prevalence of smoking has been shown to be as high as 54% in a clinical based chronic pain population (Jamison, Stetson, & Winston, 1991) and as high as 68% in a hospital based pain management center (Michna et al., 2004).

There is now clear documentation in the literature linking chronic pain and smoking, with some evidence supporting smoking as a risk factor for chronic pain (Pisinger et al., 2011). Indeed, in a study examining environmental tobacco exposure, Pisinger et al. (2011) found that both smokers and nonsmokers who had been exposed to significant daily environmental tobacco smoke (ETS), defined as five hours or more, had an increased probability of exhibiting frequent

pain than smokers and nonsmokers who had very little exposure to ETS (OR=1.46 for non-smokers [95%CI = 1.2-1.8], and 2.04 for smokers [95%CI = 1.4-3.0]). The authors also found that smokers reported more frequent pain than nonsmokers in six pain locations (i.e., lower back pain in lifting, lower back pain radiating to legs, neck and upper back pain, joint pain, abdominal pain, and non-migraine headaches). Other studies suggest that smoking and pain have a reciprocal relationship, forming a positive feedback loop that results in greater pain and the maintenance of smoking behavior (Ditre, Brandon, Zale, & Meagher, 2011). This information is highly relevant in chronic pain treatment, given that smoking among individuals with chronic pain has been linked to worse pain outcomes (Jakobsson, 2008). Additionally, the negative consequences of smoking, independent of the presence of chronic pain, are significant and well documented, costing approximately $193 billion per year in medical expenses and lost productivity (Centers for Disease Control, 2005).

Psychological Considerations

The rates of smoking among people with psychological disorders are almost twice as high as the rates found among the general population (Lasser et al., 2000; Rohde, Lwwinsohn, Brown, Gau, & Kahler, 2003). Although several theories have been proposed regarding the nature of these associations, heterogeneity among people with psychological disorders has precluded agreement regarding definitive causal models to explain the link (Ziedonis et al., 2005). Regarding depression, some suggest smoking behavior represents an effort to lessen depressive symptoms (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004), while others propose that smoking causes depression (Steuber & Danner, 2006). Bidirectional models have also emerged in the literature, maintaining that smoking and depression influence each other (Windle & Windle, 2001).

Regarding anxiety, smoking prevalence estimates can be as high as 56% for generalized anxiety disorder (Lasser et al., 2000). A study by Johnson et al. (2000) found heavy smoking during adolescence and young adulthood conferred risk for developing panic disorder, generalized anxiety disorder, and agoraphobia later in life. Unexpectedly, in this study, anxiety disorders during adolescence did not predict smoking during young adulthood. Further, Zvolensky, Schmidt, and McCreary (2003) found smoking to be associated with higher social impairment, higher severity of panic symptoms, and higher intensity and severity of anxiety symptoms among people with panic disorder. The literature provides minimal guidance regarding mechanisms driving the relationship between anxiety and smoking, and a number of factors are likely to play a role in this association (Ziedonis et al., 2008). Some researchers suggest, for example, that both anxiety and smoking result from a genetic, or other predisposition, to experience negative affect (Gilbert, 1995; R. Goodwin & Hamilton, 2002; Ziedonis et al., 2008). Posttraumatic Stress Disorder (PTSD), a trauma-related disorder with a substantial link to anxious affect (American Psychiatric Association, 2013), has been linked link to smoking behavior (Beckham, 1999; Koenen et al., 2005; Lasser et al., 2000). There is evidence that PTSD can lead to smoking, that smoking can increase the risk of developing PTSD, and that smoking is used as a coping strategy to deal with PTSD symptoms (Koenen et al., 2005).

Depression, anxiety, and PTSD rates are high among individuals with chronic pain (Arnow et al., 2006; Atkinson, Slater, Patterson, Grant, & Garfin, 1991; Dersh, Polatin, & Gatchel, 2002; Roy-Byrne, Smith, Goldberg, Afari, & Buchwald, 2004). In a study investigating the role of depressive symptoms on smoking-related pain symptoms, Goesling et al. (2012) found depressive symptoms to mediate the relationship between smoking and pain in terms of

pain severity and pain interference. Current smokers in Goesling et al.'s study reported higher depressive symptoms, higher pain severity, and higher pain interference than nonsmokers with chronic pain. However, when the authors controlled depressive symptoms in a mediation model, smoking status no longer demonstrated an effect on pain severity or pain interference. In another study using a retrospective design to examine the effects of depression and smoking on pain severity and opioid use in patients with chronic pain enrolled in a 3-week outpatient pain treatment program, baseline pain severity was independently associated with greater levels of depression but not with smoking status (Hooten, Shi, Gazelka, & Warner, 2011). These studies suggest that further research is needed to understand the complex relationship between depression, smoking status, and pain.

Ditre et al. (2013) found that pain-related anxiety accounted for a significant proportion of the variance in smoking dependence scores, both total scores, and primary and secondary smoking dependence scores as measured by the Wisconsin Inventory of Smoking Dependence Motives (WISDM) (Piper et al., 2008; Piper et al., 2004). Primary dependence scores reflect the central or core characteristics of tobacco dependence (e.g., tolerance, cravings, etc.), while secondary dependence scores are indicative of circumstantial factors contributing to smoking (e.g., weight control, alleviating stress, improving mood, etc.) (Piper et al., 2008). Because the authors found pain-related anxiety to be strongly correlated with secondary dependence motives, they deduced that smoking was motivated by a desire to cope with or escape pain-related anxiety. Interestingly, these results held true even after controlling for generalized anxiety, pain severity, and demographic and social factors. The authors concluded that smokers with chronic pain may be at greater risk of persistent or increased dependence on tobacco than smokers without chronic pain.

In addition to depression and anxiety, evidence indicates that smoking among individuals with chronic pain is linked to greater emotional distress, higher reliance on pain medication, and lower levels of physical activity (Jamison et al., 1991). Further, chronic pain on its own has been linked to psychological disorders such as depression, anxiety, substance use disorders, personality disorders, and somatoform disorders [See Dersh et al. (2002) for full a review on chronic pain and psychopathology]. It is no surprise that chronic pain patients have reported smoking behavior as an attempt to help them deal with pain and relieve depressive symptoms (Jamison et al., 1991). Interestingly, although nicotine has been found to have analgesic effects in animal studies (Rowley, Payappilly, Lu, & Flood, 2008; Sahley & Berntson, 1979), it increases pain intensity among chronic pain patients and is associated with increased occupational and social impairment (Hooten et al., 2009; Weingarten et al., 2009; Weingarten et al., 2008).

Along with mental health considerations in smoking cessation among individuals with chronic pain, pain-related beliefs and thoughts are important to consider as potential barriers to cessation efforts. In a study examining the extent to which individual differences in pain perception are related to successful abstinence from smoking, Nakajima and al'Absi (2011) found that higher pain ratings before and after a cold pressor test predicted greater risk of smoking relapse. Higher pain ratings may therefore be useful in identifying smokers at risk of early smoking relapse (Nakajima & al'Absi, 2011). Indeed, in a study examining smoking as a pain coping strategy and pain patients' awareness of the influence of smoking on their pain, Jamison et al. (1991) found that the majority of smokers (91%) did not believe that smoking had an effect on the intensity of their chronic back pain. However, 57% of smokers reported needing to smoke when they were in pain, suggesting that these patients were unaware of the relationship

between their pain and their smoking. Smokers with chronic pain were also found to have more emotional distress, to rely more heavily on medication, and to remain inactive when compared to nonsmokers with chronic pain. The authors concluded that pain patients may be at risk for greater smoking when they experience higher pain intensity and emotional distress.

Finally, the concept of fear-avoidance has received considerable attention in the pain literature. Briefly, fear-avoidance refers to a tendency to fear pain signals or to interpret them as a sign of danger and/or tissue damage (Lethem, Slade, Troup, & Bentley, 1983). In order to cope with this fear, individuals in pain avoid certain movements and activities that may lead to pain, which can result ultimately in physical deconditioning (Lethem et al., 1983). As individuals with chronic pain become more physically deconditioned, they are more likely to experience pain from simple activities and to interpret this pain as a serious sign that something is wrong, thus maintaining a negative feedback loop (Vlayen & Linton, 2000). Pain catastrophizing, defined as "an exaggerated negative orientation toward noxious stimuli" (Sullivan, Bishop, & Pivik, 1995) appears to maintain this cycle (Vlayen, de Jong, Sieben, & Combez, 2002).

Pain-related fear has emerged as a contributor to the development of chronic pain. A meta-analysis examining the relationship between pain-related fear and disability, indicated that a positive moderate to large relationship exists between pain-related fear and disability (Zale, Lange, Fields, & Ditre, 2013). As mentioned earlier, and of special relevance to the current study, pain-related anxiety, a concept closely related to fear-avoidance, has also been associated with nicotine dependence (Ditre et al., 2013). It is possible that pain-related anxiety may be an underlying mechanism in the association between pain and smoking. This may call for targeting pain-related anxiety in conjunction with smoking cessation treatment in order to help reduce smoking rates and disability among persons with chronic pain.

In sum, smoking prevalence is high among chronic pain patients (Jamison et al., 1991; Michna et al., 2004; Zvolensky et al., 2009) who are also likely to experience high rates of psychological disorders like depression, anxiety, and PTSD (Arnow et al., 2006; Atkinson et al., 1991; Dersh et al., 2002; Roy-Byrne et al., 2004). The relationship between smoking and psychological disorders is a complicated one, with biological, psychological, environmental, and social factors playing a role in the initiation and course of smoking among individuals with psychological disorders. However, there is evidence that addressing psychological symptoms concurrently with smoking can result in improved smoking cessation outcomes (McFall et al., 2010; McFall et al., 2007; Muñoz, Marín, Posner, & Pérez-Stable, 1997). As outlined above, psychological disorders such as depression, anxiety, and PTSD appear to be linked to chronic pain and may help explain the high rates of smoking among individuals with chronic pain. Addressing depression, anxiety, and pain-related beliefs may be particularly beneficial in a smoking cessation intervention for this population.

Psychological Approaches to Chronic Pain Treatment

Given that chronic pain is defined as pain lasting beyond the expected time needed for healing (Task Force on Taxonomy of the IASP, 1994), the benefits of a singular, medical approach to treatment are not as evident for chronic pain as they are with acute pain (Roditi & Robinson, 2011). Indeed, for most patients with acute pain, once the apparent cause has been addressed or once the person has had enough time to heal, the pain will end (Roditi & Robinson, 2011). However, for reasons not yet entirely understood, some patients do not achieve complete resolution of their pain condition despite medical treatment, and they subsequently develop chronic pain (Roditi & Robinson, 2011).

From a biopsychosocial standpoint, the experience of chronic pain includes physiological characteristics (e.g., tissue damage), social factors (e.g., impact of chronic pain on relationships, employment, etc.), psychological components (e.g., catastrophizing, distress associated with chronic pain), and physical characteristics (e.g., limitations on physical function due to chronic pain) (Roditi & Robinson, 2011). The role of psychology in chronic pain treatment is not to "cure" or eliminate pain, but rather to help chronic pain patients increase their quality of life while living with a chronic pain condition (Roditi & Robinson, 2011). Given the biopsychosocial perspective, pain is best managed by a multidisciplinary, integrated approach, typically consisting of physical therapy, analgesic medications, and psychological approaches including cognitive and behavioral therapies (Roditi & Robinson, 2011). Psychological approaches to pain management have shown many beneficial outcomes, such as: improved mood, greater life satisfaction, improved pain ratings, decreased pain-related anxiety, and improved cognitive coping and appraisal, among others (Moreley, Eccleston, & Williams, 1999; Vowles & McCracken, 2008; Wicksell, Ahlqvist, Bring, Merlin, & Olsson, 2008).

A variety of psychological approaches have shown promise in the management of chronic pain (Roditi & Robinson, 2011). These include *cognitive and behavioral approaches*, such as cognitive-behavioral therapy (CBT), psychoeducation, coaching in coping strategies, cognitive restructuring, and instruction in pacing, among others; *biofeedback*, helping the patient recognize areas of muscular tension so that he/she can then relax those areas and reduce pain; *operant behavior therapy* to extinguish unhelpful behaviors that help to maintain pain, such as fear avoidance in response to pain-related fear (Roditi & Robinson, 2011); *relaxation techniques*, such as diaphragmatic breathing, progressive muscle relaxation, and visualization/guided imagery to help activate the parasympathetic nervous system to achieve decreases in pain; and

acceptance-based approaches, which emphasize helping the patient live a valued life despite his/her pain, and teaching patients to increase their psychological flexibility.

Acceptance and Commitment Therapy (ACT), one of the psychological approaches used more recently in pain treatment, is among the therapies considered the "new wave" of CBT (Hofmann, Sawyer, & Fang, 2010; Kahl, Winter, & Schweiger, 2012). The difference between traditional CBT and the "new wave" or "third wave" of behavioral therapies ([e.g., Mindfulness Based Cognitive Therapy (MBCT), Dialectical Behavior Therapy (DBT), Metacognitive Therapy (MC))] is that the new therapies emphasize changing the function or power of psychosocial events rather than changing the events experienced by the client (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). This is done by using mindfulness, cognitive defusion (noticing thoughts rather than getting caught up in them), and acceptance (Hayes et al., 2006). The aim of ACT is to help individuals construct a rich and meaningful life while accepting the unpleasantness that inevitably comes with the human experience (Harris, 2009). According to Harris (2009), ACT focuses on working to clarify the patient's values and using these values to motivate and inspire him/her to set goals and take appropriate action. In addition, the patient incorporates mindfulness skills to help him/her cope with difficult thoughts and feelings. As the name implies, ACT aims to teach the patient to accept circumstances that are out of her/his control, and to commit to effective action that will result in living a life in accord to the patient's values.

In chronic pain treatment, ACT aims to increase functioning and minimize pain's interference with a patient's ability to live a rich and fulfilling life (Hayes & Duckworth, 2006). In a randomized controlled trial of ACT versus CBT for chronic pain in a primary care setting, Wetherell et al. (2011) obtained improvements among both the ACT participants and the CBT

participants on pain interference and pain-related anxiety. ACT participants who completed the intervention reported greater satisfaction with their treatment than the CBT participants. A similar study, comparing ACT to treatment as usual (TAU) in primary care, observed lower depression and higher overall improvement among the ACT participants immediately post treatment, and lower depression, lower disability and higher pain acceptance among the ACT participants at the three-month follow-up assessment (McCracken, Sato, & Taylor, 2013).

If depression and pain-related anxiety do, in fact, play a role in the smoking behavior of chronic pain patients, ACT strategies may be particularly useful for chronic pain patients who smoke, given ACT's effectiveness in reducing pain-related anxiety and depression. Indeed, as stated earlier, pain-related anxiety was found to predict nicotine dependence among individuals with chronic pain (Ditre et al., 2013). Addressing pain-related anxiety using ACT has the potential to target an important factor underlying the association between chronic pain and smoking. If. as Ditre et al. suggest, smoking is used as a coping mechanism to avoid pain-related anxiety, then addressing it specifically in a smoking cessation treatment could decrease chronic pain patients' risk of dependence on tobacco. Further, given that ACT has been effective in lowering depression scores among chronic pain patients, ACT could be used to address depression symptoms related to nicotine withdrawal in this population and to reduce the tendency of chronic pain clients to use smoking as a coping mechanism to deal with depression symptoms.

Smoking Cessation among Chronic Pain Patients: An Integrative Approach

The U.S. Department of Health and Human Services' (2008) Clinical Practice Guidelines for Treating Tobacco Use and Dependence consider integration of tobacco cessation treatment to

be an effective and efficient way of delivering treatment services to people with chronic health conditions. Indeed, these guidelines stress the importance of targeting smokers with chronic medical health conditions for tobacco cessation treatment interventions. While integrating tobacco dependence treatment in chronic pain settings is crucial to reducing smoking rates in this population, provider beliefs regarding the smoking behavior of pain patients may prevent them from providing cessation treatment (Hooten, Vickers, et al., 2011). For example, a possible concern in addressing smoking among chronic pain patients, especially if smoking is used as a coping strategy to deal with pain or distress, is whether these patients are motivated to quit smoking (Hooten, Vickers, et al., 2011). In a study investigating the role of pain in smokers' readiness to quit, Hahn, Rayens, Kirsh, and Passik (2006) found that smokers who suffer from significant pain were just as likely as those without significant pain to be ready to quit smoking. Given these findings, the authors recommended placing formal tobacco dependence treatment programs within pain clinics and addressing pain in smoking cessation programs. Additional studies in this area have also shown that individuals with chronic pain are motivated to quit using tobacco (Zale & Ditre, 2013; Zale, Ditre, Dorfman, Heckman, & Brandon, 2014).

Despite the high need for smoking cessation services and the fact that many chronic pain patients appear motivated to quit, few intervention studies exist. To this author's knowledge, there has only been one pilot randomized controlled trial of a smoking cessation intervention tested among chronic pain patients who smoke (Hooten et al., 2014). In one of the very few studies in this area, Kaye, Prabhakar, Fitzmaurice, and Kaye (2012) tested a smoking cessation intervention in pain patients that highlighted the role of physician advice to quit and investigated its effects on patients' smoking habits. The intervention condition consisted of the pain practitioner giving patients the following three messages at each monthly appointment:

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"1. Every cigarette has more than 50 poisonous chemicals

2. Smoking cigarettes will shorten your lifespan

3. Your current diagnosis will not improve (i.e., your pain will not lessen) if you continue

to smoke." (p. 18).

Patients were also offered a variety of options for smoking cessation medication. Patients

rated statement 2 (smoking cigarettes will shorten your lifespan) as the most convincing,

followed by statement 3 (your current diagnosis will not improve). Statement 1 (every cigarette

has more than 50 poisonous chemicals) was the least convincing statement chosen by pain

patients. Although the study did not have a control condition, the investigators found that 91% of

patients reduced the number of cigarettes they smoked per day, with the overall number of

cigarettes smoked per day dropping from a mean of 25.5 to 7.2. In addition, patients reported

benefits from smoking reduction and cessation, including improved breathing, feeling better, and

a reduction in pain.

Hooten et al. (2009) conducted a study in a multidisciplinary pain rehabilitation

program to test an intervention for smoking cessation. The intervention consisting of a one-time,

one-hour meeting, that included the development of a brief treatment plan, use of

pharmacotherapy, and development of a relapse prevention plan as well as three follow-up

telephone calls inquiring about tobacco use and providing relapse prevention support (conducted

at one, three, and six months). None of the smokers receiving this intervention quit smoking.

This finding was consistent with the U.S. Public Health Service's (Fiore et al., 2008) conclusion

that multiple contacts are more effective than single contacts in terms of smoking cessation

treatment. Indeed, a review of randomized controlled trials looking at the efficacy of smoking

cessation interventions delivered in hospital settings found that the most efficacious interventions

included hospital contact and follow-up treatment contacts that continued for more than one

month after discharge (Rigotti, Munafo, Murphy, & Stead, 2003).

The latest study in this area consisted of a pilot study evaluating a seven-session (four

individual, 3 group) cognitive behavioral smoking cessation treatment for adults with chronic

pain (Hooten et al., 2014). Participants were patients at the Mayo Comprehensive Pain

Rehabilitation Center. The intervention was based on the authors' preliminary studies indicating

that chronic pain patients use smoking as a distraction from pain and a way to cope with distress,

and they prefer group therapy over individual therapy. The control condition consisted of a one-

hour meeting with a trained tobacco treatment specialist who followed evidence-based practice

guidelines for treating tobacco dependence. Pharmacotherapy was available for participants in

both conditions. Results suggested that integrating smoking cessation into pain treatment may be

effective. Indeed, 20% of participants assigned to the intervention arm quit compared to 0% in

the control group. In addition, at week three, participants in the intervention condition reported

greater improvements in smoking cessation self-efficacy than participants in the control

condition. The authors concluded that integration of smoking cessation treatment in ongoing pain

treatment is feasible. The authors also asserted that the intervention did not have negative effects

on pain-related treatment outcomes.

