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A Motivational Interviewing Intervention to Increase Utilization of Smoking Cessation Services among Veterans Undergoing Substance Use Treatment

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A Motivational Interviewing Intervention to Increase Utilization of Smoking Cessation Services

among Veterans Undergoing Substance Use Treatment

by

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A dissertation submitted in partial fulfillment of
the requirements for the degree of
Doctor in Philosophy
with a concentration in Clinical Psychology
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Dedication

I want to dedicate this dissertation to my friends and family for their continuous encouragement and unconditional support.

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Abstract

Smoking remains the single most preventable cause of death worldwide and primary cause of several types of cancer, cardiovascular disease, and respiratory illness (USDHHS, 2014). Although the prevalence of smoking among the general population continues to decline, the prevalence of smoking among the veteran population remains high. In addition, the prevalence of smoking among veterans with substance and alcohol use disorders is 2 to 3 times higher than in the general population. Over the years, the VA has implemented empirically-based treatments for smoking cessation to address the cigarette smoking epidemic. These services, however, are greatly underutilized. Motivational interviewing (MI) has traditionally been used to treat alcohol dependence; however, its efficacy for smoking cessation has been mixed. There is some evidence, however, suggesting that MI could be used to motivate smokers to seek treatment. The purpose of this study was to use a brief MI intervention to motivate veteran smokers undergoing treatment for substance use to seek smoking cessation services at the VA. We recruited 60 veterans undergoing substance and alcohol use treatment at the Substance Use Disorders/Intensive Outpatient Program (SUDs/IOP) at the James A. Haley VA. Participants were randomized to one of two groups: MI vs. active control. We hypothesized that veterans in the MI condition would be more likely to seek services for smoking cessation compared to those in the control condition. Our findings supported our hypothesis: 40% of participants in the MI condition sought treatment to quit smoking after the intervention compared to 23% of participants in the control condition ($p = .03$, controlling for baseline differences in cessation

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motivation). In addition, we found that the MI intervention was most beneficial for individuals with lower baseline motivation to quit smoking. Although we did not find significant mediators of the effect of the intervention on our primary outcome, this study showed that a brief MI intervention can promote seeking of smoking cessation resources.

Introduction

Smoking remains the single most preventable cause of death worldwide, causing approximately 480,000 deaths per year in the U.S. alone, and costing approximately $289 billion in annual health-related economic losses (USDHHS, 2014). In addition, cigarette smoking is the cause of several types of cancer, cardiovascular disease, and respiratory illness (USDHHS, 2014). As of 2015, the prevalence of smoking in the U.S. was 15.1% for all adults, with males (16.7%) smoking more than women (13.6%) (Jamal, King, Neff, Whitmill, Babb et al., 2016). Although the prevalence of smoking among the general population continues to decline, the prevalence of smoking among the veteran population remains high.

Tobacco Use in Veteran Population

Cigarette smoking has been historically prevalent among the military. A culture supporting cigarette smoking in the military dates back to as early as the Civil War, when inexpensive tobacco was provided to troops (Klevens, Giovino, Peddicord, Nelson, Mowery, & Grummer-Strawn, 1995). Later, cigarettes were sent in care packages to soldiers during WWI, WWII, and the Korean War (Joseph, 1994). In addition, the "smoking break" was used as a reward or punishment by drill instructors until the late 1980s (Cronan & Conway, 1989; Conway, 1998), and until recently, cigarettes were widely available inside bases at a discounted price. A pro-cigarette smoking culture in the military may partially explain why never smokers begin smoking during service (Hamlett-Berry, Davison, Kivlahan, Matthews, Hendrickson, &

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Almenoff, 2009). In fact, being in the military is a risk factor for smoking onset (Klevens et al., 1995).

The prevalence of smoking among the veteran population has been reported to be as high as 40% (e.g., Brown, 2009; Institute of Medicine, 2009; McKinney, McIntire, Carmody, & Joseph, 1997; Veterans Health Administration, 2011). Veterans receiving care at Veteran Health Administration (VA) hospitals are more likely to smoke compared to veterans who are not part of the system. This difference may be explained by the high prevalence of psychiatric illness and substance use, and lower socioeconomic status among veterans receiving services at VA hospitals (e.g., McKinney et al., 1997; Veterans Health Administration, 2011). Furthermore, compared to non-smoking veterans, veteran smokers are more likely to be non-Hispanic, black, unemployed, uninsured, and have a combat history (Veterans Health Administration, 2011). Clearly, veteran smokers are a special population susceptible to nicotine addiction and difficulty quitting smoking. Thus, smoking cessation efforts targeted toward this population are warranted.

Mental Illness, Substance Use, and Cigarette Smoking in the Veteran Population

Individuals with mental illness are two to three times more likely to smoke (Ziedonis, Williams, Steinberg, Smelson, Krejci, Sussner, & Founds, 2004; Grant, Hasin, Chou, Stinson, & Dawson, 2004), with those in mental health treatment reporting the highest nicotine dependence (American Psychiatric Association, 2006). In fact, almost half of the cigarettes in the U.S. are consumed by individuals with mental illness (Lasser, Boyd, Woolhandler, Himmelstein, McCormick, & Bor, 2000). There are possible biological, psychological, social, and environmental factors that may lead individuals with mental illness and substance use to smoke heavily (Ziedonis et al., 2004). Some researchers hypothesize that there is a common psychological (negative affect) or genetic predisposition underlying mental illness and tobacco

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dependence (McCaffery, Niaura, Swan, & Carmelli, 2003; Dierker, Avenevoli, Merikangas, Flaherty, & Stolar, 2001; Ziedonis et al., 2004). Other researchers suggest that individuals with mental illness smoke to reduce symptoms of depression, anxiety, boredom, or to improve memory and attention (Morton & Pradhan, 2001, Ziedonis et al., 2004), thus supporting the self-medication hypothesis (Cargill, Emmons, Kahler, & Brown, 2001). Social factors, such as low education and unemployment, which are common among the mentally ill, have been shown to be risk factors for smoking (Lawn, Pols, & Barber, 2002; Ziedonis et al., 2004).

The VA is the largest provider of mental health treatment in the U.S. (Greenberg & Rosenheck, 2004). Twenty-five to forty percent of veterans are treated for mental illness by the VA, and considerably more have untreated mental health problems (Ziedonis et al., 2004). Veterans with mental illness are two to three times more likely to be heavy smokers compared to the general population (Duffy, Kilbourne, Austin, Dalack, Woltmann, Waxmonsky, & Noonan 2012); those with substance use disorders having the highest prevalence of smoking, even compared to veterans with schizophrenia, depression, and bipolar disorder (Veterans Health Administration, 2006; Institute of Medicine, 2009; Duffy et al., 2012). The high rate of smoking among veterans with mental illness could be explained by the stress experienced during service and the smoking-supporting culture discussed above. Veterans with psychiatric illness and substance use disorders have a higher likelihood of dying from tobacco related illnesses, such as cardiovascular and respiratory illnesses, cancer, and stroke, compared to the general population (e.g., Brown, Barraclough, & Inskip, 2000; Hurt, Offord, Croghan, Gomez-Dahl, Kottke et al., 1996). Research indicates that, despite the high prevalence of smoking and difficulty quitting (Institute of Medicine, 2009), smokers with mental illness appear interested in quitting and

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engage in quit attempts (e.g., Duffy, Essenmacher, Karvonen-Gutierrez, & Ewing, 2010; Lasser et al., 2000).

Smoking Cessation among Veterans

Given the economic and health burden caused by tobacco smoking, since the late 1980s, the Department of Defense (DoD) and VA have put in place policies and services to restrict smoking and help veterans quit. Some of these policies include the restriction of use of tobacco products during basic training and restriction of some indoor smoking (McKinney et al., 1997). The VA effort to reduce tobacco smoking started with the implementation of a smoke-free policy inside VA hospitals and an order to stop selling tobacco products in stores inside the VA (McKinney et al., 1997). In addition, each VA hospital designates a coordinator to enforce smoke-free policies and distribute information about smoking. The majority of VA hospitals offer empirically-supported smoking cessation treatment (individual and group), telephone counseling, and nicotine replacement therapy at no charge to patients (Hamlett-Berry et al., 2009; McKinney et al., 1997). Despite these efforts, smoking cessation services remain underutilized (Hamlett-Berry et al., 2009; Volpp, Levy, Asch, Berlin, Murphy et al., 2006). Some research suggests that even though 96% of VA hospitals offer smoking cessation services, the use of them is as low as 20% by veteran smokers (Hamlett-Berry et al., 2009).