To summarize, there are several important reasons for addressing tobacco use in

multidisciplinary pain treatment centers. First, addressing smoking in these settings is consistent

with clinical practice guidelines for treating tobacco use and dependence (U.S. Department of

Health and Human Services, 2008). Second, there is evidence that smokers with chronic pain are

motivated to quit smoking (Zale & Ditre, 2013; Zale et al., 2014), and that they are amenable to

pharmacologic intervention (Zale & Ditre, 2013). Third, smoking cessation has been found to be

related to improved pain scores following spinal care (Behrend et al., 2012). There is also evidence suggesting that persistent attention to smoking behavior by pain providers results in significant reduction in smoking behavior as well as patient-reported health benefits, including improvement in breathing, feeling better, and a reduction in pain (Kaye et al., 2012).

It is important to note that psychological approaches to the management of chronic pain can be implemented in tobacco cessation treatment. Psychological interventions for chronic pain include teaching patients cognitive, behavioral, and acceptance-based approaches to manage and cope with pain conditions. The many benefits of psychological approaches in the treatment of chronic pain include: reduced pain-related disability, reduced emotional distress, increased self-management of pain, and improved pain-coping resources, among others (Roditi & Robinson, 2011). Knowledge of these pain management strategies can be beneficial in addressing smoking cessation among patients who smoke as a coping strategy to deal with pain. Lastly, smoking status among chronic pain patients is associated with some of the same variables as those found in the general population, including depression and anxiety. Delivery of smoking cessation by a trained counselor with knowledge of the relationship between mood and smoking can be helpful for chronic pain patients who experience symptoms of depression.

ACT for Smoking Cessation

According to ACT, psychological inflexibility is at the root of most psychopathology and human suffering (Hayes et al., 2006). In Hayes et al.'s ACT model of psychopathology, six core processes contribute to psychological inflexibility: experiential avoidance; cognitive fusion; attachment to the conceptualized self; inaction, impulsivity or avoidant persistence; lack of values or clarity or contact with values; and dominance of the conceptualized past and future, or

limited self-knowledge. In ACT, these processes are targeted with six core therapeutic

approaches: acceptance, cognitive defusion, being present, self as context, committed action, and

defining valued directions. The main goal of ACT is for patients to live their lives in contact with

the present moment and to behave in ways that are consistent with their values. In this sense, the

six core processes can be categorized into two overlapping groups: mindfulness and acceptance

processes (acceptance, defusion, contact with the present moment, and self as context), and

commitment and behavior change processes (contact with the present moment, self as context,

values, and committed action) (Hayes et al., 2006).

According to Hayes et al. (2006), the process of *acceptance* targets experiential

avoidance by embracing one's experiences rather than engaging in attempts to avoid or change

these experiences. *Cognitive defusion* targets cognitive fusion by teaching patients to change the

function of the thoughts they experience rather than attempting to change the content of those

thoughts. *Being present* involves experiencing the world in a non-judgmental fashion rather than

letting oneself become dominated by fearful thoughts about the future or by a strongly held

concept of the past. *Self-as-context* involves being aware of the wide array of one's experiences

without attachment to the self as "the conceptualized self." In other words, it is the observing self

(or the space from which observing happens), rather than the thinking self. Defining valued

direction involves clarifying one's values in several domains rather than doing things because

society or other people deem those things important. Lastly, committed action involves the

development of greater patterns of effective action related to one's values (Hayes et al., 2006).

ACT has shown promise in smoking cessation treatment research. To date, a number of

studies have examined ACT for smoking cessation in a variety of formats: Telephone-delivered

ACT (Bricker, Bush, Zbikowski, Mercer, & Heffner, 2014; Bricker, Mann, Marek, Liu, &

Peterson, 2010; Schimmel-Bristow, Bricker, & Comstock, 2012), group and individual ACT sessions (Gifford et al., 2004; Hernandez-Lopez, Bricker, Roales-Nieto, & Montesinos, 2009), web-based delivered ACT (Bricker, Wyszynski, Comstock, & Heffner, 2013), and smartphone-delivered ACT (Bricker, Mull, et al., 2014).

The first study to examine ACT for smoking cessation was conducted by Gifford et al. (2004). The investigators tested a seven-week individual and group based ACT treatment for smoking cessation (14 sessions total) using 124 participants who smoked and who did not have any active psychiatric conditions. The control condition, administered by a psychiatrist and a psychiatry resident, consisted of use of nicotine replacement therapy (NRT), patient education and physician advice. In this condition, participants met as a group with the psychiatrist for a 1.5 hour education session providing rationale for using NRT, followed by a 30-minute session where the participants could ask questions. Participants in this condition were instructed not to smoke. They were also provided with basic smoking cessation advice, and with instructions on how to reach the psychiatrist if needed.

The ACT condition was delivered by a psychologist and by three advanced psychology students, all of whom had been trained in ACT. Participants were asked to complete seven 50-minute individual sessions and seven 90-minute group sessions for a period of seven weeks (two sessions per week). The protocol focused on teaching participants to notice their smoking triggers, accept the ones they could not change, and take action in constructive ways when appropriate. In addition, participants were encouraged to make public commitments to cessation as a means of behaving in a way consistent with their values (please see *Appendix 1* for a copy of the description of the components of the intervention). In this study, the ACT condition produced better long-term smoking cessation outcomes (35% compared to 15% in the control condition at

the one-year follow-up assessment). There were no significant differences among conditions at posttreatment or 6-month follow-up. Another interesting finding was that improvement in acceptance-related skills mediated ACT outcomes, suggesting that the ACT model of smoking cessation treatment is a valuable one.

A similar study evaluating the effectiveness of ACT for smoking cessation was conducted in 2009 by Hernandez-Lopez et al. (2009). The authors compared a seven-week, 90-minute long ACT group treatment for smoking cessation with a CBT treatment of the same format and duration. The ACT condition employed metaphors, and experiential exercises in an effort to help participants establish the value of quitting and to teach acceptance of thoughts and feelings related to quitting (please see *Appendix 2* for a copy of the full description of the intervention). Essentially,the Hernandez-Lopez et al. (2009) ACT intervention consisted of helping clients become aware of the costs of smoking, engage in clarification of values and commitment to quitting smoking, and practice defusion, or seeing thoughts as thoughts rather than as the cause of smoking. The intervention also targeted clients' willingness to accept and experience unpleasant situations, and to deal with lapses by getting back on track and resuming a direction that was consistent with their values. The authors' CBT intervention consisted of a preparation phase in which participants received education on the health effects of smoking and learned strategies to help them quit. In the quit phase, participants reduced the number of cigarettes smoked and received instruction in cognitive and behavioral strategies to help them cope with internal and external triggers. Finally, in the maintenance, phase participants learned additional coping strategies to deal with triggers to smoke.

Hernandez-Lopez et al. (2009) observed promising long-term results for the ACT condition compared to CBT. While the CBT condition showed a 13.2% intent-to-treat 30-day

point prevalence of smoking cessation at 12-month follow-up, the ACT condition showed a

30.2% intent-to-treat 30-day point prevalence at 12 months. Further, the authors described the

ACT treatment to be as feasible as the CBT treatment in that participants in both conditions

participated in a majority of the sessions, rated the treatment as useful, stated satisfaction with

treatment, and practiced treatment techniques regularly. Similar findings were obtained by

(Gifford et al., 2011) in a randomized clinical trial of ACT and Functional Analytic

Psychotherapy (FAP) plus bupropion compared to bupropion alone. Gifford et al. observed

31.6% quit rates at 12 months for the combined treatment versus 17.5% for bupropion alone.

While the results from these three trials are promising, they both required significant

resources from clinicians and from participants. The two studies described next show promise for

briefer interventions delivered over the telephone. In a feasibility study, Bricker et al. (2010)

tested a five session, telephone-delivered ACT treatment for smoking cessation (please see

Appendix 3 for an intervention component list). The treatment was delivered over a three-month

period, with a total of 90 minutes of intervention time. Although this study employed a small

sample size (14 participants), the sample was diverse. It included ethnic minorities, individuals

with probable depression and anxiety, and individuals belonging to a low socioeconomic class

(e.g., 64% of participants were below the federal poverty level). The ACT counseling sessions

were delivered by a psychologist with expertise in ACT. The telephone contacts were brief (30

minutes for the first contact and 15 minutes for the rest of the sessions), and focused on teaching

both acceptance and commitment strategies. As described by Bricker et al. (2010), the

acceptance strategies involved:

" *(a) increasing one's willingness to experience urges that [were] historically…*

associated with smoking, (b) changing the function of smoking urges, and (c) responding

differently to smoking urges (e.g., noticing and not acting on urges)." (pp. 455).

Bricker et al.'s (2010) commitment strategies focused on helping participants identify

their values and take appropriate steps towards quitting smoking based on them. Participants in

this sample were receptive to the ACT intervention, with 100% stating they felt respected by

their counselor, 86% identifying the intervention as a good fit, and 93% saying that the

intervention helped them in their quit attempts. At the end of treatment, Bricker et al.'s therapists

delivered a mean of 3.5 telephone calls with an average of 82 minutes of total intervention time.

The investigators obtained higher cessation rates than those obtained by smoking cessation

counseling provided by telephone quitlines. While the quitline success rate is 12% (Stead,

Perera, & Lancaster, 2006), 43% of participants in Bricker et al's ACT study had not smoked on

the day of the 20-day posttreatment interview, and 29% had not smoked in the 7 days prior to the

posttreatment interview. Cessation rates at 12-month follow-up were 29%. The authors

concluded that ACT approaches to smoking cessation delivered by telephone hold promise, but

that they should be investigated using well-powered randomized trials. Of note, a study

evaluating recordings of these phone sessions demonstrated that ACT could be delivered with

fidelity as a brief phone intervention (Schimmel-Bristow et al., 2012).

More recently, Bricker, Bush, et al. (2014) conducted a pilot study of a randomized trial

of ACT versus CBT for smoking cessation delivered over the telephone. Both study arms

consisted of five sessions as well as two weeks of NRT. This study demonstrated higher overall

quit rates at six months (31% for ACT and 22% for CBT), although these results were not

statistically significant. Further, the ACT intervention appeared to be particularly beneficial for

smokers with depression (33% quit rates for ACT versus 13% for CBT), although this difference

was not statistically significant either, except for those participants who scored low on

acceptance of cravings at baseline (37% quit rates for ACT versus 10% for CBT). Importantly,

100% of study participants in the ACT condition said their treatment helped them to quit

smoking versus 83% for CBT.

In sum, the ACT studies described above have shown promising results in addressing

smoking, and they have tested a variety of different delivery formats, including in-person, group,

telephone, and web-based technologies. The ACT treatment in these studies appeared to be

particularly helpful in producing long-term outcomes (demonstrating superior cessation rates at

12-months). To our knowledge, ACT for smoking cessation has never been tested in a chronic

pain population, a group of smokers who have been understudied in smoking cessation research.

Barriers to Smoking Cessation among Chronic Pain Patients

Several barriers to smoking cessation among chronic pain patients have been identified in

the literature. From the patient's perspective, these barriers include: difficulty in accessing care

(attitudinal barriers, transportation, architecture barriers, and logistical barriers) (Weaver et al.,

2011), use of smoking as a coping strategy for pain and distress (Hooten, Shi, et al., 2011), and

increases in the urge to smoke in some patients who use opioids (Hooten, Shi, et al., 2011). From

the physician's perspective, lack of time (Hooten, Shi, et al., 2011), lack of knowledge about

smoking cessation (Hooten, Shi, et al., 2011), and concerns about the effects of abstinence on

pain (Ditre et al., 2011; Shi, Hooten, & Warner, 2011) were identified as barriers.

In spite of the detrimental effects of smoking on individuals with chronic pain, there have

been no rigorous randomized clinical trials demonstrating the effectiveness of smoking cessation

interventions in this population (Ditre et al., 2011), although a pilot study (described earlier) by (Hooten et al., 2014) has shown promising results. As described earlier, smoking among individuals with chronic pain is a significant public health concern. Chronic pain patients often have comorbid depression and anxiety, factors that are important to take into account when addressing smoking in this population. Fortunately, research on smoking and pain has significantly increased since the 1960s, with nearly 50 published studies in PubMed and 34 in PsycINFO in 2008-2010 compared to fewer than 5 in 1963-1965 (Ditre et al., 2011). In addition, as reviewed earlier, there have been a number of attempts to address smoking in this population, including use of physician advice and cognitive behavioral approaches. Nonetheless, there is still a need for research to be conducted in this population, especially regarding treatment.

Pilot Data

A pilot study was conducted using survey methodology to determine the smoking cessation needs of the patients at the two multidisciplinary pain treatment centers from which participants for the present study were recruited. Preliminary data analyses (*N=97*) revealed current smoking rates to be 36%. Lifetime smoking prevalence (100+ cigarettes) was 62%. Among current smokers, 72% reported smoking to manage pain (17% "always," 33% "quite often," and 22% "seldom"). The top methods used by current smokers in previous quit attempts were: "cold turkey" (21%), gradual cutting down (15%), electronic cigarettes (12%), nicotine patches (10%), and Chantix (9%). Regarding readiness to quit, 66% of current smokers were considering quitting smoking within the next 6 months, with 50% of these smokers planning to quit in the next 30 days. Of the smokers, 87% reported openness to using smoking cessation medications.

When asked what type of provider they would like to help them quit smoking, the smokers indicated a preference for a physician (21%) or a counselor/other mental health professional (21%), followed by a registered nurse (17%), physical therapist (14%), or pharmacist (14%). When queried about concurrent treatment targets in smoking cessation interventions, patients wanted to focus on pain management (23%), depression (23%), anxiety (19%), and the interaction between pain and smoking (15%). Of note, 40% of participants reported living 40+ miles away from their respective pain treatment centers, and 100% of them reported having access to a telephone. These preliminary data suggested that a majority of smokers in these two settings wanted to quit smoking. Further, these patients expressed interest in addressing pain, depression, and anxiety concurrently with smoking cessation. Given the travel difficulties that many of these patients reported, a telephone-delivered intervention was considered to be a more feasible option than either a group or in-person treatment format.

The Current Study

ACT has shown encouraging results for treating both chronic pain and smoking. Given ACT's theory that psychological flexibility is the underlying cause of psychopathology, increasing psychological flexibility should lower psychological symptoms, including those associated with depression and PTSD, as well as reduce smoking. Indeed, research suggests that ACT has potential to lessen depression and pain-related anxiety (Wetherell et al., 2011), two problems that may be causally linked to smoking among individuals with chronic pain. ACT appears to be a promising intervention to effectively lower smoking rates among chronic pain patients, a group that may have particular difficulty with quitting smoking according to research evidence (Fishbain et al., 2007; Hooten et al., 2009). The current study examined the feasibility and effectiveness of ACT for smoking cessation delivered over the telephone. Patients for the

study were recruited from two multidisciplinary pain treatment centers in Missoula, MT. The ACT intervention specifically addressed pain-related triggers for smoking and pain-related anxiety.

The barriers identified above were targeted in our study in the following ways: We addressed transportation and logistical barriers by providing the intervention over the telephone. Smoking as a coping strategy for pain and distress was addressed by teaching patients alternative coping skills. Regarding increased urges to smoke as a result of opioid use, our ACT intervention taught patients to experience urges without having to react to those urges by smoking a cigarette. Considering physician-related barriers, our telephone-delivered intervention by a trained therapist freed up physician time, making it more likely that physicians would feel confident advising patients to quit smoking because they had a person at their clinic to address their patients' smoking cessation needs. Finally, regarding concerns about the effects of abstinence on pain from smoking, there is evidence suggesting that these concerns are unfounded (Shi et al., 2011). Shi et al. (2011) found that quitting smoking was not linked to changes in pain among adults 50 years or older. To address this concern, psychoeducation was provided to physicians and other pain providers via presentations by research staff at the two multidisciplinary pain treatment centers during the initial phase of our study, just prior to recruitment. In addition, all participants in the study were educated about the relationship between pain and smoking.

As described earlier, multidisciplinary treatment centers can be ideal settings for treating tobacco dependence among chronic pain patients. A telephone-delivered ACT intervention was chosen over group and individual face-to-face sessions because it would utilize fewer clinic and patient resources, potentially making it easier to implement the intervention at these settings if to be found effective. Further, based on preliminary data,, a significant proportion of patients who

attended the two multidisciplinary pain treatment centers in this study lived in rural areas and

reported difficulty traveling the long distances required to receive services. Telephone-delivered

interventions were chosen in an attempt to circumvent these barriers.

CHAPTER 2: HYPOTHESES

Primary

1. Participants receiving the intervention will experience higher cessation rates than those achieved by participants receiving treatment as usual (TAU).

2. Participants receiving the intervention will demonstrate a greater reduction in number of cigarettes smoked per day compared to those receiving TAU.

Secondary

1. Participants receiving the intervention will exhibit greater increases in psychological flexibility from baseline to 3-months compared to TAU.

2. Participants receiving the intervention will demonstrate greater reductions in depression scores from baseline to 3-months compared to TAU.

3. Participants receiving the intervention will demonstrate greater reductions in PTSD scores from baseline to 3-months compared to TAU.

4 Participants receiving the intervention will evince greater reductions in pain-related anxiety, pain interference, and pain intensity from baseline to 3-months compared to TAU.

5. Changes in pain-related anxiety will predict smoking outcomes at 3 months.

6. Changes in psychological flexibility will predict smoking outcomes at 3 months.

7. Several indicators, including treatment satisfaction and number of sessions completed, will suggest that the ACT intervention is feasible.

CHAPTER 3: METHODS

Participants and Procedures

Participants were recruited through flyers and direct referrals from providers at two

multidisciplinary pain treatment centers.

Inclusion criteria were as follow:

1. Screen positive for chronic pain (e.g., have experienced pain lasting 6 months or longer).

2. Have smoked more than 100 cigarettes in their lifetime and currently smoke cigarettes.

3. Have access to a telephone and agree to being contacted via telephone for 5 treatment

    sessions and 3 follow-up sessions.

4. Demonstrate a willingness to provide the telephone numbers of two contacts in order to

    decrease the possibility of loss of follow-up retention and for verification of smoking status.

5. Certify a desire/willingness to quit smoking.

Exclusion criteria included active psychosis, cognitive impairment, no access to a telephone, and

high risk for suicidality.