Some evidence indicates that approximately 70% of veterans report interest in quitting smoking (Miller,1999). Veterans with medical conditions – including tobacco related illnesses – are more motivated to quit compared to veterans without these conditions (Duffy, Biotti, Karvonen-Gutierrez, & Essenmacher, 2011). Although counter-intuitive, some research found that veterans with mental illness, especially those undergoing substance use treatment, were more motivated to quit than veterans without mental disorders (Duffy et al., 2011).

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Unfortunately, motivation to quit smoking does not necessarily translate to behavior, as suggested by the low usage of smoking cessation services among this population (Duffy et al., 2011).

There are several possible explanations for the lack of translation between motivation and treatment-seeking behavior. Formal treatment programs may be inconvenient in outpatient settings due to scheduling conflicts, lack of transportation, and other barriers (Bastian et al., 2010). Also, research suggest that most smokers want to quit on their own (e.g., Emmons & Goldstein, 1992; Duffy et al., 2011), possibly explaining why smokers do not get smoking cessation treatment, such as individual or group therapy. The inconsistency between motivation to quit smoking and the low use of smoking cessation treatment may indicate a need to better inform smokers, especially veterans, of all the resources available to them to quit smoking, from one-to-one treatment sessions to self-help material, provided at and outside of the VA.

There may be other important barriers at work besides the ones presented previously that prevent veterans from seeking formal smoking cessation treatment, especially in the context of mental illness and substance use treatment. Patients and staff members often believe that smoking cessation can complicate substance use treatment, worsen psychiatric symptoms, and lead to relapse (Duffy et al., 2012). In addition, some believe that individuals with mental illness are not motivated to quit smoking (Acton, Prochaska, Kaplan, Small, & Hall, 2001; Ziedonis & Williams, 2003). There is evidence, however, that indicates that individuals with mental illness are very interested in quitting (e.g., Duffy et al., 2010; Lasser et al., 2000). Other research has shown that concurrent treatment for nicotine and drug addiction yields positive results (Fiore Jaen, Baker, Bailey, Bennett, Benowitz, & Dorfman, 2008; Shealy & Winn, 2014). In fact, data from one Florida VA hospital that has incorporated mandatory nicotine education in their

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substance use recovery program showed that participation in nicotine recovery groups was related to increased motivation to quit smoking and decreased medical problems (Shealy, DeBaldo, Kropp, Gary, Egan-Blackwood, & Francis, 2001; Shealy & Winn, 2014). In addition, in that study, participation in nicotine recovery groups did not interfere with substance use recovery among individuals with substance use disorders, regardless of comorbid psychiatric diagnosis. Overall, research suggests that veteran smokers with mental illness seem to be motivated to quit smoking. This seems contradictory, as the use of smoking cessation services is low. This possibly indicates that veteran smokers with mental illness may want to quit smoking, but are not motivated to attend treatment. Interventions, such as Motivational Interviewing, could increase veteran smokers' motivation to seek smoking cessation treatment.

Motivational Interviewing for Smoking Cessation

Motivational Interviewing (MI) was originally developed by Miller and Rollnick in 1991 to treat alcohol abuse. Since then, MI has been successfully applied to a multitude of problematic behaviors such as diet, exercise, drug abuse, weight loss, treatment compliance, and diabetes. (Burke, Arkowitz, & Menchola, 2003, Knight, McGowan, Dickens, & Bundy, 2006; Rubak, Sandbæk, Lauritzen, & Christensen, 2005). MI was developed under the premise that motivation is fluid across time and contexts; therefore, it can change. (Miller, 1994). MI takes a client-centered and goal directed approach to foster behavior change (Miller & Rollnick, 2002).

The purpose of MI is to help clients explore and resolve discrepancies related to their behavior. The therapist guides the client or patient in such a way that the client becomes more likely to take steps toward changing a specific behavior. MI aims to explore and confront ambivalence through four main principles: expressing empathy, developing discrepancy, rolling with resistance, and supporting self-efficacy (Miller & Rollnick, 2002; Rollnick, Miller, &

Butler, 2008). In addition, MI focuses on identifying the problem, increasing motivation to change, accepting ambivalence, collaborating with the client, and letting the client set the pace for change (Miller & Rollnick, 2002). There are an additional 8 strategies suggested by the developers of MI that help increase the likelihood of behavior change. These are providing advice, eliminating obstacles, offering alternative options, practicing empathy, providing feedback, affirming what clients say, clarifying goals, and offering help (Rollnick et al., 2008).