An *a priori* power analysis was conducted to determine the sample size for the present

study. Power analysis parameters were selected with the fact in mind that the study appears to be

the first to test an ACT intervention for smoking in chronic pain patients. The analysis set power

at 0.71, with an alpha of .10 and was run for the primary hypothesis that examined proportions of

patients in the study groups who quit smoking. The test value of 33% quit was used for the ACT

group based on the success rates of previous ACT interventions for smoking cessation (Bricker,

Bush, et al., 2014). The value of 12% quit was used for the TAU group, based on the standard

cessation rates for telephone-delivered smoking cessation provided by tobacco quitlines (Stead et
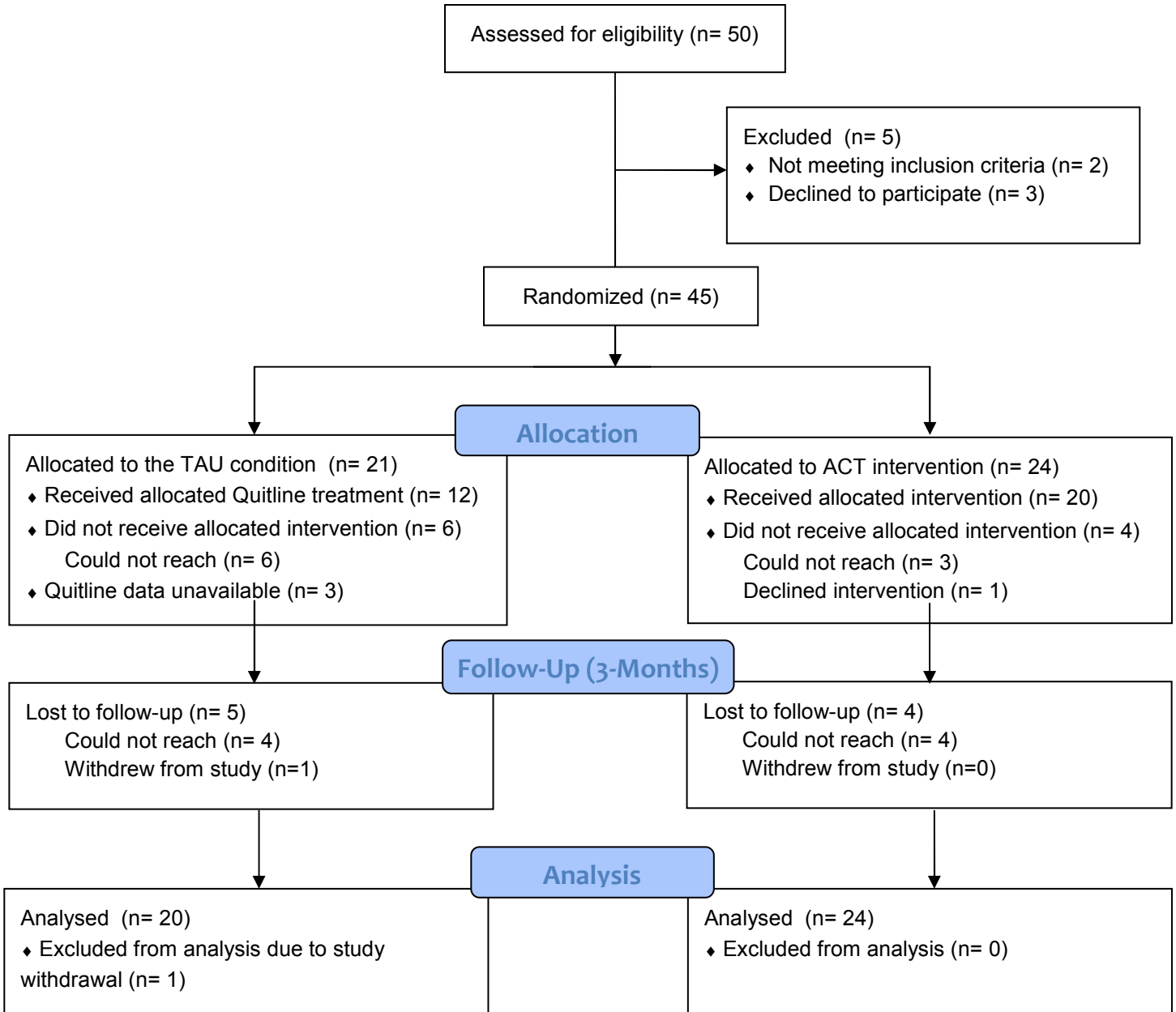
al., 2006). The analysis indicated an overall target sample size of 50, with the goal of randomizing 25 patients each to the experimental treatment and the control condition.

Participants were referred by providers from the two multidisciplinary pain treatment centers, who handed flyers to their patients who smoked cigarettes (see Appendix 4 for a copy of the flyer) and referred them to the smoking cessation researcher via a warm handoff. Researchers explained the consent form to interested participants. Participants screened into the study received a thorough explanation of all study procedures from the researcher. They were then provided with an overview of the informed consent process and given the informed consent form to read and sign if they agreed. They were also provided with a copy to take home. Those who agreed to participate completed measures of chronic pain, smoking, depression, anxiety, psychological flexibility and ACT processes, pain-related anxiety, alcohol and substance use, and PTSD. There were only three patients who did not qualify for the study because they did not smoke cigarettes, but rather chewed tobacco or smoked electronic cigarettes. These patients were given information regarding the Montana Tobacco Quitline and were encouraged to call the quitline for assistance in the quitting process.

Following determination of study eligibility and informed consent, the researchers offered all study participants enhanced referral to the Montana Tobacco Quitline. Enhanced referral included completion and submission of a faxed referral form to the Quitline. Patients were then randomized to ACT or TAU through use of a random number table. Ultimately, 45 eligible participants agreed to participate in the study and were randomized; 24 participants were assigned to the experimental intervention condition, and 21 were assigned to the control condition. One participant in the control condition withdrew over the course of the study (see diagram below for enrollment and follow-up information).

Enrollment and Follow-Up Information

Assessed for eligibility (n= 50)

Excluded (n= 5)
- Not meeting inclusion criteria (n= 2)
- Declined to participate (n= 3)

Randomized (n= 45)

Allocation

Allocated to the TAU condition (n= 21)
- Received allocated Quitline treatment (n= 12)
- Did not receive allocated intervention (n= 6)
    Could not reach (n= 6)
- Quitline data unavailable (n= 3)

Allocated to ACT intervention (n= 24)
- Received allocated intervention (n= 20)
- Did not receive allocated intervention (n= 4)
    Could not reach (n= 3)
    Declined intervention (n= 1)

Follow-Up (3-Months)

Lost to follow-up (n= 5)
    Could not reach (n= 4)
    Withdrew from study (n=1)

Lost to follow-up (n= 4)
    Could not reach (n= 4)
    Withdrew from study (n=0)

Analysis

Analysed (n= 20)
- Excluded from analysis due to study withdrawal (n= 1)

Analysed (n= 24)
- Excluded from analysis (n= 0)

Follow-up assessments were conducted at end of treatment (within 1 week), and at 3 and 6 months following the end of treatment. Assessments were conducted over the telephone by clinical psychology graduate students who were blind to participants' study conditions. Psychological and pain measures were assessed at the 3 and 6-month follow-up interviews. Confirmation of smoking status was obtained by obtaining collateral information from one of the contacts provided at baseline or by using NicAlert's saliva nicotine test. Saliva NicAlert has been shown to predict self-reported smoking status with 100% sensitivity and 96% specificity (Marrone, Paulpillai, Evans, Singleton, & Heishman, 2010). Only one participant in the study chose the option of returning to the clinic to provide biological verification of smoking status, but this person failed to come in to his perspective clinic to meet with the researcher for provision of verification status. With the exception of this person, collateral information was obtained for all other participants who quit.

A variety of incentives were used to support participants' completion of baseline and follow-up measures. Participants were given a small token purchased from a dollar store following completion of baseline measures. Participants were offered $5 for the initial assessment and for each follow-up assessment completed, for a total possible of $20. Participants who completed all three follow-up sessions were entered in a raffle for a chance to win a $100 gift card at a grocery store of their choice. There was no compensation for the counseling sessions. Follow-up assessments were completed via telephone or via mailed surveys.

Experimental Treatment Condition

Once the baseline measures were completed, the researcher gave a brief orientation about the study procedures along with a binder of ACT handout materials for participants in this condition to take home. The intervention was delivered over the telephone by two advanced

clinical psychology doctoral students trained in ACT, and supervised by a licensed psychologist with ACT training. The smoking cessation ACT sessions were delivered weekly for five weeks over the telephone (see Appendix 5 for intervention details and Appendix 6 for participant workbook).

The ACT intervention was adapted from Gifford et al. (2004), and it included components from Hernandez-Lopez et al. (2009) as well as elements from an unpublished protocol of ACT for the treatment of polysubstance abuse by Hayes, Wilson, Gifford, and Batten (1998). *Session 1* consisted of an introduction to the treatment and an assessment of internal and external smoking triggers. Participants were prompted to talk about areas in their lives that have been affected by smoking. An initial values assessment using The Matrix (Polk & Schoendorff, 2014) prompted participants to identify their values, understand what gets in the way of value-linked behavior, and identify actions with potential to move them towards their values. *Session 2* focused on helping the patient develop a behavioral plan for managing smoking triggers. Internal triggers (especially depression, anxiety, and pain) were specifically addressed.

The researcher explained to patients how smoking and problems with quitting might arise from efforts to control or avoid triggering experiences. Participants were encouraged to continue to reflect on their values and to choose a quit date. Smoking reduction was strongly encouraged in order to reduce withdrawal symptoms and to give patients an opportunity to practice resisting smoking. Mindfulness skills were introduced and patients were encouraged to do a mindfulness exercise on a CD that was provided to them along with their binder of handout materials upon enrolling in the study. *Session 3* focused on the ACT process of acceptance by use of metaphors, helping clients practice experiencing cravings, and developing exposure hierarchies. *Session 4* focused on the ACT processes of cognitive defusion, self as context, and committed action. In

this session, clients were helped to identify and defuse cognitive triggers, see thoughts as thoughts rather than as the cause of smoking, and see themselves as the context in which urges and withdrawal symptoms take place while continuing to expose themselves to aversive stimulus. *Session 5* focused on the ACT value of commitment. Participants were encouraged to notice when they were detouring from the direction they wanted to follow. They were advised to simply get back to that direction regardless of the extent of any lapse (e.g., smoking one cigarette or smoking for days). Relapse was explained as a part of the process of quitting.

Participants also received educational materials in their binder regarding information on smoking cessation medication options. They were encouraged to check with their physicians and/or the Quitline regarding their preferred choice of smoking cessation medication. The meditation CD that participants received contained a number of guided meditations taken from a pain workbook: "Living Beyond Your Pain" (Dahl & Lundgren, 2006). All sessions were recorded for supervision purposes. As noted above, participants in this condition were also referred for services provided by the Montana Tobacco Quitline, with researchers filling out a fax referral form for the Montana Quitline to call them. This was done so participants in this condition would be eligible to receive pharmacotherapy for quitting smoking. Services provided by the Montana Tobacco Quitline are described below.

Control Condition

The control condition consisted of an enhanced treatment as usual (TAU) in which participants filled out a fax referral form for the Montana Tobacco Quitline. Researchers faxed the form, and the Montana Tobacco Quitline called the participants at the number they had provided. According to the Montana Tobacco Use Prevention Program's website by the Montana Department of Public Health and Human Services (2014), the Montana Tobacco Quitline offers

5 weekly sessions by a *Quit Coach*. Individuals wanting help with quitting are required to enroll in the Quitline program, which offers a supply of nicotine patches, gum, or lozenges free of charge for up 8 weeks. Chantix is also offered for a monthly co-pay of $50 per month for 3 months. Bupoprion is offered for a $5 copay per month for 3 months. The Quit Coach helps smokers determine which medication may be the most appropriate for them. The enrollment session lasts 10-15 minutes and callers get a personalized quit plan with 5 free sessions, as well as educational materials for friends, family members, and providers (Montana Department of Public Health and Human Services, 2014). Cessation rates for quitlines are 12% for counseling and 14% for counseling in combination with NRT (Stead et al., 2006).

Measures

Demographics. Relationship status, age, gender, race/ethnicity, employment status, education, and distance from the pain treatment center from which participants receive services were assessed at baseline using open-ended questions.

Smoking Status. Smoking status was assessed at baseline, end or treatment, 3- and 6-weeks by asking participants the number of cigarettes smoked in the past 24 hours, the number of cigarettes smoked in the previous 7 days, and the number of cigarettes smoked in the past 30 days. Self-reported smoking is standard for interventions delivered over the telephone (Stead, Hartmann-Boyce, Perera, & Lancaster, 2013).

Planning and Motivation to Quit. Participants were asked whether they were considering quitting smoking in the next 6 months and whether they were planning to quit in the next 30 days. They were also asked to rank on a scale from 0-10 how motivated and how confident they were in their ability to quit smoking.

NRT Use. Participants were asked about their use of NRT or other smoking cessation pharmacotherapy at baseline, end of treatment, and 3- and 6-weeks. We also obtained information from the Montana Tobacco Quitline regarding whether they sent participants NRT or Chantix.

Depression. The PHQ-8, given at baseline, and at 3- and 6-weeks, was used to assess for depressive symptomatology. The PHQ-9 is a well-validated self-report measure of depressive symptomatology (Kroenke, Spitzer, & Willimas, 2001) and it is commonly used in medical settings. The PHQ-8 has been shown to be comparable to the PHQ-9 for identifying depressive symptoms (Corson, Gerrity, & Dobscha, 2004; Kroenke & Spitzer, 2002). The PHQ-8 does not include the question regarding thoughts that the individual would be better off dead, or of hurting themselves, which was deemed a more appropriate measure given the telephone nature of the current study and related difficulties in addressing suicidal ideation. On this measure, participants reported the frequency of eight DSM-IV symptoms of major depression over the past two weeks. The measure uses a four-point scale (0 = "not at all" - 3 "every day/nearly every day"). Scores on the PHQ-8 range from 0-24. Higher scores indicate worse depressive symptomatology. Scores of 10 or higher on the PHQ-9 identify a Major Depressive Episode with high sensitivity and specificity (.88 to .93 for sensitivity, and 85 to .88 for specificity) (Kroenke et al., 2001; Wittkampf et al., 2009). The cut-off score of 10 was applied to the PHQ-8 for the present study to identify patients who were likely to have a current Major Depressive Episode.

Chronic Pain. Chronic pain was assessed at baseline by asking participants whether they had experienced pain for a period of six months or longer. This is a conservative definition of chronic pain, which as stated earlier, has been defined as pain lasting 3-6 months or longer (Task Force on Taxonomy of the IASP, 1994).

Pain-Related Anxiety. Pain-related anxiety was assessed at baseline, end of treatment, 3- and 6-weeks and measured using the Pain Anxiety Symptoms Scale-20 (PASS-20). The PASS-20 assesses fearful and anxious responses to pain in terms of both physical and cognitive expressions, escape or avoidance behaviors, and fearful assessments of pain (McCracken & Dhingra, 2002). The PASS-20 has demonstrated reliability and validity among people with chronic pain (Ditre et al., 2013). The total score for the PASS-20 was used to measure pain-related anxiety, as it represents a comprehensive global composite of pain-related anxiety (McCracken, Zayfert, & Gross, 1992). Higher scores are indicative of greater pain-related anxiety and scores range from 0 to 100.

Pain. Additional pain variables were assessed at baseline, and at 3- and 6-weeks by use of the Brief Pain Inventory Short From (BPI) (Cleeland & Ryan, 1994). The BPI is a recommended measure of functioning (Dworkin et al., 2005) and assesses both pain severity and pain interference. The two subscales of the BPI have shown adequate internal consistency (Cronbach's αs = .88 and .80 for pain interference for pain severity, respectively) (Wetherell et al., 2011) and sensitivity to change in treatment (Tan, Jensen, Thornby, & Shanti, 2004).

Posttraumatic Stress Disorder. The Post-Traumatic Stress Disorder Check List-Civilian Version (PCL-C) (Weathers, Litz, Herman, Huska, & Keane, 1993) was used to measure PTSD symptomatology and severity at baseline, and at 3- and 6-weeks . This measure consists of 17 questions assessing DSM-IV symptoms of PTSD using a 5-point scale. Higher scores are indicative of increased likelihood of PTSD diagnosis and greater PTSD symptomatology. A cutoff score of 50 has been found to have a sensitivity of .90 and a specificity of .79 for identifying PTSD in a non-Veteran population (Gardner, Knittel-Keren, & Gomez, 2012).

Alcohol Misuse. The Alcohol Use Disorders Identification Test – Consumption (AUDIT-C) questions assessed alcohol misuse at baseline, and at 3- and 6-weeks. This measure addresses frequency of alcohol consumption, number of drinks consumed in a single occasion, and frequency of over-consumption. AUDIT-C scores range from 0-12, with higher scores representing higher alcohol consumption. A cutoff score of four or more is recommended as a screening threshold for alcohol misuse, with optimal specificity (.86) and sensitivity (.72) (Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998). Scores of 8-12 are indicative of severe alcohol misuse and demonstrate associations with the lowest health status in research with Veterans (Williams et al., 2010).

Treatment Satisfaction. Following Bricker et al. (2010) treatment satisfaction was assessed at the end of treatment with four questions: Participants were asked 1) How satisfied were you with the smoking cessation treatment you received? (0 = "not at all satisfied" – 5 = "extremely satisfied"); 2) Did the treatment help you quit? (0 = "not at all" – 5 = "very much"); 3) Did you feel respected by your counselor? (0 = "not at all" – 5 = "very much"); 4) Was the treatment a good fit for you? (0 = "not at all" – 5 = "very much").

ACT Processes. Participants completed the Acceptance and Action Questionnaire (AAQ-II) (Bond et al., 2011) at baseline, end of treatment, 3- and 6-weeks . The AAQ-II is a measure of experiential avoidance, acceptance, and psychological flexibility. This measure demonstrates good reliability and validity evidence (Bond et al., 2011). In previous research, the AAQ-II has been found to correlate with depression, anxiety, trauma symptomatology, medication taken for pain, somatization, depression and anxiety about pain, and other mental health problems [see Hayes et al. (2006) for a list of studies included in a meta-analysis]. The scale's 10 items (e.g., my painful memories prevent me from having a fulfilling life, I worry about being unable to

control my worries and feelings...) are rated on a scale from 1 = "never true" to 7 = "always true." Lower scores are indicative of higher psychological flexibility.

Statistical Analyses

All data were entered onto SPSS 17.0. Descriptive statistics were used to report demographics, smoking, depression, PTSD, motivation to quit and confidence to quit at baseline. Hypothesis 1 tested differences in cessation between the ACT and TAU groups at end of treatment. This was examined with the Pearson's Chi square test. Intent-to-treat analyses were employed for this hypothesis, where all participants with missing data regarding smoking status were counted as smokers. Participants were considered nonsmokers if they reported not smoking any cigarettes in the past 7 days. Hypotheses 2-5 examined group differences over time in the number of cigarettes smoked per day, psychological flexibility, depression severity, and PTSD symptomatology. These hypotheses were tested with separate repeated measures analyses of variance (ANOVA). The between subjects condition was ACT versus TAU. The within-subjects condition was time, tested at end of treatment, 3 and 6 months-follow-ups.

A repeated measures MANOVA compared group differences regarding pain-related variables: pain-related anxiety, pain interference, and pain intensity (Hypothesis 6). A linear regression analysis examined whether reductions in pain-related anxiety or changes in psychological flexibility predicted the number of cigarettes smoked per day at the three-month follow-up (Hypotheses 7 and 8). The feasibility of the intervention (Hypothesis 9) was examined using descriptive statistics indicating the number of telephone sessions completed and responses to the treatment satisfaction questions. In addition, independent samples t-tests were used to compare these variables between participants receiving the intervention and those accessing the Quitline.

CHAPTER 4: RESULTS

Demographic and baseline mental health and smoking characteristics:

Demographic and clinical characteristics are presented in Table 1 for the sample overall (N=45) and for participants from the experimental (n=24) and control (n=21) groups. The mean age was 48 (*SD* = 12.6). Sixty-two percent of participants were female and 38% male. In terms of race and ethnicity, 89% identified as Non-Hispanic White, 4% as Native American or American Indian, 2% as Asian, and 2% as other (more than one ethnic group or unknown ethnicity). Regarding education status, 4% of our sample had some high school education, 40% had a high school education, 49% had some college, and 7% had a college degree or higher. In terms of marital status, 32% of our participants were single, 52% were married or living as married, 7% were divorced, 2% were separated, and 5% were widowed. Only 22% of our participants were employed, either part time or full time.