Research supports the efficacy of MI in treating a myriad of problematic behaviors (e.g., Foley, Duran, Morris, Lucero, Jiang, Baxter et al., 2005; Burke et al., 2003, Madson, Campbell, Barrett, Brondino, & Melchert, 2009; Hettema, Steele& Miller, 2005). However, the efficacy of MI for smoking cessation is not well established, mainly because of the smaller number of studies and the different methodologies used (Hettema et al., 2010; Lai et al., 2010; Piñeiro, Míguez Varela, & Becoña Iglesias, 2010). A recent meta-analysis, however, showed a moderate effect of MI for smoking cessation (Lai, Cahill, Qin, & Tang, 2010). The same meta-analysis showed that sessions longer than 20 minutes were more effective than shorter sessions, and that single sessions were just as effective as multiple sessions. In general, the majority of studies showing mixed results on the effect of MI on smoking cessation used abstinence as the outcome variables. The limited efficacy of MI could be explained by the fact that MI represents a style of treatment rather than a cessation treatment per se and could indicate that an MI style may not be sufficient to help individuals quit smoking. However, given that MI's purpose is to increase motivation to initiate behavior change, this style of treatment could move smokers into more intensive and efficacious treatments.

Studies examining treatment adherence and utilization of smoking cessation services as the primary outcomes show some promising results, especially those recruiting difficult-to-treat

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populations. For instance, a study aimed at motivating smokers with schizophrenia to seek treatment for smoking cessation found that MI increased treatment-seeking behavior compared to psychoeducational and minimal-control conditions (Steinberg, Ziedonis, Krejci, & Brandon, 2004). Other studies have shown MI to lead to higher follow-up session attendance among smokers with psychosis and high impulsivity (Baker, Richmond, Haile, Lewin, Carr, et al., 2006; Helstrom, Hutchison, & Bryan, 2007), as well as a higher likelihood of following through with after care treatment among smokers with psychiatric and substance-use disorders (Daley & Zuckoff, 1998; Martino, Carroll, O'Malley, & Rounsaville, 2000; Swanson, Pantalon, & Cohen, 1999).

The mechanisms of change of MI are not yet fully understood. The research in this area is limited and mixed because the majority of studies focused on outcomes rather than process (Copeland, McNamara, Kelson, & Simpson, 2015). Some studies suggest that MI is more efficacious among those with high impulsivity (Helstrom et al., 2007) and lower motivation to change (Brown, Ramsey, Strong, Myers, Lejuez, et al., 2003; Miller & Rollnick, 2002; Rollnick et al., 2008). Whereas some research suggests that MI leads to smoking cessation through its effects on self-efficacy to quit smoking (Brown et al., 2003), others have failed to find similar results (Copeland et al., 2015). More research is needed to understand the mechanisms of change of MI.

The Current Study

As reviewed earlier, a large number of veterans are diagnosed with mental illness and/or substance use disorders. Also, the majority of these individuals are smokers. Over the years, the VA has implemented empirically-based treatments for smoking cessation. These services, however, are underutilized. Research examining the efficacy of MI on smoking cessation

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outcomes, such as abstinence rates, has shown mixed results. However, there is some promising evidence suggesting that MI could be used to motivate smokers to seek treatment. The purpose of this initial study was to test a MI intervention to motivate veteran smokers undergoing treatment for substance use to seek smoking cessation services.

Primary Aims

Specific Aim 1: To test the effect of a MI intervention on smoking cessation treatment-seeking behavior among veterans undergoing substance use treatment at a VA Medical Center.

       Hypothesis 1: Participants randomized to a motivational interviewing condition would be more likely to seek smoking cessation services offered at the VA (Nicotine Replacement Therapy [NRT], other cessation medication, individual treatment, or group treatment) as a result of the MI intervention compared to the control condition. The primary outcome of the study was treatment-seeking behavior rather than smoking cessation per se.

Secondary Aims

Aim 2: To examine moderators of the effect of MI on smoking cessation treatment-seeking behavior.