Every participant in the study was considering quitting within the next 6 months, and 87% stated planning to quit within the next 30 days. Overall, participants reported smoking nearly 15 cigarettes per day at baseline, indicating moderate use (Wilson, Parsons, & Wakefield, 1999). Regarding motivation to quit, the mean motivation to quit was 8 (*SD* = 1.9) and the mean confidence to quit was 7 (*SD* = 2.2). With regards to pharmacologic interventions, 56% of our participants reported a history of using the nicotine patch, 36% had used a nicotine inhaler, 38% reported trying Chantix in the past, 36% had used nicotine gum, 16% had used nicotine lozenges, 27% had tried Bupropion, and 38% reported a history of using electronic cigarettes.

Mental health concerns were prevalent: 40% of the overall sample scored at or above the PHQ-8 cutoff score of 10, suggesting probable major depressive symptomatology. Regarding PTSD, 18% of participants scored at or above the PCL-C score of 50, suggesting probable

PTSD, and 11% of our sample scored at or above the cutoff score of 4 on the AUDIT-C,

suggesting problematic alcohol use. There were no statistically significant differences between

the ACT and TAU groups at baseline on any demographic or clinical variables (see Table 1).

Table 1: Participant baseline descriptive information

	Intervention *n*=24 (53%)	Control *n*=21 (47%)	Total N = 45	*p*
Demographics				
Age (Mean, SD)	49 (13.1)	47 (12.4)	48 (12.6)	0.67
Marital Status (n, %)				0.61
Married/co-habiting	14 (60.9)	9 (43.0)	23 (52.3)	
Ethnicity (n, %)				0.30
Hispanic/Latino	0 (0.0)	0 (0.0)	0 (0.0)	
Caucasian	21 (87.5)	19 (90.5)	40 (89.0)	
American Indian	2 (8.3)	0 (0.0)	2 (4.4)	
Asian	0 (0.0)	1 (4.8)	1 (2.2)	
Other (n, %)	1 (4.2)	1 (4.8)	2 (4.4)	
Gender (n, % Female)	15 (62.5)	13 (62.0)	28 (62.2)	0.60
Education (n, %)				0.50
Some High School	2 (8.3)	0 (0.0)	2 (4.5)	
High School Diploma/GED	10 (41.7)	8 (40.0)	18 (40.9)	
Some College	11 (45.8)	10 (50.0)	21 (47.7)	
College Degree +	1 (4.2)	2 (10.0)	3 (6.8)	
Employment (n, % employed)	7 (29.2)	3 (15.0)	10 (22.3)	0.24
Clinical & Smoking Characteristics				
Cigarettes Per Day (Mean, SD)	13.3 (8.1)	16.4 (10.2)	14.8 (9.2)	0.27
Motivation to Quit (Mean, SD)	8.2 (1.9)	8.1 (2.0)	8.2 (1.9)	0.86
Confidence to Quit (Mean, SD)	6.9 (2.3)	6.5 (2.2)	6.7 (2.2)	0.51
Major Depressive Episode (n, % yes)	8 (33.3)	10 (47.6)	18 (40.0)	0.38
PTSD (n, % yes)	5 (20.8)	3 (14.3)	8 (18.0)	0.71
Alcohol Misuse (n, % yes)	3 (12.5)	2 (9.5)	5 (11.1)	0.67
ACT and Pain Characteristics (Mean, SD)				
Psychological Flexibility	24.5 (13.1)	30.2 (17.0)	27.1 (15.1)	0.21
Pain-Related Anxiety	31.6 (21.5)	44.3 (26.4)	37.5 (24.5)	0.08
Pain Severity	26.1 (5.7)	26.3 (7.1)	26.2 (6.3)	0.90
Pain Interference	37.4 (14.3)	40.5 (15.9)	38.9 (15.0)	0.51

Attrition and Follow-Up Rates:

All participants in both study groups completed baseline measures. At the end of treatment, 84% of all patients provided smoking status data, at a minimum, and 90% of TAU and 83% of ACT participants provided end or treatment data. The proportions of those who responded at end of treatment did not differ between the two groups, X^2 (1, $N = 45$) = 0.48, $p = .67$, $r = .10$. At the 3-month follow-up assessment, we had at least smoking status data for 76% of the sample (76% of TAU and 83% of ACT participants). There were no significant differences in rates of response at the 3-month follow-up assessment either, X^2 (1, $N = 45$) = 0.55, $p = .71$, $r = .11$.

Cessation Rates:

Hypothesis # 1 was tested using intent-to-treat analyses, where all participants with missing data were counted as smokers. At the end of treatment, four people (17%) in the intervention condition had verified smoking 7-day point prevalence abstinence (confirmed by a collateral contact), compared to only one person (5%) in the control condition. Although results were not significant (X^2 [1, $N = 45$] = 1.67, $p = .22$), $r = .21$, they were in the direction that was hypothesized. At the 3-month follow-up assessment, two people in the intervention condition had quit compared to only one in the control condition. These results were not statistically significant, X^2 (1, $N = 45$) = 0.23, $p = 0.55$, $r = .08$.

To explore the possibility of whether smoking cessation in the ACT group was related to intensity of the intervention, we examined smoking abstinence among the 9 (38% of total) ACT participants who completed all five sessions. In this subset of participants, 3 (33%) reported abstinence at end of treatment. At 3-month follow-up, 2 (22%) of the completers reported abstinence. Relative to the full sample of TAU patients, quit rates among ACT completers were

significantly higher at end of treatment, X^2 (1, $N = 28$) = 3.93, $p = .08$, $r = .37$, but not at 3-month follow-up, X^2 (1, $N = 23$) = .22, $p = .58$, $r = .09$.

Number of Cigarettes Smoked Per Day:

Hypothesis # 2 was tested using repeated measures ANOVA. At the one-week follow-up assessment, there was a significant effect of time, $F(1, 31) = 21.30$, $p < .05$, $\eta_p^2 = .407$, indicating that smoking means decreased overall between baseline and end of treatment. There was no significant effect of condition $F(1, 31) = .10$, $p = .76$, $\eta_p^2 = .003$, suggesting no mean differences between control and intervention participants. The interaction term, time × condition, evidenced a trend toward significance $F(1, 31) = 2.88$, $p = .10$, $\eta_p^2 = .085$. *Figure 1* presents the results graphically. As the graph illustrates, there was reduction in smoking over time for both groups, with TAU participants demonstrating greater reductions.

We also examined smoking intensity relative to baseline at the 3-month follow up. In this analysis, there was a significant effect of time, $F(1, 28) = 5.80$, $p < .05$, $\eta_p^2 = .172$, suggesting a reduction in smoking across the board. The main effect for group was not significant $F(1, 28) = .04$, $p = .84$, $\eta_p^2 = .001$, suggesting no mean differences between groups. The interaction term, time × condition, was not significant, $F(1, 28) = .36$, $p = .55$, $\eta_p^2 = .013$. *Figure 2* presents these results. The general reduction in smoking over time is evident in the Figure.

Table 2. Smoking Cessation and Number of Cigarettes Smoke

	N, %	Intervention	Control	Total	*p*
Cessation Rates (n, %)					
EOT[1], Quit	45[2] (100.0)	4 (16.7)	1 (5.3)	5 (11.1)	*0.22*
EOT (Completers), Quit	28 (62.2)	3 (10.7)	1 (3.6)	4 (14.3)	*0.08*
Three-Month Follow-Up	34 (75.6)	2 (10.5)	1 (6.7)	3 (8.8)	*0.55*
Number of Cigarettes Smoked					
Per Day (Mean, SD)					
Baseline	45 (100.0)	13.3 (8.1)	16.4 (10.4)	14.8 (9.2)	*0.27*
End of Treatment	33 (73.3)	11.06 (7.4)	8.05 (6.6)	9.82 (7.0)	*0.10*
Three-Month Follow-Up	30 (66.7)	10.75 (8.3)	10.36 (7.2)	10.57 (7.7)	*0.84*

[1] EOT= End of Treatment. [2]The sample size reported here denotes the total number of participants who provided

self-report data at End of Treatment. The analysis of quit rates assumed that nonrespondents were smokers.

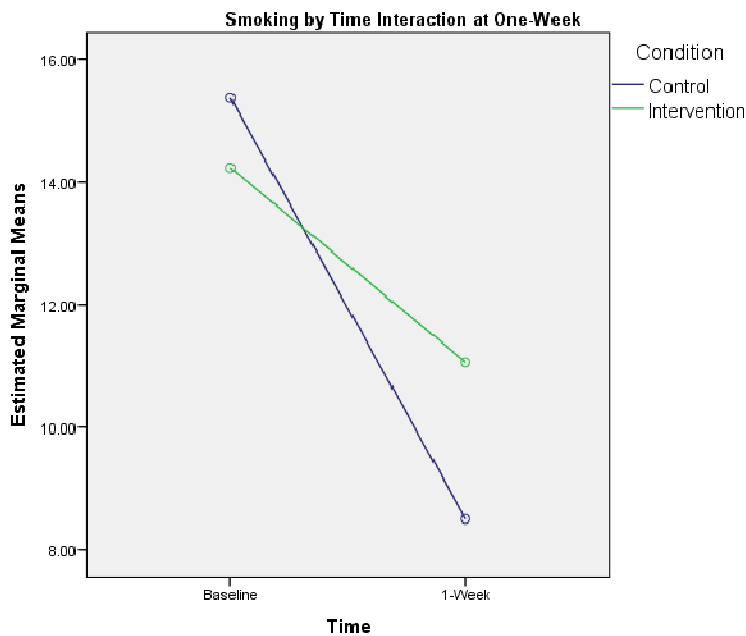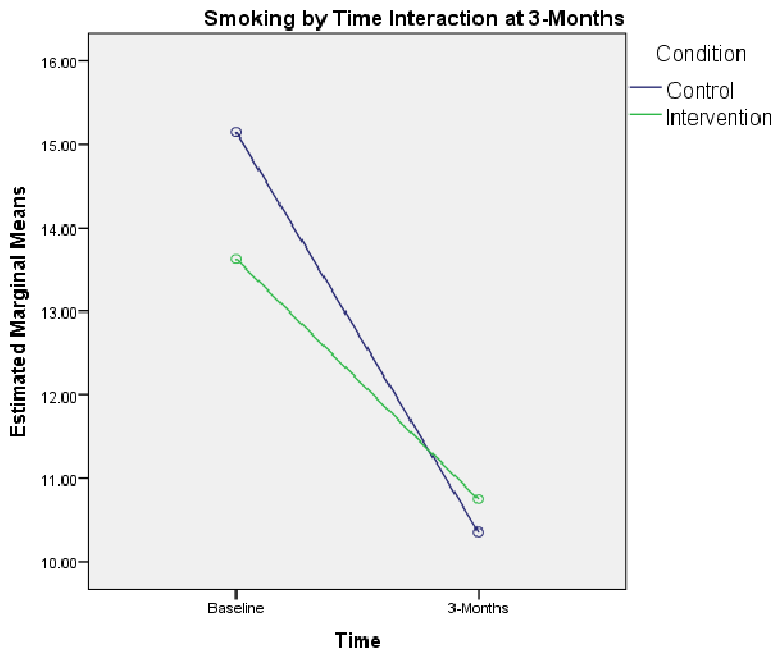*Figure 1: Daily smoking baseline to end of treatment by group*

Figure 2. Daily smoking baseline to 3-month follow-up by group

Psychological Variables:

Separate mixed-design, repeated measures ANOVAs were used to assess differences in psychological variables between the control and intervention condition from baseline to the three-month follow up assessment (Secondary Hypotheses 1-3). Regarding psychological flexibility, all effects are reported as significant at $p<.05$. There was a significant main effect of time $F(1, 27) = 5.51$, $\eta_p^2 = .169$, indicating that psychological flexibility scores increased between baseline and three months. There was also a significant main effect for groups $F(1, 27) = 6.72$, $\eta_p^2 = .812$, indicating that psychological flexibility means differed based on condition. The interaction term, time × condition was not significant, $F(1, 27) = 0.18$, $p = .68$, $\eta_p^2 = .007$. *Figure 3* presents the results graphically. As can be seen, psychological flexibility means increased over time, suggesting a *reduction* in psychological flexibility for patients in both groups.

Figure 3
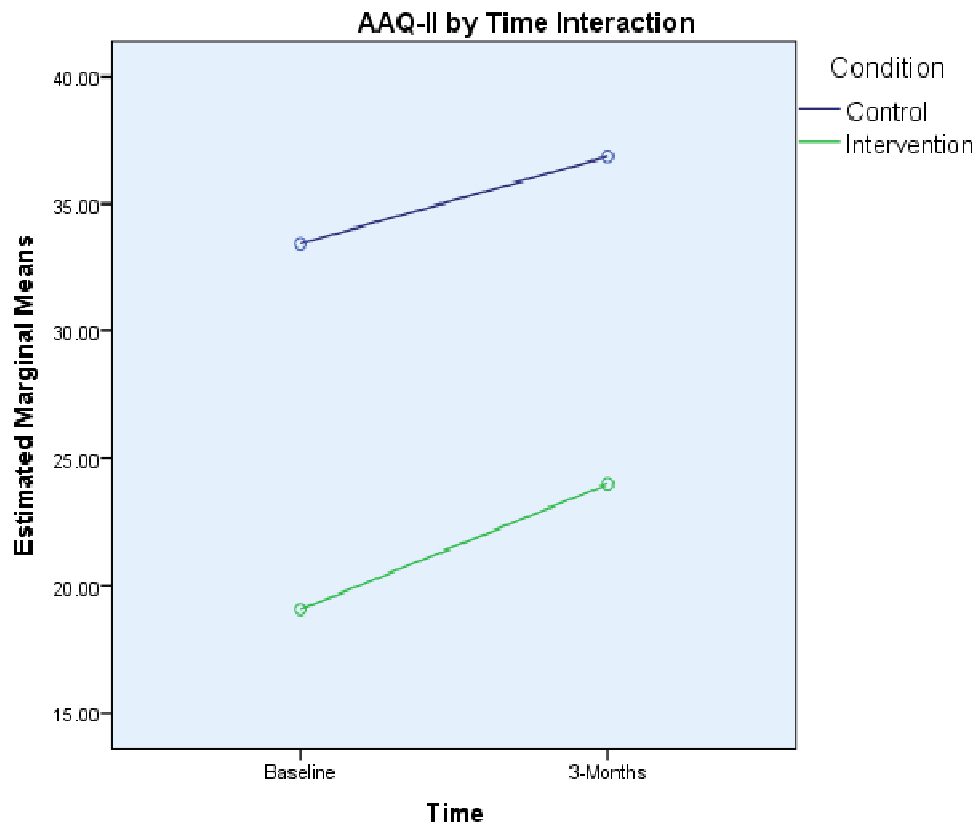
Regarding depression scores, there was a significant main effect of time, $F(1, 27) = 6.06$, $p < .05$, $\eta_p^2 = .183$, indicating that depression scores increased between baseline and three months. There was no significant effect of condition, $F(1, 27) = 2.21$, $p = .15$, $\eta_p^2 = .076$, suggesting no mean differences between control and intervention participants. The interaction term, time × condition was not significant, $F(1, 27) = 2.21$, $p = .15$, $\eta_p^2 = .076$. *Figure 4* presents the results graphically. As the graph illustrates, depression scores increased for both groups.

Figure 4
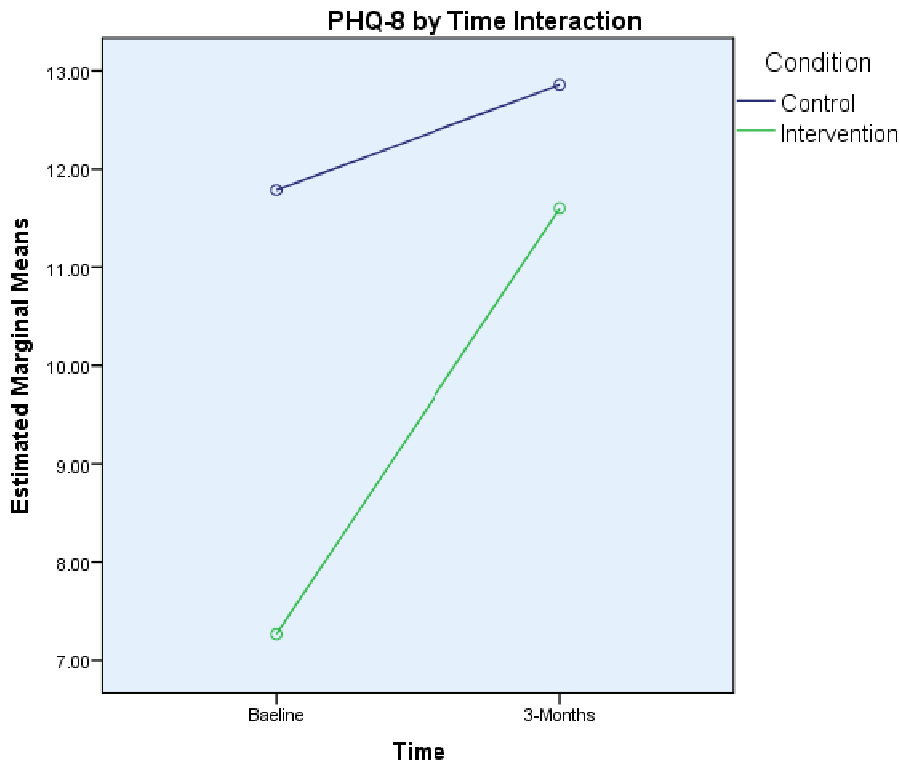
Regarding PTSD scores, the main effect of time was not significant, $F(1, 26) = 3.92$, p = .06, $\eta_p^2 = .131$, indicating that PTSD scores did not significantly increase between baseline and three months. There was no significant effect of condition $F(1, 26) = 2.97$, $\eta_p^2 = .103$, suggesting no mean differences between the control and the intervention conditions. The interaction term, time × condition was not significant $F(1, 26) = .12$, $p = .74$, $\eta_p^2 = .004$. As illustrated in *Figure 5*, PTSD scores increased fairly equally for both groups from baseline to 3-months.

Figure 5
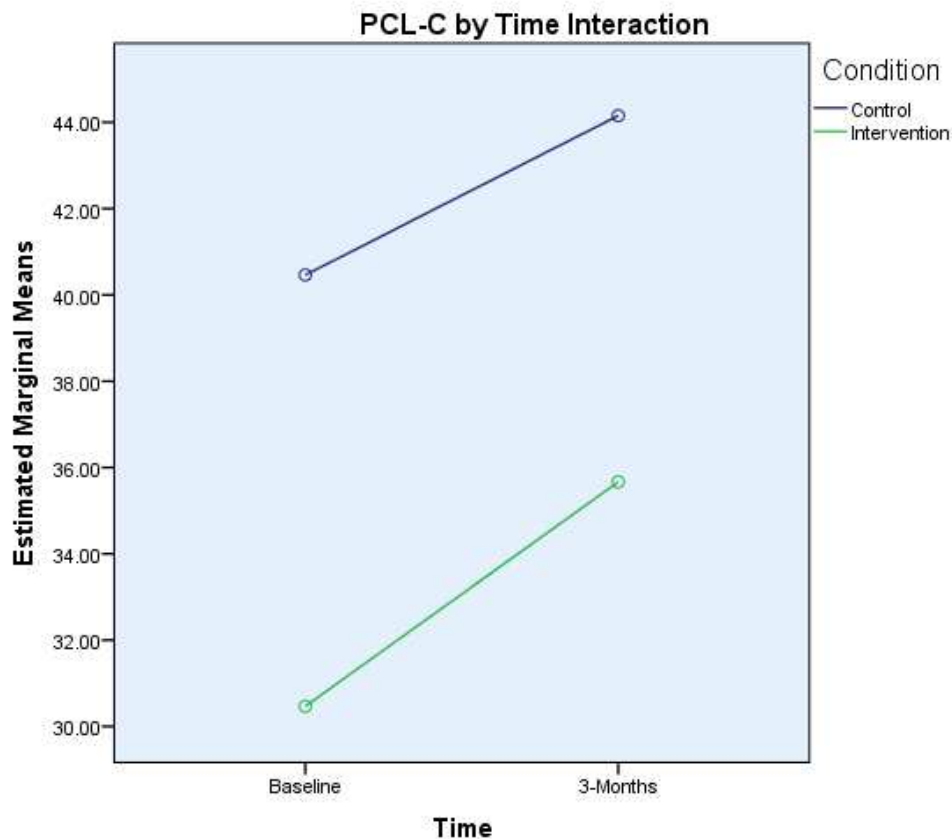
Pain Variables:

A repeated measures MANOVA was used to test Secondary Hypothesis # 4. This

analysis revealed no significant effect of time on the composite variable of pain-related anxiety,

pain severity, and pain interference, $F(3,22) = 0.48$, $p = .70$, $\eta_p^2 = .062$. There was no significant

main effect for condition on the composite pain variable, $F(3,22) = 1.43$, $p = .26$, $\eta_p^2 = .163$. The

interaction term, time × condition was nonsignificant $F(3,22) = 1.64$, $p = .21$, $\eta_p^2 = .183$.

Predictors of Smoking:

Secondary Hypotheses # 5 and 6 were tested using a multiple regression analysis that

tested whether changes in pain-related anxiety or in psychological flexibility predicted number of

daily cigarettes smoked at 3-month follow-up. The results of the regression were nonsignificant

$(R^2 = .07$, $F(2,26)=.93$, $p = .41)$, indicating that neither changes in psychological flexibility nor changes in pain-related anxiety significantly influenced the number of cigarettes smoked per day at the three-month follow-up (see Table 4).

Table 3. Concurrent predictors of number of cigarettes smoked

	B	SE B	β
Constant	9.87	1.63	
Pain-Related Anxiety Changes	.04	.09	.09
Psychological Flexibility Changes	-.20	.16	-.25

Note: $R^2 = .07$, p = .41

Feasibility of the Intervention:

Regarding Secondary Hypothesis # 7, participants in the intervention condition completed an average of 3.1 out of 5 sessions ($SD = 1.9$). The majority of participants (83%) completed at least one session of ACT, with 2 participants (8%) completing one session, 5 participants (21%) completing two sessions, 2 participants (8%) completing three sessions, another 2 (8%) completing four sessions, and 9 participants (38%) completing all five sessions.

Data from the Quitline for the overall sample indicate that participants completed an average of 1.4 sessions ($SD = 1.7$) through the Quitline. 10 participants (22%) completed one session, 2 participants (4%) completed two sessions, 7 participants (16%) completed three sessions, 3 participants (7%) completed four sessions, 2 participants (4%) completed five sessions, and 1 participant (2%) completed six sessions. Regarding NRT/pharmacotherapy, 17 participants (38%) were mailed NRT, and 1 participant (2%) was mailed Chantix by the Quitline.

Treatment Satisfaction. Independent samples t-tests examined differences in treatment satisfaction between conditions. There were no significant differences for treatment satisfaction rankings between the control and intervention conditions $t(32) = 0.69$, $p = .50$, or in rankings of feeling respected by the counselor for the control and intervention conditions; $t(17.24) = -1.35$, p $= .19$. Participants in the control condition reported significantly higher rankings than participants in the intervention condition regarding the degree to which their treatment helped them quit $t(32) = 2.16$, $p = 0.04$. In addition, there were significant differences for rankings of whether the treatment was a good fit for them between participants in the control condition and participants in the intervention condition $t(30) = 2.37$, $p = 0.02$. In both cases, patients in the control condition provided more favorable ratings than patients in the intervention condition (see Table 4).

To reduce the possibility of spurious treatment satisfaction data provided by participants who did not engage in any of the counseling sessions, we conducted a follow-up analysis using only participants who had completed at least one session in either condition. These data showed higher (although not statistically significantly so) rankings for the intervention condition for satisfaction with treatment ($M = 3.85$, $SD = 1.51$) than for the TAU condition ($M = 3.45$, $SD = 1.80$), $t(23) = -0.61$, $p = 0.55$, as well as higher rankings for feeling respected by their counselor in the intervention condition ($M = 4.93$, $SD = 0.27$) versus the TAU condition ($M = 4.36$, $SD = 1.50$), $t(23) = -0.14$, $p = 0.18$. The rankings for treatment fit for the intervention ($M = 3.46$, $SD = 1.61$) versus the TAU condition ($M = 4.09$, $SD = 1.51$), $t(22) = 0.98$, $p = 0.34$, and the degree to which the treatment helped them quit for the intervention ($M = 2.07$, $SD = 2.30$) versus the TAU condition ($M = 3.18$, $SD = 2.18$), $t(23) = 1.22$, $p = 0.23$ were no longer statistically significantly different, but they were still higher for the TAU condition.

Table 4. Feasibility of the Intervention

	N	Intervention	Control	Total	p
Treatment Satisfaction Variables (mean, SD)					
Feeling Respected by Counselor	32	4.9 (0.2)	4.5 (1.2)	4.7 (0.9)	*0.19*
Satisfaction with Treatment	32	3.5 (1.9)	3.9 (1.6)	3.7 (1.7)	*0.50*
Treatment was a Good Fit	32	3.0 (1.9)	4.4 (1.3)	3.7 (1.7)	***0.02***
Treatment Helped in Quitting	30	1.7 (2.2)	3.3 (2.1)	2.5 (2.3)	***0.04***
Number of Sessions Completed (mean, SD)					
ACT Treatment		3.1 (1.9)	N/A	N/A	
Quitline Counseling		1.4 (1.8)	1.8 (1.6)	1.6 (1.7)	*0.47*

Exploratory Analyses:

We were interested in exploring whether NRT/pharmacotherapy for smoking cessation rates differed by condition and in examining whether there were group differences in motivation or confidence to quit at the end of treatment and at the 3-month follow-up assessments. Regarding NRT/pharmacotherapy for smoking cessation, when examining only participants who had completed at least 1 session with the Quitline, the proportions of participants using NRT was significantly higher for the TAU condition (85%) than for the intervention condition (30%) X^2 $(2, N = 33) = 11.26, p = .004, r = .58$. When examining the overall sample, these results were no longer significant $X^2 (2, N = 39) = 4.60, p = .10, r = .34$.

Mean differences in motivation to quit were tested using repeated measures ANOVA. At the end of treatment, there was no significant effect of time, $F(1, 35) = 2.33, p = .14, \eta_p^2 = .062$, indicating that motivation means did not decrease significantly between baseline and end of treatment. There was no significant effect of condition $F(1, 35) = .29, p = .59, \eta_p^2 = .008$,

suggesting no mean differences between control and intervention participants. The interaction term, time × condition, was nonsignificant $F(1, 35) = 1.24$, $p = .27$, $\eta_p^2 = .034$. We also examined motivation to quit relative to baseline at the 3-month follow up. In this analysis, there was a significant effect of time, $F(1, 28) = 12.46$, $p < .05$, $\eta_p^2 = .308$, suggesting that motivation means reduced across the board. The main effect for group was not significant $F(1, 28) = 1.76$, $p = .20$, $\eta_p^2 = .059$, suggesting no mean differences between groups. The interaction term, time × condition, was not significant, $F(1, 28) = .36$, $p = .55$, $\eta_p^2 = .013$. *Figure 6* presents these results graphically, illustrating the reductions in motivation means for both groups between baseline and 3 months.

Figure 6
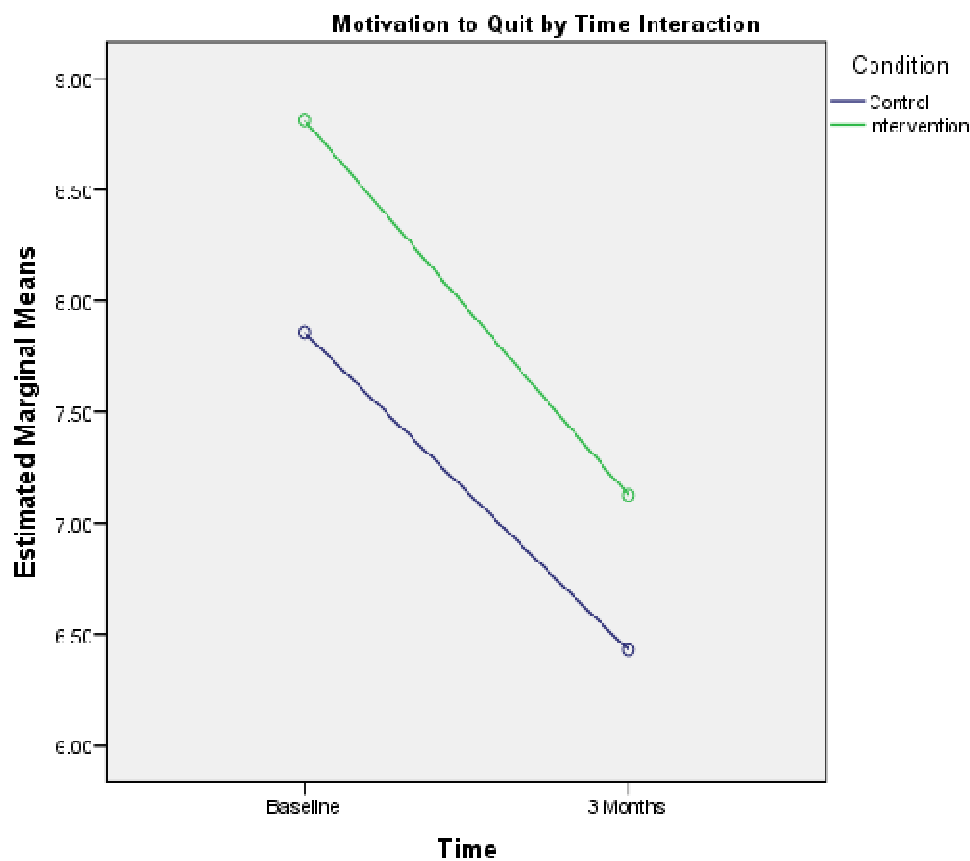
Mean differences in confidence to quit were also tested using repeated measures ANOVA. At the end of treatment, there was no significant effect of time, $F(1, 35) = .36$, $p = .55$, $\eta_p^2 = .010$, indicating that confidence means did not significantly differ between baseline and end of treatment for the overall sample. There was no significant effect of condition $F(1, 35) = 3.18$, $p = .08$, $\eta_p^2 = .083$, suggesting no overall mean differences between control and intervention participants. The interaction term, time × condition, was significant $F(1, 35) = 4.54$, $p = < .05$, $\eta_p^2 = .115$, indicating that confidence means decreased for intervention participants while they increased for the TAU participants at the end of treatment. We also examined confidence in quitting relative to baseline at the 3-month follow up. In this analysis, there was not a significant effect of time, $F(1, 28) = 3.25$, $p = .08$, $\eta_p^2 = .104$, suggesting that confidence means did not significantly differ between baseline and end of treatment for the overall sample. The main effect for group was not significant $F(1, 28) = .42$, $p = .52$, $\eta_p^2 = .015$, suggesting no mean differences between groups. The interaction term, time × condition, was not significant, $F(1, 28) = .29$, $p = .60$, $\eta_p^2 = .010$. *Figure 7* illustrates these results, showing a trend for reduced confidence means for both groups between baseline and 3 months.

Figure 7

Confidence to Quit by Time Interaction

CHAPTER 5: DISCUSSION

The literature suggests that chronic pain patients who smoke may have particular difficulty quitting (Fishbain et al., 2007; Hooten et al., 2009). Our results are consistent with these findings, with only 9% of our overall sample successfully quitting at the three-month follow-up assessment. Participants in the ACT condition had higher verified smoking 7-day point prevalence abstinence (confirmed by a collateral contact) at the end of treatment assessment (15% for ACT versus 5% for TAU), although these results were not statistically significant. However, when only intervention completers (those who completed all 5 sessions of ACT) were examined against participants in the TAU condition, these results were statistically significant. This exploratory analysis suggested that the ACT intervention, as it was designed, may hold promise for those smokers with chronic pain who have the capacity to complete the full course of treatment. At the 3-month follow-up assessment, two participants in the ACT condition (11%) had quit smoking versus only one in the TAU condition (7%). Overall, our results suggest that ACT may have potential to address smoking among individuals with chronic pain. Further study is clearly needed to identify factors that supported treatment completion for some patients but not for others. Though our results suggest some potential promise for ACT, these data need to be understood in light of the very small numbers of patients overall who quit. Ultimately, because the current study was proposed as a preliminary pilot study of the effectiveness of ACT in smoking cessation among chronic pain patients, our sample size was relatively small.

To our knowledge, this is the first study to test whether Quitline services can meet the needs of chronic pain patients. Tobacco Quitlines offer five smoking cessation counseling sessions and NRT, free of charge to people who enroll in the service. The 12% quit rates (Stead et al., 2006) reported at the population level make a large impact in reducing smoking-related morbidity and mortality. Cessation rates in the present study were lower overall than the Quitline cessation rates in the general population, and even lower among participants in the control condition receiving the Quitline-only treatment. In our study, at end of treatment, the ACT + Quitline group achieved 17% cessation, a rate that approximated Quitline-only rates reported for the general population. Cessation dropped from 17% at end of treatment to 11% at 3-month follow-up in the ACT group, suggesting that maintenance of cessation is an important issue to address. Although the reasons behind the relatively low quit rates in the present study are impossible to know for certain, several possibilities are described below, including the high rates of psychological disorders, the shorter duration of our intervention, or the persistent chronic pain experienced by our patients. Collectively, these possibilities suggest that pain clinic patients may need more specialized and/or more intensive smoking cessation assistance than patients drawn from other settings.

When comparing our quit rates and nonsignificant findings in the control and intervention conditions to those in other studies using ACT for smoking cessation, it is worth noting that these studies failed to find significant differences until the 12-month follow-up assessment. The pilot study by Bricker et al. (2010), finding a 7-day point cessation prevalence of 29% at the 20 day posttreatment interview, did not have a control condition and the sample was very small (only 14 participants). Further, recruitment in their study was conducted via free advertisements and news media that included: Craigslist.com, Backpage.com, *The Stranger,* and *The Dallas*

Observer. It is possible that the positive results reported by Bricker et al. (2010) were attributable in part to a self-selection bias. In other words, those who took the time to respond and call the study number may have had higher intrinsic motivation for quitting than the participants in our study who were handed off by their chronic pain providers.

In addition, despite our emphasis on the voluntary nature of participation in our study, it is possible that our participants may have felt a slight social pressure to tell their physicians they were willing to quit smoking and to participate in the study, perhaps giving us slightly inflated baseline motivation rankings. Nevertheless, our intervention average number of calls of 3.1 was just slightly lower than that of Bricker's of 3.5, suggesting that even if there was a slight social pressure to participate in the study, these patients still engaged in the telephone counseling sessions, even without compensation. This is important, considering that engagement in smoking cessation treatment is associated with a higher likelihood of abstinence, with a higher number of sessions producing better outcomes, especially if combined with medication (U.S. Department of Health and Human Services, 2008).

Another possible explanation for our lower cessation rates relative to Bricker et al.'s (2010) study might be the fact that our intervention was delivered over a 5-week period rather than over a 3-month period. The longer period of time between sessions in their study may have provided additional time for patients to rehearse skills and problem-solve. Our 5-session intervention delivered over 5 weeks may not have provided ample rehearsal and problem-solving opportunities. However, given the nature of our study, and our limited resources, delivering the intervention over 5 weeks was deemed in advance to be more feasible.

In the ACT for smoking cessation studies by Gifford et al. (2004) and Hernandez-Lopez et al. (2009), there appeared to be a 'sleeper effect'. Although these interventions involved

significant time and substantial treatment resources, significant differences between groups did not emerge until the 12-month follow-up assessment. This 'sleeper effect' is similar to that found in motivational interviewing (White, Mun, Pugh, & Morgan, 2007), and although it is not immediate, the long-term outcomes are promising and quite possibly more likely to endure. For the present study, 6-month follow data collection is ongoing. Unfortunately, 12-month follow-up data will not be collected. Future studies should assess whether ACT for smoking cessation treatment for a chronic pain population confers success in long-term follow-up rates.

The findings regarding smoking intensity showed a reduction in smoking over time for both groups, suggesting that addressing smoking in our two multidisciplinary pain settings was beneficial. Ultimately, this good news suggests that substantial declines in smoking intensity are achievable among patients with chronic pain and substantial psychiatric comorbidities. This finding is also consistent with the U.S. Department of Health and Human Services' (2008) Clinical Practice Guidelines for Treating Tobacco Use and Dependence, which recommends addressing tobacco use in health settings.

Reductions in smoking were evident in our study, but outright cessation was less common. The difficulty in moving from reduction to cessation may have been a function of psychiatric complexity or the high prevalence of depression, PTSD, and alcohol misuse in our sample. Recall, for example, that 40% of our participants likely met diagnostic criteria for Major Depressive Disorder, 18% met criteria for PTSD according to the PCL-C, and 11% reported alcohol misuse on AUDIT-C. Another possibility for the low quit rates may be that chronic pain patients require a higher level of care for smoking cessation than smokers without concomitant psychological disorders. They may require a higher number of sessions, and/or combined formats (e.g., in person, telephone, group, etc.), such as the intervention performed by Hooten et

al. (2014) described earlier in this paper. The U.S. Department of Health and Human Services'

(2008) Clinical Practice Guidelines for Treating Tobacco Use and Dependence strongly

encourage health providers to overcome their reluctance to address smoking cessation in

populations with psychological disorders, given patients' high rates of smoking and the evidence

suggesting that they want to and are able to quit smoking if given appropriate smoking cessation

care.

There is evidence that smoking among individuals with depression is associated with

complex health circumstances in physical and mental health domains (Lombardero et al., 2014).

These circumstances include higher depressive symptomatology, higher likelihood of presence

of comorbid PTSD, higher alcohol consumption, worse overall mental health status, more

medical comorbidities, and lower levels of social support (Lombardero et al., 2014). If smoking

is not addressed among individuals with chronic pain and psychological disorders, it is likely that

their health will continue to worsen as smoking continues, and their depression and pain remain

constant or increase in severity. Fortunately, the evidence observed in the present work suggests

that many smokers with chronic pain, like smokers with psychological disorders, are considering

quitting smoking and are able to cut down. It is imperative to find optimal interventions for this

population so that their smoking cessation needs can be met. For example, in the treatment of

smokers with mental health conditions, the evidence suggests that integrating tobacco treatment

in mental health settings can be more effective than assessment of smoking followed by referral

to separate smoking cessation clinics.

Indeed, McFall et al. (2007) studied a randomized tobacco treatment study among

patients with PTSD. Their results showed a 5-fold increased likelihood of cessation at 2, 4, 6,

and 9 months in smokers with PTSD by providing integrated smoking cessation treatment.

Further, McFall et al.'s (2010) second study of integrated smoking cessation treatment among

PTSD patients demonstrated that integrated care can improve long-term (18-months) smoking

abstinence rates by more than double compared to referring patients to smoking cessation clinics.

Although our study integrated tobacco treatment in a pain setting, the researchers were not

clinical staff treating ongoing patients, and our treatment was short in duration relative to McFall

et al.'s (5 weeks versus 3 months). It is possible that a similar study, integrating tobacco

cessation care provided by psychologists treating their ongoing clients in pain settings might

result in better patient engagement and better outcomes. Other studies of tobacco treatment

integration among smokers with psychological disorders have also shown promising results. A

stepped-care intervention tested by Hall et al. (2006) and tailored to patients recruited from

outpatient mental health treatment considered readiness to quit, provided computerized

motivational feedback, and also provided an optional 6-session psychological counseling and

pharmacological tobacco cessation treatment. This intervention produced positive outcomes,

showing significantly higher quit rates than for the group receiving brief contact. It is possible

that an ACT intervention that includes a motivational enhancement component may prove

effective in chronic pain settings.