       Hypothesis 2: The effect of the MI intervention on smoking cessation treatment-seeking behavior would be moderated by baseline motivation, impulsivity, treatment expectancies, and baseline self-efficacy. We expected the treatment effect to be larger among participants with lower baseline motivation, higher impulsivity, low treatment expectancies (how helpful treatment can be and whether smoking cessation treatment could interfere with substance/alcohol use treatment), and lower self-efficacy for quitting smoking.

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Aim 3: To test mediators of the effect of MI on smoking cessation treatment-seeking behavior.

Hypothesis 3: The effect of the MI intervention on smoking cessation treatment-seeking behavior would be mediated by changes in motivation, self-efficacy, and treatment expectancies. Participants who report the highest changes in motivation, self-efficacy, and treatment expectancies as a result of the MI intervention should be more likely to seek smoking cessation treatment.

Method

Experimental Design

The study was conducted using a two-group between-subjects design. It was publicized as a single session research study designed to compare different ways of discussing smoking cessation with VA patients. All recruited participants signed consent. After they consented, participants were screened for eligibility criteria. Those who did not meet criteria discontinued the study at this point. Eligible participants completed baseline assessments measuring nicotine dependence, smoking history and status, demographic information, motivation to smoke, self-efficacy to quit smoking, impulsivity, and treatment expectancies. Once baseline measures were completed, participants were randomized to one of two groups: motivational interviewing or active control. After the intervention sessions, participants completed measures of motivation to quit smoking, self-efficacy to quit smoking, treatment expectancies, and treatment fidelity, and they were compensated for their time. A chart review was conducted by the experimenter to collect information about treatment-seeking behavior, psychiatric diagnosis, substance use disorder, and smoking-related illness. The study was approved by the local VA Research and Development office and University Institutional Review Board.

Participants

Participants were 61 (57 males) current veteran smokers recruited from the Substance Use Disorder's Clinic/Intensive Outpatient Program (SUDs/IOP) at the James A. Haley Veterans

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Hospital. SUDs/IOP is a program that offers outpatient comprehensive care to veterans with substance use disorders. A priori power analyses demonstrated that a sample size of 60 (30 participants per condition) would provide a power of .80 with a two-tailed alpha level of .05 to show a medium effect size for the primary aim, Specific Aim 1. The power analysis was computed based on results from similar prior research (Daley et al., 1998; Martin et al., 1999; Steinberg et al., 2006; Martin et al., 2000), which found approximately 30 percentage points difference between the two conditions. Anecdotal reports from the SUDs/IOP program indicated that spontaneous rate of smoking cessation treatment-seeking behavior was about 10%. We considered the results from these past studies and the baseline treatment-seeking behavior (10%) from patients at SUDs/IOP to calculate the sample size. Thus, we used .1 (control group) and .4 (MI group) as the estimated proportions.

To participate in the study, participants had to meet the following inclusion criteria: 1) veteran, 2) able to read and understand English, 3) 18 to 70 years of age, 4) ≥ 5 cigarettes smoked per day for the past year, 5) have an exhaled carbon monoxide (CO) of 5 ppm or greater, and 6) not currently enrolled in any formal smoking cessation treatment or support group. Participants received $25 for their approximately 1.5-hour participation in the study.

Measures

   Screening Form. Eligibility screening was conducted in person. A screening form was used during the initial contact with participants.

   Demographic Form. The demographic form was used to gather information regarding participants' gender, age, date of birth, education level, occupation, employment status, ethnicity, racial identity, and marital status.

Exhaled Carbon Monoxide. Carbon monoxide (CO) level was assessed at baseline to obtain a biochemical verification of smoking status. The cutoff for eligibility was 5 ppm or greater (e.g., Deveci, Deveci, Açik, & Ozan, 2004; Perkins, Karelitz, & Jao, 2013).

Smoking Status Form. The Smoking Status Form (SSF) assessed current smoking status and smoking history. The Fagerström Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerström, 1991) was included in the SSF as a measure of nicotine dependence.

Motivation. The Contemplation Ladder (Biener & Abrams, 1991) is a measure that assesses current motivation to quit smoking. This measure depicts a ladder that represents a continuum of readiness to quit smoking, ranging from 0 (No thought of quitting) to 10 (Taking action to quit). This measure has demonstrated good predictive validity, such that it predicts future quit attempts and likelihood to take action to quit (Biener & Abrams, 1991). Participants were also asked to rate their motivation to quit, on a 10-point rating scale, using a single item (How committed are you to quit smoking?). We also asked participants about their motivation to seek help to quit smoking using the same 10-point rating scale format.