Understanding the links between smoking and mental health can be important in

addressing smoking among chronic pain patients, and in interpreting the lower cessation rates

found in our study as well as in other studies of smoking cessation among chronic pain patients

(e.g., Hooten et al., 2009). A number of mental health conditions associated with smoking, such

as mood disorders, anxiety disorders, personality disorders, and substance use disorders have

been shown to predict persistent nicotine dependence among adults in the United States (R. D.

Goodwin, Pagura, Spiwak, Lemeshow, & Sareen, 2011). Without treatment, the predicted

probabilities of quitting smoking in primary care have been found to be lower for patients with

alcohol, drug, or mental disorders (6.0%) than for smokers without these disorders (10.5%)

(Ong, Zhou, & Sung, 2011). Research has shown, for example, that compared to non-depressed

smokers, depressed smokers are less likely to stop smoking and more likely to experience

smoking relapse (Kinnunen, Doherty, Militello, & Garvey, 1996; Niaura et al., 2001). However,

it is important to keep in mind that these smokers are still motivated to quit, and that they have

been shown to successfully quit with appropriate interventions, as described above.

The increase in depression scores from baseline to the 3-month follow-up in the present

study is consistent with other studies examining psychiatric symptoms during smoking cessation

(Aubin, 2009; Aubin, Rollema, Svensson, & Winterer, 2012) and could be partially explained by

the similarities between withdrawal symptoms and symptoms of depression (Hall & Prochaska,

2009). Additionally, in our sample, indicators of multiple aspects of pain persisted from baseline

to end of treatment and 3-month follow-up. The persistence of pain may also have played a role

in the increase of depression symptoms in the present sample. The interactive relationship

between pain and depression, for example, is documented in the literature (Arnow et al., 2006;

Atkinson et al., 1991).

We also found decreases in psychological flexibility over time in the present study. This

may have been related to the observed increases in depression and/or pain persistence.

Psychological flexibility correlates highly with depression, negative mood, anxiety, and stress,

for example (Hulbert-Williams & Storey, 2015). With these possibilities in mind, it is important

to note that the evidence drawn from studies of psychiatric patients highlights that quitting

smoking does *not* worsen psychiatric symptoms (Hall & Prochaska, 2009; Prochaska, Hall,

Delucchi, & Hall, 2014). Further, a study of tobacco dependence treatment initiated in inpatient

psychiatry demonstrated lower psychiatric rehospitalization rates among participants who had quit smoking than among those who continued to smoke (Prochaska et al., 2014), suggesting possible protective effects of quitting smoking. In our study, the increase in depression did not significantly differ by condition, indicating that both groups experienced similar levels of increases in symptomatology.

The U.S. Department of Health and Human Services' (2008) Clinical Practice Guidelines for Treating Tobacco Use and Dependence among psychiatric patients highlight the potential beneficial effects of antidepressants, particularly Bupropion SR and Nortiptyline in increasing long-term smoking cessation rates among people with a past history of depression, based on studies comparing antidepressants to placebo. These guidelines also emphasize that there is not enough evidence yet to determine whether addressing psychiatric symptoms in a smoking cessation intervention is more beneficial than standard tobacco cessation treatments. A reason for the lack of knowledge about smoking cessation among psychiatric patients is that most of the smoking cessation trials excluded participants with active depression (Gierisch, Bastian, Calhoun, McDuffie, & Williams, 2010). However, new studies in this domain show promise in considering mental health status in smoking cessation efforts. Smoking cessation interventions tailored to the specific needs of individuals with mental illness demonstrate better outcomes than non-tailored treatments, such as higher cessation rates and prolonged abstinence (Hayford et al., 1999; Patten, Martin, Myers, Calfas, & Williams, 1996).

In a study of smoking cessation among college students with depression, Schleicher, Harris, Campbell, and Harrar (2012) found that depressed smokers in a mood-oriented group treatment for smoking were more likely to reduce smoking intensity by 50%. These participants also evidenced a greater increase in smoking reduction confidence compared to participants in an

active control condition. Given the high rates of depression among chronic pain patients, it seems

relevant to address and monitor depression during smoking cessation. To our knowledge, our

study is the first to address both depression and pain as internal triggers for smoking, but a longer

treatment duration may be required to obtain more optimal results.

Considering research suggesting certain characteristics that may contribute to the

maintenance of smoking behavior among chronic pain patients, we were interested in examining

changes in pain-related anxiety (Ditre et al., 2013), and changes in psychological inflexibility, an

underlying contributor to psychopathology and suffering according to ACT (Harris, 2009) as

possible predictors of smoking. Our insignificant findings may be due to our small sample size,

or to the very small changes in pain-related anxiety found among our chronic pain patients.

Future studies with larger samples should examine explicitly the contributions of these variables

to smoking quantity or to the likelihood of successful smoking cessation.

Regarding our pain variables, we did not find significant changes from baseline to the

three-month follow-up assessment, nor did we find changes by condition. These findings

suggested that pain-related anxiety, interference, and severity were not affected by addressing

smoking or by attention to pain during the intervention. These findings also suggest that these

pain indicators were persistent among the smokers in our sample, despite whatever treatment

they received from their pain clinics. These observations are consistent with Hooten et al.'s

(2014) findings that smoking status did not affect pain-related treatment outcomes. According to

Ditre et al.'s (2011) paper investigating the relationship between smoking and pain, "there have

been no published studies that examined how the engagement or completion of treatment for

chronic pain may influence smoking-related factors such as the urge to smoke, smoking

behavior, motivation to quit, or cessation- related outcomes" (p. 18). This is an area in which

future research may be helpful. Our study provides additional evidence that smoking reduction does not appear to negatively affect pain, which can be helpful psychoeducation to provide to patients who smoke in an effort to cope with pain.

Regarding the feasibility of the intervention, participants in both conditions reported feeling respected by their counselors and being satisfied with their treatment. Participants in the Quitline condition, however, reported higher ratings in the helpfulness of the treatment and in the degree to which the treatment was a good fit for them than participants in the ACT condition, although these differences were not significant when examining rankings from people who had completed at least one session of either TAU or ACT. Although these findings seem to suggest that participants found the TAU condition to be a better fit and to be more helpful in the process of quitting, it is important to remember that participants in both conditions had contact with the Quitline. These findings may reflect confusion about having two slightly different treatments, or feeling overwhelmed by receiving more phone calls than the standard once-a-week session provided by tobacco Quitlines.

It is also quite possible that some patients in the ACT condition were poor fits for the intervention, given their lower rankings of fit and helpfulness in quitting. In spite of the lower rankings in these two categories, participants reported overall satisfaction with both treatments, suggesting that pain patients are amenable and generally satisfied with interventions delivered over the telephone. Future studies should examine patient preferences for smoking cessation. Some of the existing evidence in this domain suggests that chronic pain patients prefer a group format while in an interdisciplinary pain program as well as follow-up support including social networks, emails, or phone calls from their counselors (Hooten, Vickers, et al., 2011). We chose not to do a group intervention in our study due to practical barriers, such as transportation, that

limited our ability to recruit and maintain the high number of patients needed for the current study.

Of note, based on our exploratory analyses, participants in the TAU condition used NRT at higher rates than participants in the ACT condition. Although participants in the ACT condition were encouraged to pursue NRT/pharmacotherapy for smoking cessation, it is possible that they found it more inconvenient to do this via another outlet (the Quitline) than if we had had the ability to provide these resources ourselves. The higher rates of NRT/pharmacotherapy use found in the TAU condition could explain the higher reduction in number of cigarettes per day found in this condition compared to the ACT condition as well as the end of treatment higher rankings in confidence to quit smoking. Although it is impossible to determine if our findings would have been different had we had the resources to provide NRT/pharmacotherapy to participants in the ACT condition, future studies comparing ACT to CBT should continue to provide NRT/pharmacotherapy to participants, as this has been found to increase the likelihood of success in smoking cessation (U.S. Department of Health and Human Services, 2008).

This study includes several important limitations. First, our sample consisted predominantly of middle-aged, predominately high-school educated, Caucasian patients, with high rates of probable depression and probable PTSD. Any generalization of the present findings to other patient populations ought to be done with caution. At the same time, we were specifically interested in chronic pain patients and the high rates of depression and PTSD found in our sample are consistent with those found among chronic pain patients (Arnow et al., 2006; Atkinson et al., 1991; Dersh et al., 2002; Roy-Byrne et al., 2004). Our study provides valuable information about chronic pain patients who are mostly Caucasian and from rural areas of the country. Other studies should recruit a more ethnically diverse sample, and in urban areas.

A second limitation is that the nature of the feasibility study limited our ability to make definitive conclusions regarding the mechanisms underlying tobacco use among chronic pain patients and limited our ability to know with certainty whether the ACT intervention was effective. However, this study opens the door for future studies examining the effectiveness of ACT for smoking cessation in this population. A third limitation is that our study did not follow participants to obtain 12-month cessation outcomes. This would have allowed tracking of long-term 'sleeper' effects that have emerged in other studies of ACT for smoking cessation and other studies using Motivational Interviewing that found significant differences at 12- or 18-month follow up assessments (Gifford et al., 2004; Hernandez-Lopez et al., 2009; White et al., 2007). Tracking patients for 12 -months in the present study was simply not possible. Future studies testing ACT in this population could address this limitation by including longer-term follow-ups.

In conclusion, our study provides preliminary evidence of the potential effectiveness of ACT for smoking cessation in a chronic pain population, a population with characteristics (e.g., high rates of depression, PTSD, and alcohol misuse) that can complicate smoking cessation efforts. Our results suggest that it is feasible to address smoking in some multidisciplinary pain treatment settings, and that these patients are generally satisfied with phone-based interventions. The overall low rates of smoking cessation in our study suggest that chronic pain patients may need increased attention to smoking, potentially including other formats such as group and individual therapy, provision of NRT/pharmacotherapy, and/or increased number of smoking cessation sessions. Future studies in this area are desperately needed in order to help address a significant public health concern: smoking among chronic pain patients.

References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (5th ed.)*. Arlington, VA: American Psychiatric Publishing.

Arnow, B. A., Hunkeler, E. M., Blasey, C. M., Lee, J., Constantino, M. J., Fireman, B., . . . Hayward, C. (2006). Comorbid depression, chronic pain, and disability in primary care. *Psychosomatic Medicine, 68*(2), 262-268.

Atkinson, J. H., Slater, M. A., Patterson, T. L., Grant, I., & Garfin, S. R. (1991). Prevalence, onset, and risk of psychiatric disorders in men with chronic low back pain: A controlled stud. *Pain, 45*(2), 111-121. doi: 10.1016/0304-3959(91)90175-W

Aubin, H.-J. (2009). Management of Emergent Psychiatric Symptoms During Smoking Cessation. *Current Medical Research and Opinion, 25*(2), 519-525. doi: 10.1185/03007990802707600

Aubin, H.-J., Rollema, H., Svensson, T. H., & Winterer, G. (2012). Smoking, quitting, and psychiatric disease: A review. *Neruoscience and Biobehavioral Reviews, 36*, 271-284.

Baker, T. B., Piper, M. E., McCarthy, D. E., Majeskie, M. R., & Fiore, M. C. (2004). Addiction motivation reformulated: An affective processing model of negative reinforcement. *Psychological Review III, 1*, 33-51.

Beckham, J. C. (1999). Smoking and anxiety in combat veterans with chronic posttraumatic stress disorder: a review. *Journal of Psychoactive Drugs, 31*(103-110).

Behrend, C., Prasarn, M., Coyne, E., Horodyski, M., Wright, J., & Rechtine, G. R. (2012). Smoking cessation related to improved patient-reported pain scores following spinal care. *The Journal of Bone and Joint Surgery 94*(23), 2161-2166.

Bond, F. W., Hayes, S. C., Baer, R. A., Carpenter, K. C., Guenole, N., Orcutt, H. K., . . . Zettle,

  R. D. (2011). Preliminary psychometric properties of the Acceptance and Action

  Questionnaire--II: A revised measure of psychological inflexibility and experiential

  avoidance. *Behavior Therapy, 42*(4), 676-688.

Bricker, J. B., Bush, T., Zbikowski, S. M., Mercer, L. D., & Heffner, J. L. (2014). Randomized

  trial of telephone-delivered acceptance and commitment therapy versus cognitive

  behavioral therapy for smoking cessation: A pilot study. *Nicotine & Tobacco Research,*

  Advance Access. doi: 10.1093/ntr/ntu102

Bricker, J. B., Mann, S. L., Marek, P. M., Liu, J., & Peterson, A. V. (2010). Telephone-delivered

  acceptance and commitment therapy for adult smoking cessation: A feasibility study.

  Nicotine & Tobacco Research, 12(4), 454-458.

Bricker, J. B., Mull, K., Kientz, J. A., Vilardaga, R. M., Mercer, L. D., Akioka, K., & Heffner, J.

  L. (2014). Randomized, controlled pilot trial of a smartphone App for smoking cessation

  using Acceptance and Commitment Therapy. *Drug and Alcohol Dependence, In Press*.

  doi: 10.1016/j.drugalcdep.2014.07.006

Bricker, J. B., Wyszynski, C., Comstock, B., & Heffner, J. L. (2013). Pilot randomized

  controlled trial of a web-based acceptance and commitment therapy for smoking

  cessation. *Nicotine & Tobacco Research, 15*(10), 1756-1764.

Bush, K., Kivlahan, D. R., McDonell, M. B., Fihn, S. D., & Bradley, K. A. (1998). The AUDIT

  Alcohol Consumption Questions (AUDIT-C): An effective brief screening test for

  problem drinking. *Archives of Internal Medicine, 158*(16), 1789-1795.

Centers for Disease Control. (2005). *Smoking-attributable mortality, years of potential life lost, and productivity losses*. United States, 2000-2004: Morbidity and Mortality Weekly Report.

Centers for Disease Control. (2009). *Cigarette smoking among adults and trends in smoking cessation*. United States, 2008: Morbidity and Mortality Weekly Report.

Cleeland, C. S., & Ryan, K. M. (1994). Pain assessment: global use of the Brief Pain Inventory. *Annals of the Academy of Medicine, Singapore, 23*(2), 129-138.

Corson, K., Gerrity, M. S., & Dobscha, S. K. (2004). Screening for depression and suicidality in a VA primary care setting: 2 items are better than 1 item. *American Journal of Managed Care, 10*(11), 839-845.

Dahl, J., & Lundgren, T. (2006). *Living beyond your pain: Using acceptance & commitment therapy to ease chronic pain*. Oakland, CA: New Harbinger Publications, Inc.

Dersh, J., Polatin, P. B., & Gatchel, R. J. (2002). Chronic pain and psychopathology: Research findings and theoretical considerations. *Psychosomatic Medicine, 64*(5), 773-786. doi: 10.1097/01.PSY .0000024232 .11538.54

Ditre, J. W., Brandon, T. H., Zale, E. L., & Meagher, M. M. (2011). Pain, nicotine, and smoking: Research findings and mechanistic considerations. *Psychological Bulletin, 137*(6), 1065-1093.

Ditre, J. W., Zale, E. L., Zvolensky, M. J., & Kosiba, J. D. (2013). A pilot study of pain-related anxiety and smoking-dependence motives among persons with chronic pain. *Experimental and Clinical Psychopharmacology, 21*(6), 443-449.

Dworkin, R. H., Turk, D. C., Farrar, J. T., Haythornthwaite, J. A., Jensen, M. P., Katz, N. P., . . .
Witter, J. (2005). Core measures for chronic pain clinical trials: IMMPACT
recommendations. *Pain, 113*, 9-19.

Fiore, M. C., Jaen, C. P., Baker, T. B., Bailey, W. C., Benowitz, N. L., Curry, S. J., . . . Wewers,
M. E. (2008). *Treating tobacco use and dependence: 2008 update.* Rockville, MD: U.S.
Department of Health and Human Services. Public Health Service.

Fishbain, D. A., Lewis, J. E., Cole, B., Cutler, R. B., Rosomoff, H. L., & Rosomoff, R. S. (2007).
Variables associated with current smoking status in chronic pain patients. *Pain Medicine,
8*(4), 301-311.

Gardner, P. J., Knittel-Keren, D., & Gomez, M. (2012). The Posttraumatic Stress Disorder
Checklist as a screening measure for posttraumatic stress disorder in rehabilitation after
burn injuries. *Archives of Physical Medical Rehabilitation, 93*(4), 623-628.

Gierisch, J. M., Bastian, L. A., Calhoun, P. S., McDuffie, J. R., & Williams, J. W. (2010).
*Comparative effectiveness of smoking cessation treatments for patients with depression:
A systematic review and meta-analysis of the evidence* Washington, DC: Evidence-based
Synthesis Program (ESP) Center.

Gifford, E. V., Kohlenberg, B. S., Hayes, S. C., Antonuccio, D. O., Piasecki, M. M., Rasmussen-
Hall, M. L., & Palm, K. M. (2004). Acceptance-based treatment for smoking cessaion.
Behavior Therapy, 35(4), 689-705.

Gifford, E. V., Kohlenberg, B. S., Hayes, S. C., Pierson, H. M., Piasecki, M. P., Antonuccio, D.
O., & Palm, K. M. (2011). Does acceptance and relationship focused behavior therapy
contribute to bupropion outcomes? A randomized controlled trial of Functional Analytic

Psychotherapy and Acceptance and Commitment Therapy for smoking cessation.

Behavior Therapy, 42(4), 700-715.

Gilbert, D. (1995). *Smoking: Individual differences, psychopathology and emotion*. Washington,

DC.

Goesling, J., Brummett, C. M., & Hassett, A. L. (2012). Cigarette smoking and pain: Depressive

symptoms mediate smoking-related pain symptoms. *Pain   153*(8), 1749-1754.

Goodwin, R., & Hamilton, S. P. (2002). Cigarette smoking and panic: The role of neuroticism.

American Journal of Psychiatry, 159, 1208-1213.

Goodwin, R. D., Pagura, J., Spiwak, R., Lemeshow, A. R., & Sareen, J. (2011). Predictors of

persistent nicotine dependence among adults in the United States. *Drug and Alcohol*

Dependence, 118, 127-133.

Hahn, E. J., Rayens, M. K., Kirsh, K. L., & Passik, S. D. (2006). Brief report: Pain and readiness

to quit smoking cigarettes. *Nicotine & Tobacco Research, 8*(3), 473-480.

Hall, S. M., & Prochaska, J. J. (2009). Treatment of smokers with co-occurring disorders:

Emphasis on integration in mental health and addiction treatment settings. *Annual Review*

of Clinical Psychology, 5, 409-431. doi: 10.1146/annurev.clinpsy.032408.153614

Hall, S. M., Tsoh, J. Y., Prochaska, J. J., Eisendrath, S., Rossi, J. S., Redding, C. A., . . . Gorecki,

J. A. (2006). Treatment for cigarette smoking among depressed mental health oupatients:

A randomized clinical trial. *American Journal of Public Health, 96*(10), 1808-1814.

Hardt, J., Jacobsen, C., Goldberg, J., Nickel, R., & Buchwald, D. (2008). Prevalence of chronic

pain in a representative sample in the United States. *Pain Medicine, 9*(7), 803-812. doi:

10.1111/j.1526-4637.2008 .00425.x

Harris, R. (2009). *ACT made simple: an easy-to-read primer on acceptance and commitment therapy*. Oakland, CA: New Harbinger Publications, Inc.

Hayes, S. C., & Duckworth, M. P. (2006). Acceptance and commitment therapy and traditional cognitive behavior therapy approaches to pain. *Cognitive and Behavioral Practice, 13*(3), 185-187.

Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and Commitment Therapy: Model, processes and outcomes. *Behaviour Research Therapy, 44*(1), 1-25.

Hayes, S. C., Wilson, K. G., Gifford, E. V., & Batten, S. (1998). *Acceptance and commitment therapy for the treatment of polysubstance-abusing methadone clients: Individual therapy protocol*.

Hayford, K. E., Patten, C. A., Rummans, T. A., Schroeder, D. R., Offord, K. P., Croghan, I. T., . . . Hurt, R. D. (1999). Efficacy of bupropion for smoking cessation in smokers with a former history of major depression or alcoholism. *Brithis Journal of Psychiatry, 174*, 173-178.

Hernandez-Lopez, M., Bricker, J. B., Roales-Nieto, J. G., & Montesinos, F. (2009). Acceptance and commitment therapy for smoking cessation: A preliminary study of its effectiveness in comparison with cognitive behavioral therapy. *Psychology of Addictive Behaviors, 23*(4), 723-730.

Hofmann, S. G., Sawyer, A. T., & Fang, A. F. (2010). The empirical status of the "new wave" of CBT. *Psychiatric Clinics of North America, 33*(2), 701-710. doi: 10.1016/j.psc.2010.04.006

Hooten, W. M., Shi, Y., Gazelka, H. M., & Warner, D. O. (2011). The effects of depression and smoking on pain severity and opioid use in patients with chronic pain. *Pain, 152*(1), 223-229.

Hooten, W. M., Townsend, C. O., Bruce, B. K., Schmidt, J. E., Kerkvliet, J. L., Patten, C. A., & Warner, D. O. (2009). Effects of smoking status on immediate treatment outcomes of multidisciplinary pain rehabilitation. *Pain Medicine, 10*(2), 347-355.

Hooten, W. M., Townsend, C. O., Hays, J. T., Ebnet, K. L., Gauvin, T. R., Gehin, J. M., . . . Warner, D. O. (2014). A cognitive behavioral smoking abstinence intervention for adults with chronic pain: A randomized controlled pilot trial. *Addictive Behaviors, 39*(3), 593-599.

Hooten, W. M., Vickers, K. S., Shi, Y., Ebnet, K. L., Townsend, C. O., Patten, C. A., & Warner, D. O. (2011). Smoking cessation and chronic pain: patient and pain medicine physician attitudes. *Pain Practice, 11*(6), 552-563.

Hulbert-Williams, N. J., & Storey, L. (2015). Psychological flexibility correlates with patient-reported outcomes independent of clinical or sociodemographic characteristics. *Support Care Cancer, Epub ahead of print*. doi: 10.1007/s00520-015-3050-9

Jakobsson, U. (2008). Tobacco use in relation to chronic pain: Results from a Swedish population survey. *Pain Medicine, 9*(8), 1091-1097

Jamison, R. N., Stetson, B. A., & Winston, P. C. V. (1991). The relationship between cigarette smoking and chronic low back pain. *Addictive Behaviors, 16*(3-4), 103-110.

Johannes, C. B., Le, T. K., Zhou, X., Johnston, J. A., & Dworkin, R. H. (2010). The prevalence of chronic pain in United States adults: Results on an Internet-based study. *Journal of Pain, 11*(11), 1230-1239. doi: 10.1016/j.jpain.2010.07.002

Johnson, J. G., Cohen, P., Pine, D. S., Klein, D. F., Kasen, S., & Brook, J. S. (2000). Association

between cigarrette smoking and anxiety disorders during adolescence and early

adulthood. *Journal of the American Medical Association, 284*(18), 2348-2351.

Kahl, K. G., Winter, L., & Schweiger, U. (2012). The third wave of cognitive behavioural

therapies: what is new and what is effective? *Current Opinion Psychiatry, 25*(6), 522-

528.

Kaye, A. D., Prabhakar, A. P., Fitzmaurice, M. E., & Kaye, R. J. (2012). Smoking cessation in

pain patients. *The Ochsner Journal, 12*(17-20).

Kinnunen, T., Doherty, K., Militello, F. S., & Garvey, A. J. (1996). Depression and smoking

cessation: Characteristics of depressed smokers and effects of nicotine replacement.

Journal of Consulting and Clinical Psychology, 64(4), 791-798.

Koenen, K. C., Hitsman, B., Lyons, M. J., Niaura, R., McCaffery, J., Goldberg, J., . . . Tsuang,

M. (2005). A twin registry study of the relationship between posttraumatic stress disorder

and nicotine dependence in men. . *Archives of General Psychiatry, 62*(11), 1258-1265.

Kroenke, K., & Spitzer, R. L. (2002). The PHQ-9: A new depression diagnostic and severity

measure. *Psychiatric Annals, 32*(9), 509-515.

Kroenke, K., Spitzer, R. L., & Willimas, J. B. (2001). The PHQ-9. *Journal of General Internal

Medicine, 16*(9), 606-613.

Lasser, K., Boyd, J. W., Woolhandler, S., Himmelstein, D. U., McCormick, D., & Bor, D. H.

(2000). Smoking and mental illness: A population-based prevalence study. . *Journal of

the American Medical Association, 284*(20), 2606-2610.

Lethem, J., Slade, P. D., Troup, J. D. G., & Bentley, G. (1983). Outline of a fear-avoidance model of exaggerated pain perception--I *Behavior Research and Therapy, 21*(4), 401-408.

Lombardero, A., Campbell, D. G., Harris, K. J., Chaney, E. F., Lanto, A. B., & Rubesntein, L. V. (2014). Prevalence and correlates of smoking status among Veterans Affairs primary care patients with probable major depressive disorder. *Addictive Behaviors, 39*(3), 538-545.

Marrone, G. F., Paulpillai, M., Evans, M. P., Singleton, E. G., & Heishman, S. J. (2010). Breath carbon monoxide and semiquantitative saliva cotinine as biomarkers for smoking. *Human Psychpharmacology: Clinical and Experimental, 25*, 80-83.

McCracken, L. M., & Dhingra, L. (2002). A short version of the Pain Anxiety Symptoms Scale (PASS-20): preliminary development and validity. *Pain Research & Management, 7*(1), 45-50.

McCracken, L. M., Sato, A., & Taylor, G. J. (2013). A trial of a brief group-based form of acceptance and commitment therapy (ACT) for chronic pain in general practice: Pilot outcome and process results. *The Journal of Pain, 14*(11), 1398-1406.

McCracken, L. M., Zayfert, C., & Gross, R. T. (1992). The Pain Anxiety Symptoms Scale: Development and validation of a scale measure fear of pain. *Pain, 50*(1), 67-73. doi: 10.1016/0304-3959(92)90113-P

McFall, M., Saxon, A. J., Malte, C. A., Chow, B., Bailey, S., Baker, D. G., . . . Lavoir, P. W. (2010). Integrating tobacco cessation into metnal health care for posttraumatic stress disorder: a randomized controlled trial. *Journal of the American Medical Association, 304*(22), 2485-2493.

McFall, M., Saxon, A. J., Thaneemit-Chen, S., Smith, M. W., Joseph, A. M., Carmody, T. P., . . . Lavori, P. W. (2007). Integrating smoking cessation into mental health care for post-traumatic stress disorder. *Clinical Trials, 4*(2), 178-189.

Michna, E., Ross, E. L., Hynes, W. L., Nedeljkovic, S. S., Soumekh, S., Janfaza, D., . . . Jamison, R. N. (2004). Predicting aberrant drug behavior in patients treated for chronic pain: Importance of abuse history. *Journal of Pain and Symptom Management, 28*(3), 250-258. doi: 10.1016/ j.jpainsymman.2004.04.007

Montana Department of Public Health and Human Services. (2014, 5/16/2014). Montana Tobacco Use Prevention Program, 2014

Moreley, S., Eccleston, C., & Williams, A. (1999). Systematic review and meta-analysis of randomized controlled trials of cognitive behaviour therapy and behaviour therapy for chronic pain in adults, excluding headache. *Pain, 80*(1-2), 1-13.

Muñoz, R. F., Marín, B. V., Posner, S. F., & Pérez-Stable, E. J. (1997). Mood management mail intervention increases abstinence rates for Spanish-speaking Latino smokers. *American Journal of Community Psychology, 25*(3), 325-343.

Nakajima, M., & al'Absi, M. (2011). Enhanced pain perception prior to smoking cessation is associated with early relapse. *Biological Psychology, 88*(1), 141-146.

Niaura, R., Britt, D. M., Shadel, W. G., Goldstein, M., Abrams, D., & Brown, R. (2001). Symptoms of depression and survival experience among three samples of smokers trying to quit. *Psychology of addictive behaviors, 15*(1), 13-17.

Ong, M. K., Zhou, Q., & Sung, H.-Y. (2011). Primary care providers advising smokers to quit: Comparing effectiveness between those with and without alcohol, drug, or mental disorders. *Nicotine & Tobacco Research, 13*(12), 1193-1201.

Patten, C. A., Martin, J. E., Myers, M. G., Calfas, K. J., & Williams, C. D. (1996). Effectiveness of Cognitive-Behavioal Therapy for smokers with histories of alcohol dependence and depression. *Journal of Studies on Alcohol, 59*(3), 327-335.

Piper, M. E., Bolt, D. M., Kim, S., Japuntich, S. J., Smith, S. S., Niederdeppe, J., . . . Baker, T. B. (2008). Refining the tobacco dependence phenotype using the Wisconsin Inventory of Smoking Dependence Motives. *Journal of Abnormal Psychology, 117*(4), 747-761.

Piper, M. E., Piasecki, T. M., Federman, E. B., Bolt, D. M., Smith, S. S., Fiore, M. C., & Baker, T. B. (2004). A multiple motives approach to tobacco dependence: The Wisconsin Inventory of Smoking Dependence Motives (WISDM-68). *Journal of Consulting and Clinical Psychology, 72*(2), 139-154.

Pisinger, C., Aadahl, M., Toft, U., Birke, H., Zytphen-Adeler, J., & Jorgensen, T. (2011). The association between active and passive smoking and frequent pain in a general population. *European Journal of Pain, 15*(1), 77-83.

Polk, K. L., & Schoendorff, B. (2014). *The ACT matrix: A new approach to building psychological flexibility across settings & populations.* . Oakland, CA: New Harbinger Publications, Inc. .

Portenoy, R. K., Ugarte, C., Fuller, I., & Haas, G. (2004). Population-based survey of pain in the United States: Differences among white, African American, and Hispanic subjects. *The Journal of Pain, 5*, 317-328. doi: 10.1016/j.jpain.2004.05.005

Prochaska, J. J., Hall, S. E., Delucchi, K., & Hall, S. M. (2014). Efficacy of initiating tobacco dependence treatment in inpatient psychiatry: A randomized controlled trial. *American Journal of Public Health, 104*(8), 1557-1565.

Rigotti, N. A., Munafo, M. R., Murphy, M. F., & Stead, L. F. (2003). Interventions for smoking

cessation in hospitalised patients. *Cochrane Database System Review*(1).

Roditi, D., & Robinson, M. E. (2011). The role of psychological interventions in the

management of patients with chronic pain. *Psychology Research and Behavior

Management, 4*, 41-49.

Rohde, P., Lwwinsohn, P. M., Brown, R. A., Gau, J. M., & Kahler, C. W. (2003). Psychiatric

disorders, familial factors and cigarette smoking: Associations with smoking initiation

Nicotine & Tobacco Research, 5(1), 85-98.

Rowley, T. J., Payappilly, J., Lu, J., & Flood, P. (2008). The antinociceptive response to

nicotinic agonists in a mouse model of postoperative pain. *Anesthesia and Analgesia,

107*(3), 1052-1057. doi: 10.1213/ ane.0b013e318165e0c0

Roy-Byrne, P., Smith, W. R., Goldberg, J., Afari, N., & Buchwald, D. (2004). Post-traumatic

stress disorder among patients with chronic pain and chroni fatigue. *Psychological

Medicine, 34*, 363-368.

Sahley, T. L., & Berntson, G. G. (1979). Antinociceptive effects of central and systemic

administrations of nicotine in the rat. *Psychopharmacology, 65*(3), 279-283. doi:

10.1007/BF00492216

Schimmel-Bristow, A., Bricker, J. B., & Comstock, B. (2012). Can acceptance & commitment

therapy be delivered with fidelity as a brief telephone-intervention? *Addictive Behaviors,

37*(4), 517-520. doi: 10.1016/j.addbeh.2011.11.015

Schleicher, H. E., Harris, K. J., Campbell, D. G., & Harrar, S. W. (2012). Mood management

intervention for college smokers with elevated depressive symptoms: a pilot study.

Journal of American College Health, 60(1), 37-45. doi: 10.1080/07448481.2011.567403

Shi, Y., Hooten, W. M., & Warner, D. O. (2011). Effects of smoking cessation on pain in older

      adults. *Nicotine & Tobacco Research, 13*(10), 919-925.

Stead, L. F., Hartmann-Boyce, J., Perera, R., & Lancaster, T. (2013). Telephone counselling for

      smoking cessation. *Cochrane Database of Systematic Reviews, 8*(CD002850). doi:

      10.1002/14651858.CD002850.pub3.

Stead, L. F., Perera, R., & Lancaster, T. (2006). Telephone counseling for smoking cessation.

      Cochrane Database of Systematic Reviews, 3CD002850.

Steuber, T., & Danner, F. (2006). Adolescent smoking and depression: Which comes first?

      Addictive Behaviors, 31(1), 133-136.

Sullivan, M. J. L., Bishop, S. R., & Pivik, J. (1995). The pain catastrophizing scale:

      Development and validation. *Psychological Assessment, 7*(4), 524-532.

Tan, G., Jensen, M. P., Thornby, J. I., & Shanti, B. F. (2004). Validation of the brief pain

      inventory for chronic nonmalignant pain. *Journal of Pain, 5*(2), 133-137.

Task Force on Taxonomy of the IASP. (1994). Pain terms, a current list with definitions and

      notes on usage. In H. Merskey & N. Bogduk (Eds.), *Classification of crhronic pain* (pp.

      209-214). Settle, WA: IASP Press. (Reprinted from: 2nd).

U.S. Department of Health and Human Services. (2008). *Treating tobacco use and dependence:*

      Quick reference guide for clinicians 2008 update. (Report No. ISSN-1530-6402).

      Rockville, MD.

Vlayen, J. W., de Jong, J., Sieben, J., & Combez, G. (2002). Graded exposure in vivo for pain-

      related fear. . In D. C. Turk & R. J. Gatchel (Eds.), *Psychosocial approaches to pain*

      management: a practitioner's handbook. (pp. 210-233). New York: Guilford Press.

Vlayen, J. W., & Linton, S. J. (2000). Fear-avoidance and its consequences in chronic

musculoskeletal pain: a state of the art. *Pain, 85*(3), 317-332.

Vowles, K. E., & McCracken, L. M. (2008). Acceptance and values-based action in chronic pain:

A study of treatment effectiveness and process. *Journal of Consulting and Clinical

Psychology, 76*(3), 397-407.

Weathers, F. W., Litz, B. T., Herman, D. S., Huska, J. A., & Keane, T. M. (1993). *The PTSD

Checklist (PCL): reliability, validity, and diagnostic utility.* Paper presented at the Annual

Meeting of the International Society for Traumatic Stress Studies, San Antonio, TX.

Weaver, F. M., Smith, B., LaVela, S. L., Evans, C. T., Ulrich, P., Miskevics, S., . . . Burns, S. P.

(2011). Smoking behavior and delivery of evidence-based care for veterans with spinal

cord injuries and disorders. *Journal of Spinal Cord Medicine, 34*(1), 35-45.

Weingarten, T. N., Iverson, B. C., Shi, Y., Schroeder, D. R., Warner, D. O., & Reid, K. I. (2009).

Impact of tobacco use on the symptoms of painful temporomandibular joint disorders.

Pain, 147(1-3), 67-71. doi: 10.1016/j.pain.2009.08.021

Weingarten, T. N., Moeschler, S. N., Ptaszynski, A. E., Hooten, W. M., Beebe, T. J., & Warner,

D. O. (2008). An assessment of the association between smoking status, pain intensity,

and functional interference in patients with chronic pain. *Pain Physician, 11*(5), 643-653.

doi: 10.1016/j.pain.2009.08.021

Wetherell, J. L., Afari, N., Rutledge, T., Sorrell, J. T., Stoddard, J. A., Petkus, A. J., . . .

Atkinson, J. H. (2011). A randomized controlled trial of acceptance and commitment

therapy and cognitive-behavioral therapy for chronic pain. *Pain, 152*(9), 2098-2107.

White, H. R., Mun, E. Y., Pugh, L., & Morgan, T. J. (2007). Long-term effects of brief substance

use interventions for mandated college students: Sleeper effects of an in-person personal

feedback Intervention. *Alcoholism: Clinical and Experimental Research, 31*(8), 1380-1391. doi: 10.1111/j.1530-0277.2007.00435.x

Wicksell, R. K., Ahlqvist, J., Bring, A., Merlin, L., & Olsson, G. L. (2008). Can exposure and acceptance strategies improve functiioning and life satisfaction in people with chronic pain and whiplash-associated disorders (WAD)? A randomized controlled trial. *Cognitive Behaviour Therapy, 37*(3), 169-182.

Williams, E. C., Peytremann-Bridevaux, I., Fan, V. S., Bryson, C. L., Blough, D. K., Kivlahan, D. R., & Bradley, K. A. (2010). The association between alcohol screening scores and health status in male Veterans. *Journal of Addiction Medicine, 4*(1), 27-37.

Wilson, D., Parsons, J., & Wakefield, M. (1999). The healh-related quality-of-life of never smokers, ex-smokers, and light, moderate, and heavy smokers. *Preventive Medicine, 29*, 139-144.

Windle, M., & Windle, R. C. (2001). Depressive symptoms and cigarette smoking among adolescents: Prospective associations and intrapersonal and interpersonal influences. . *Journal of Consulting and Clinical Psychology, 69*(2), 215-226.

Wittkampf, K., van Ravesteijn, H., Baas, K., van de Hoogen, H., Schene, A., Bindels, P., . . . van Weert, H. (2009). The accuracy of Patient Health Questionnaire-9 in detecting depression and measuring depression severity in high-risk groups in primary care. *General Hospital Psychiatry, 5*, 451-459. doi: 10.1016/j.genhosppsych.2009.06.001

Zale, E. L., & Ditre, J. W. (2013). Associations between chronic pain status, attempts to quit smoking, and use of pharmacotherapy for smoking cessation. *Psychology of Addictive Behaviors, 28*(1), 294-299. doi: 10.1037/a0032515

Zale, E. L., Ditre, J. W., Dorfman, M. L., Heckman, B. W., & Brandon, T. H. (2014). Smokers in

pain report lower confidence and greater difficulty quitting. *Nicotine & Tobacco*

Research, Advance Access.

Zale, E. L., Lange, K. L., Fields, S. A., & Ditre, J. W. (2013). The relation between pain-related

fear and disability: A meta-analysis. *The Journal of Pain, 14*(10), 1019-1030.

Ziedonis, D. M., Hitsman, B., Beckham, J. C., Zvolensky, M. J., Adler, L. E., Audrain-

McGovern, J. A., . . . Riley, W. T. (2008). Tobacco use and cessation in psychiatric

disorders: National Institute of Mental Health report. *Nicotine & Tobacco Research,*

10(12), 1691-1715.

Ziedonis, D. M., Williams, J. M., Steinberg, M. L., Smelson, D., Krejci, J., Sussner, B. D., . . .

Foulds, J. (2005). Addressing tobacco dependence among individuals with a psychiatric

disorder: A neglected epidemic of major clinical and public health concerns In S. L.

Isaacs (Ed.), *VA in the vanguard: Building on success ins moking cessation* (pp. 141-

170). Washingdon, DC: Department of Veterans Affairs.