Treatment Expectancies. Treatment expectancies were assessed with a 3-item measure assessing participants' beliefs about the benefits of smoking cessation treatment and whether they believe that smoking cessation treatment could interfere with their substance and alcohol use treatment. Participants were asked to answer each item on a 7-point Likert Scale. Baseline expectancies were explored as possible moderators of the effect of the MI intervention on treatment-seeking behavior

Self-efficacy. Self-efficacy to quit smoking was assessed using a single item asking participants to rate, on a scale from 1 (not at all) to 10 (very), how confident they were about their ability to quit smoking. We also asked about self-efficacy to seek help quitting smoking.

Barratt Impulsiveness Scale. The Barratt Impulsiveness Scale (BIS-11; Patton, Stanford, & Barratt, 1995) is a 34-item self-report measure of trait impulsivity. Participants were asked to rate, on a scale from 1 (Rarely/Never) to 4 (Almost Always/Always), how they act and think in different contexts. Impulsivity was explored as a possible moderator of the effect of the MI intervention on treatment-seeking behavior.

Motivational Interviewing Treatment Integrity Scale. The Motivational Interviewing Treatment Integrity scale (MITI; Moyers, Martin, Manuel, Hendrickson, & Miller, 2005) was used to measure treatment fidelity. A random sample of 10 audiotapes from each condition was selected. The therapist's supervisor, who was blind to condition, rated the therapist on a 7-point Liker scale, on empathy, MI spirit, giving information, MI adherent behaviors, reflections, and open questions. Higher scores indicated higher levels on the two constructs. A patient report of topics covered during the session was added as a secondary measure of fidelity.

Mental Illness. The experimenter collected information about psychiatric diagnosis, substance use disorder, psychiatric medication, and medical conditions through chart review. This information was recorded in the Psychiatric Diagnoses Record Form.

Treatment-Seeking Behavior. Treatment-seeking behavior was operationalized as action from the patient to request smoking cessation treatment (NRT, other medication, individual or group counseling) from psychiatrists, nurses, and psychologists at SUDS/IOP. Patients at the VA can request a prescription for nicotine replacement therapy at no cost. The VA also offers a manualized and empirically-based individual smoking cessation treatment based on

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Cognitive Behavioral Therapy. At the VA, all patient and provider contact is recorded in the patient's medical chart. The experimenter reviewed the patient's medical record at the end of their substance use treatment (2 to 5 weeks after the study intervention) to collect information about smoking cessation services requested by the participant. At the end of the intervention, participants were provided a handout describing the services available to them and how to get them. The contact information of the staff psychologist who provides smoking cessation counseling at the outpatient clinic was added in the handout. Participants were asked to contact her to schedule an appointment for smoking cessation counseling. She assisted with tracking of all individuals who request services for smoking cessation through her. All SUDs/IOP patients completed an exit interview upon completion of the outpatient substance use program. Questions about quit attempts and use of e-cigarettes to aid smoking cessation were added to the exit interview.

Procedures

Recruitment. Recruitment of participants occurred during a weekly tobacco recovery education class, which is required as part of the program to all enrollees, including nonsmokers. Enrollees attend this class while they participate in the program. The class is led by different providers, and the number of classes attended by each patient varies. In addition, patients may enroll in SUDS/IOP several times as they relapse, which means that they could repeat the nicotine recovery education class several times. During the nicotine recovery class, patients are informed about quit aids (what is available and what they are), and they discuss triggers to smoke, reasons to quit smoking, and barriers to quitting smoking. In addition, they are informed about the smoking cessation services offered at the clinic. This education class is conducted in a group, lecture format by different providers, and it does not follow any particular protocol or

schedule. The content of the class may include some aspects of cognitive behavioral therapy (discussing barriers to quit and triggers for smoking) and motivational interviewing (discussing reasons to quit smoking). This class posed several challenges to the study. First, the variability in class topics, providers, content, and attendance introduced error variance that could have made it more difficult to find significant differences between the conditions. Second, whereas the goal of the study was to motivate patients to seek smoking cessation treatment, this class could be conceptualized as a similar program that all participants already received to some degree. However, was largely ineffective as such, and it historically has not resulted in more than 10% of participants seeking additional smoking cessation assistance. Thus, there was sufficient room for improvement via the interventions tested in the present study.