Zvolensky, M. J., McMillan, K., Gonzalez, A., & Asmundson, G. J. G. (2009). Chronic pain and

cigarette smoking and nicotine dependence among a representative sample of adults.

Nicotine & Tobacco Research, 11(12), 1407-1414.

Zvolensky, M. J., Schmidt, N. B., & McCreary, B. T. (2003). The impact of smoking on panic

disorder: an initital investigation of a pathoplastic relationship. *Journal of Anxiety*

Disorders, 17(4), 447-460.

Appendices

Appendix 1: Gifford et al (2004) ACT Intervention Components

Appendix 2: Hernandez-Lopez et al (2009) ACT Intervention Components

Appendix 3: Bricker et al (2009) ACT-Telephone Session Outline

Appendix 4: Flyers

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Appendix 1[1]

Gifford et al. (2004) Intervention Components (pp. 695-696)

"1. Internal versus external triggers. Therapists helped clients identify their internal triggers, i.e., thoughts, feelings, and physiological sensations associated with smoking. Therapists described the role internal triggers play in smoking and their relevance to the quitting process. *2. Problems with control efforts.* Therapists helped clients identify that efforts to control or avoid internal experience are linked to smoking and to problems with quitting. Experiences from participants' smoking histories and history of smoking attempts were considered (e.g., drawing out the success or failure of previous cessation strategies). This section of the ACT protocol was designed to help clients identify control-based strategies and enhance motivation to try acceptance-based strategies instead. *3. Values, goals, and barriers.* Therapists helped clients clarify their values, define goals related to their values, and identify barriers to achieving their goals. Goals were defined as specific behavioral tasks related to quitting smoking. Barriers were defined as thoughts/feelings/sensations that derail efforts to perform these tasks. Clients were asked to identify the internal experiences most likely to function as barriers (i.e., the thoughts, feelings and sensations most likely to trigger smoking or attrition from treatment). *4. Acceptance and willingness*. Therapists provided the rationale for approaching/accepting previously avoided internal stimuli, and for the skills training format. Through exercises and metaphors, clients identified that there is not an intrinsic link between feelings and actions and that the presence of aversive internal experiences in and of themselves does not constitute a threat. (Clients had multiple programmed opportunities to experience feelings and thoughts fully without acting on them.) The purpose of this component was to reduce motivation for avoidant behavior and to increase tolerance for discomfort. *5. Mindfulness skills*. Clients participated in experiential exercises designed to develop a safe and consistent perspective from which to observe and accept all changing inner experiences. Mindfulness techniques were incorporated during this phase in order to enhance awareness of problematic stimuli and also to expand awareness of alternative features of their experience and environment in order to promote cognitive and behavioral flexibility. *6. Graduated exposure.* Therapists helped clients establish individualized exposure hierarchies. During these exposure sessions clients experienced increasing levels of withdrawal symptoms and aversive internal states. Therapists provided support and reinforced participants' contact with their previously avoided inner experiences. The goal of this treatment component was to alter the avoidant and smoking-related stimulus functions of internal stimuli through extinction and to add stimulus functions linked to alternative responses. *7. Scheduled smoking.* If requested by participants as part of their graduated exposure hierarchies, therapists provided smoking schedules according to algorithms based on current client smoking and hours of wakefulness. Scheduled smoking increases the latency between the

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[1] The intervention components by Gifford et al. (2004) (pp. 695-696) described here are reproduced verbatim from the source: Gifford, E. V., Kohlenberg, B. S., Hayes, S. C., Antonuccio, D. O., Piasecki, M. M., Rasmussen-Hall, M. L., & Palm, K. M. (2004). Acceptance-based treatment for smoking cessaion. *Behavior Therapy, 35*(4), 689-705.

stimuli associated with smoking and the occurrence of smoking responses. These structured periods of delayed responding provided windows in which to practice identifying and responding differently to withdrawal symptoms/internal triggers outside of the treatment session.

8. Cognitive defusion skills. Clients participated in a series of exercises designed to identify and defuse cognitive triggers, with particular emphasis on rationalizations for smoking. For example, clients were taught to see thoughts as what they are (more or less helpful descriptors, depending on the specific cognition), and not as what they say they are (infallibly accurate reflections of reality). The goal of this component was to help clients alter the functions of cognitions that limit achievement of their behavioral goals.

9. Behavioral activation and commitment. Clients practiced a range of adaptive responses in the presence of negative affect and other internal triggers. The goal was to shape flexibility by developing repertoires that provide realistic behavioral alternatives to smoking and other internal triggers. The goal was to shape flexibility by developing repertoires that provide realistic behavioral alternatives to smoking."

Appendix 2[2]

Hernandez-Lopez, Luciano, Bricker, Roales-Nieto, & Montesinos (2009) ACT Intervention (pp. 725-726).

"Several metaphors, paradoxes, examples, and experiential exercises, most of them drawn from Hayes et al. (1999) and from Wilson & Luciano (2002), were used with the aim of clarifying the value of quitting and of promoting the willingness and acceptance of thoughts, emotions, and sensations related to quitting.

(a) Analyzing the personal cost of smoking as an attempt to control private events. The first step was to make participants aware of the personal cost of smoking. For most of them smoking was a control strategy that in the short run served to reduce anxiety, urges, or distress, although it was ineffective long-term. The therapist illustrated how trying to control thoughts, emotions, and sensations might not only be futile, but more importantly, have negative effects on certain valued life domains (e.g., health, family).

(b) Values clarification and commitment with personal choices. The therapist helped participants clarify their values and examine how quitting fits into a more meaningful life. They were taught to identify and undertake specific actions oriented to quit (e.g., choosing how to quit, either gradually reducing their cigarette consumption in one third each week, or "cold turkey," by setting a date for quit) and to detect psychological barriers (e.g., fear of withdrawal) to these actions. They were encouraged to commit to taking valued actions.

(c) Defusion and willingness to experience and accept private aversive events. Participants were trained to detect which internal and external triggers led them to smoking, and to differentiate among those they could change (e.g., throwing away ashtrays) and those they could not (e.g., being sad) or did not want to change because of the personal cost it would imply (e.g., by refusing to meet with friends who smoke you'll probably have less urges, but you will lose their companionship). The goal was to break the link between triggers and smoking behavior. They were taught to see thoughts as thoughts, not as the cause of smoking. They also learned to see themselves as the context in which urges and withdrawal symptoms occur, and were encouraged to actively expose themselves to their private aversive events.

(d) Relapse as part of the process of quitting. No explicit difference was made between lapse and relapse. Participants were trained to "notice when they were detouring from the direction they wanted to follow," and then to "get back to that direction" regardless of the intensity of lapse (i.e., whether they had smoked a puff, a cigarette, or resumed smoking for some time)."

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[2] The intervention components by Hernandez-Lopez, Luciano, Bricker, Roales-Nieto, & Montesinos (2009) (pp. 725-726) described above are reproduced verbatim from the source: Hernandez-Lopez, M., Bricker, J. B., Roales-Nieto, J. G., & Montesinos, F. (2009). Acceptance and commitment therapy for smoking cessation: A preliminary study of its effectiveness in comparison with cognitive behavioral therapy. *Psychology of Addictive Behaviors, 23*(4), 723-730.

Appendix 3[3]

Bricker et al.'s (2010) ACT-Telephone Session Outline.

SESSION 1: Core ACT processes of values and acceptance

SESSION 2: ACT processes of being present and committed action

SESSION 3: ACT processes of cognitive defusion and committed action

SESSION 4: ACT processes of self-as-context and committed action

SESSION 5: Material review and finalize a committed action plan for quitting

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[3] Schimmel-Bristow, A., Bricker, J. B., & Comstock, B. (2012). Can acceptance & commitment therapy be delivered with fidelity as a brief telephone-intervention? *Addictive Behaviors, 37*(4), 517-520. doi: 10.1016/j.addbeh.2011.11.015

Appendix 4

PROVIDENCE
Medical Group
Montana Spine & Pain Center

Want to Quit Smoking?

- Participate in a smoking cessation study and learn useful skills to help you quit!
- Receive up to $25.00 plus a chance to win a $150.00 gift card for study participation

- Are you a patient at the Montana Spine and Pain Center?
- Are you considering quitting smoking?
- If so, call for a screening in-person appointment
- If you qualify for the study, you will complete 5 weekly telephone sessions, and 3 follow-up questionnaires within an 8-month period.

Inclusion criteria:
1. Screen positive for chronic pain (e.g., have experienced pain lasting 6 months or longer).
2. Have smoked at least 100 cigarettes in your lifetime and currently smoke cigarettes.
3. Express a desire to quit smoking.
4. Have access to a telephone and agree to being contacted via telephone for 5 treatment sessions and 3 follow-up sessions.
4. Be able to provide the telephone numbers of two contacts

Exclusion criteria:
1. No access to a telephone, active psychosis, current suicidality and/or suicide attempts in the past 2 years, severe alcohol use

If you qualify for the study, we will help you start services with the Montana Tobacco Quit Line; these services will assist you with smoking cessation. In addition, you may be assigned to a new treatment for smoking cessation that includes 5 weekly telephone sessions. All study participants will complete 3 follow-up questionnaires within an 8-month period.

For more information call 406-274-5199 OR email:
quitsmokingpainstudy@gmail.com

Appendix 5

Acceptance and Commitment Manual for Smoking Cessation

Questions or comments may be addressed to: Anayansi Lombardero, MA, The University of Montana, Skaggs Building 362, Missoula, MT 59812.

Appendix 6

1

Smoking Cessation Workbook

Questions or comments may be addressed to: Anayansi Lombardero, MA, The
University of Montana, Skaggs Building 362, Missoula, MT 59812.

Appendix 7

Baseline Measures 1

DEMOGRAPHIC ITEMS

1. Gender: _____
   (Male, Female, Transgender, etc.)

2. Age: _____

3. What best describes your ethnic background?

   a. Hispanic / Latino
      ☐ $_0$ No
      ☐ $_1$ Yes

   b. Additionally, do you identify as:
      ☐ $_1$ African-American / Black
      ☐ $_2$ Asian
      ☐ $_3$ Pacific Islander/Native Hawaiian
      ☐ $_4$ Caucasian/White
      ☐ $_5$ American Indian/Alaska Native
      ☐ $_6$ More than one ethnic group
      ☐ $_7$ Other:_____
      ☐ $_8$ Not known

4. Education (check highest level completed)
   ☐ $_1$ No formal education
   ☐ $_2$ Some grade school: (yrs completed: ____)
   ☐ $_3$ Completed grade school
   ☐ $_4$ Some high school: (yrs completed: ____)
   ☐ $_5$ Completed high school/GED
   ☐ $_6$ Some college: (yrs completed: ____)
   ☐ $_7$ Completed college BA/BS degree

5. What is your relationship status
   _____

6. How far do you live from this treatment center?
   ☐ $_0$ Within 5 miles
   ☐ $_1$ 5-20 miles
   ☐ $_2$ 20-40 miles
   ☐ $_1$ 40-60 miles
   ☐ $_1$ More than 60 miles (please indicate how mar

7. What is your employment status?
   ☐ $_0$ Unemployed
   ☐ $_1$ Retired
   ☐ $_2$ Employed Full Time
   ☐ $_3$ Employed Part-Time
   ☐ $_4$ Receiving disability benefits
   ☐ ^{5} Homemaker
   ☐ ^{6} Student

8. Are you seriously considering quitting smoking within the next 6 months?
   ☐ $_0$ No
   ☐ $_1$ Yes

9. Are you planning to quit in the next 30 days?
   ☐ $_0$ No
   ☐ $_1$ Yes

10. The last time you stopped smoking, how long did you remain smoke free?
    ____ days ____ months ____ years

11. What is the longest time you've ever stopped smoking? ___ days ____ months ____ years

12. Currently, how motivated are you to quit smoking?

    0----1----2----3----4----5----6----7----8----9----10
    Not at all   Very
    motivated   motivated

13. Currently, how confident do you feel in your ability to quit smoking?

    0----1----2----3----4----5----6----7----8----9----10
    Not at all   Very
    confident   confident

Appendix 8

1-Week Follow-Up

1. Do you still smoke cigarettes? _____
2. If not, how long ago did you quit smoking? _____
3. How many cigarettes a day do you smoke? _____
4. How many cigarettes have you smoked in the past 24 hours? _____
5. How many cigarettes have you smoked in the past 7 days? _____
6. How many cigarettes have you smoked in the past 30 days? _____
7. Did you use any medications or nicotine replacement therapy to help you quit?

_____
8. If so, what medication(s) did you use and when did you use it? _____
9. Currently, how motivated are you to quit smoking?

    0----1----2----3----4----5----6----7----8----9----10
    Not at all   **Very**
    motivated   **motivated**

10. Currently, how confident do you feel in your ability to quit smoking?

    0----1----2----3----4----5----6----7----8----9----10
    Not at all   **Very**
    confident   **confident**

Treatment Satisfaction:
The following questions pertain to how satisfied you are with the help you received from us in quitting smoking and how helpful it was to you?
Please rate on a scale from 0-5 (not at all – very much)

1. How satisfied are you with the treatment you received for quitting smoking?	0	1	2	3	4	5
2. Did the treatment help you quit?						
3. Did you feel respected by your counselor?						
4. Was the treatment a good fit for you?						

AAQ-II - Following is a list of statements. Rate how true each statement is for you by circling a number next to it. Use the scale below to make your choice.

1	2	3	4	5	6	7
Never true	Very rarely true	Seldom true	Sometimes true	Often true	Almost always true	Always true

1. It's okay if I remember something unpleasant.	1 2 3 4 5 6 7
2. My painful experiences and memories make it difficult for me to live a life that I would value.	1 2 3 4 5 6 7
3. I'm afraid of my feelings.	1 2 3 4 5 6 7
4. I worry about being unable to control my worries and feelings.	1 2 3 4 5 6 7
5. My painful memories prevent me from having a fulfilling life.	1 2 3 4 5 6 7
6. I am in control of my life.	1 2 3 4 5 6 7
7. Emotions cause problems in my life.	1 2 3 4 5 6 7
8. It seems as if most people are handling their lives better than I am.	1 2 3 4 5 6 7
9. Worries get in the way of my success.	1 2 3 4 5 6 7
10. My thoughts and feelings do not get in the way of how I want to live my life	1 2 3 4 5 6 7

Appendix 9

3 and 6 Months Follow-Ups   1

1. Do you still smoke cigarettes? _____
2. If not, how long ago did you quit smoking? _____
3. How many cigarettes a day do you smoke? _____
4. How many cigarettes have you smoked in the past 24 hours? _____
5. How many cigarettes have you smoked in the past 7 days? _____
6. How many cigarettes have you smoked in the past 30 days? _____
7. Did you use any medications or nicotine replacement therapy to help you quit? _____
8. If so, what medication(s) did you use AND WHEN did you use it? _____
9. Currently, how motivated are you to quit smoking?

   0----1----2----3----4----5----6----7----8----9----10

   Not at all   **Very**

   motivated   **motivated**

10. Currently, how confident do you feel in your ability to quit smoking?

   0----1----2----3----4----5----6----7----8----9----10

   Not at all   **Very**

   confident   **confident**

AAQ-II - Following is a list of statements. Rate how true each statement is for you by circling a number next to it. Use the scale below to make your choice.

1	2	3	4	5	6	7
Never true	Very rarely true	Seldom true	Sometimes true	Often true	Almost always true	Always true

1. It's okay if I remember something unpleasant.	1 2 3 4 5 6 7
2. My painful experiences and memories make it difficult for me to live a life that I would value.	1 2 3 4 5 6 7
3. I'm afraid of my feelings.	1 2 3 4 5 6 7
4. I worry about being unable to control my worries and feelings.	1 2 3 4 5 6 7
5. My painful memories prevent me from having a fulfilling life.	1 2 3 4 5 6 7
6. I am in control of my life.	1 2 3 4 5 6 7
7. Emotions cause problems in my life.	1 2 3 4 5 6 7
8. It seems as if most people are handling their lives better than I am.	1 2 3 4 5 6 7
9. Worries get in the way of my success.	1 2 3 4 5 6 7
10. My thoughts and feelings do not get in the way of how I want to live my life.	1 2 3 4 5 6 7

Appendix 10

Screening Interview

Introduce yourself and your credentials, thank the participant for meeting with you, and briefly explain the purpose and procedures of the study. Remind them that as part of the screening interview, you will be asking questions regarding their physical and mental health, and that even though some of the questions may or may not apply to them, we have to ask everyone these questions. Ask the participants if she/he has any questions. If not, proceed to ask the following questions:

1. Are you ready to quit smoking? Y/N
   a. If yes, congratulate them on their decision to do so.
   b. If not, they do not qualify for the study.

2. Have you experienced pain lasting 6 months or longer? Y/N

3. Have you smoked over 100 cigarettes in your lifetime? Y/N
   a. *Note: 100 cigarettes = 5 packs of cigarettes*

4. Do you have access to a telephone and do you agree to be contacted by telephone for 5 counseling sessions and 3-follow-up questions? Y/N

5. Have you ever been diagnosed with a mental health problem? Y/N

6. If yes, what was the problem/diagnosis? _____

7. Do you currently have this problem/diagnosis?_____

8. How would you describe your current mood?_____

9. Has your mood ever been so low that you have considered killing yourself or hurting yourself in any way? Y/N

10. If yes, when was the last time, and what happened? Assess for frequency, severity and recency of past attempts (if within the past 2 years, screen out).
    _____
    _____
    _____

11. Do you ever hear voices or see things that other people don't? Y/N

12. If yes, assess further. If participant is experiencing current, active psychosis, she/he does not qualify for the study.

13. Use the AUDIT-C to screen for a severe alcohol use disorder (Score ≥ 8)

Appendix 11

Appendix 11

Suicide Assessment and Procedures

At St. Patrick Hospital:

The trained researcher, a master's level clinician, will conduct a thorough suicide assessment if the participant expresses suicidality during the screening interview. The researcher will consult with her supervisor, Patrick Davis, Ph.D. a licensed psychologist on staff who will be on the site. If Dr. Davis is not available, the researcher will consult with Jeff Schroeder, Ph.D. or with Bill Patanaude, Ph.D.

Based on procedures followed at The Montana Spine and Pain Center at St. Patrick Hospital, the suicide protocol to follow is the following: if the person says she/he is suicidal, she/he is asked for verbal confirmation that she/he will not hurt or kill herself/himself. If the person is not able to do so and she/he is actively suicidal, then she/he is walked to the emergency room downstairs. Lastly, if the person is not willing to be walked down to the emergency room, then the staff will call 911 to have an officer walk her/him to the emergency room.

At Community:

If a patient indicates suicidal ideation, a suicidal risk assessment will be performed including, but not limited to assessment of frequency, intensity, and content of the suicidal thoughts; intention to act on the suicidal thoughts; plan for how to carry out the suicidal thoughts and availability of means; history of prior suicidal ideation, self-harm, and/or suicide attempts; degree of hopelessness; substance use/abuse; ability to willingness to engage in a contract for safety and/or safety plan.

A safety plan and/or contract for safety will be established, including but not limited to engaging a family or friend in a plan for safety, knowledge of crisis numbers, and increased phone or session contact with the provider.

For patients at imminent risk of suicide, the patient will be walked over to the Community Medical Center Emergency Department by the provider or a family or friend. If the patient refuses to go the ED and imminent risk is determined, then the provider will call 911.

Telephone intervention and follow-ups
Persons reporting suicidal ideation or intent or with a history of suicidality (within the last 2 years) will be screened out of the study. This will be done in order to minimize the possibility of contacting suicidal individuals over the telephone. In addition, participants will not be asked questions regarding suicidal ideation during any of the phone sessions or follow-up assessments.

Although unlikely, if a participant reports suicidal ideation over the telephone, then the researcher will conduct a suicide assessment over the telephone. If the