The experimenter attended the weekly tobacco recovery education class to make veterans aware of the study. Interested participants were able to schedule an appointment with the experimenter at the end of the class.

Consent. Before screening for eligibility criteria and the experimental procedures, the experimenter explained the study's procedures and purposes to the participants. The experimenter went through a consent form with the participants, in which their rights as human research participants were described. Participants were asked to sign the informed consent and a HIPAA form upon agreeing to participate in the study.

Screening. Consented participants were screened for eligibility. The Screening Form was completed with participants. In addition, participants were asked to provide a breath sample to measure CO levels to verify smoking status. Participants who did not meet eligibility criteria discontinued the study at this point.

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Baseline Measures. Eligible participants were asked to complete baseline measures. These included the demographic form, smoking status form, Contemplation Ladder (baseline motivation), baseline self-efficacy to quit smoking, impulsivity, and treatment expectancies.

Randomization. After completion of the baseline questionnaires, participants were randomized (using www.randomizer.org) to one of two conditions: 1) motivational interviewing, or 2) health education control.

Intervention. After randomization, participants underwent an intervention (MI or health education control). The intervention occurred within the first 2 weeks of participant recruitment (the first or second week of substance use treatment). Participants underwent an MI or Health Education intervention that lasted approximately 40 minutes.

Post-intervention measures. After the intervention, participants were asked to complete measures that assessed motivation to quit smoking, self-efficacy, and treatment expectancies.

Follow-up. The experimenter collected information about treatment seeking behavior through chart review at the end of the substance use treatment.

Interventions

Training and treatment fidelity. The experimenter received training from experienced MI trainers, who are affiliated with The Motivational Interviewing Network of Trainers (MINT). The experimenter received 20 hours of training. Supervision was provided by an experienced clinician once per week and as needed throughout the recruitment process. As described earlier, the supervisor blindly completed the MITI using 10 audiotapes selected at random from each condition.

MI. The MI intervention was based on the concepts outlined by Miller and Rollnick (1991, 2002, 2008, 2009). MI is not an intervention or treatment modality per se; rather, MI can

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be described as a person-centered, therapeutic or collaborative conversation style that is intended to build up an individual's motivation and commitment to change (Miller & Rollnick, 2008, 2009). MI's primary goal is to address an individual's ambivalence about behavior change. MI intends to engage a person in a conversation about problematic behavior while expressing empathy, eliciting ambivalence, rolling with resistance, and increasing self-efficacy to change (Miller & Rollnick, 2002). The role of a therapist that uses MI is to assist individuals verbalize discrepancies between their behavior and goals and resolve them (Miller & Rollnick, 2002). The purpose of our sessions was consistent with the MI spirit, which includes expressing empathy, eliciting ambivalence, rolling with resistance, and increasing self-efficacy to quit smoking (Miller & Rollnick, 2002). The intervention lasted approximately 40 minutes and concluded with information about the smoking cessation resources that are available at the outpatient substance use clinic.

Health Education Control. Participants in the control condition completed baseline measures and underwent a smoking history interview. The Smoking Status Form was used to guide the interview. The interview consisted of asking participants questions about their experience with cigarette smoking, maintenance of smoking, quit attempts, and family history of cigarette smoking. In addition, the intervention included educational information about smoking-related illnesses. The experimenter presented information about prevalence and etiology of several diseases that are a direct consequence of smoking cigarettes, such as multiple cancers, cardiovascular disease, diabetes, respiratory illnesses, stroke, and hypertension. Participants were allowed to share and discuss concerns about smoking in ways that relate to their health. The intervention concluded with information about the smoking cessation resources that are available at the outpatient substance use clinic. Previous studies have shown this type of intervention to be

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credible and helpful to smokers undergoing treatment for smoking cessation (Webb, de Ybarra, Baker, Reis, & Carey, 2010). The health education control intervention lasted approximately 40 minutes, matching the MI intervention.

The length of the interventions (minutes) were recorded to assure that there were no significant differences in contact time between the two conditions. Participants in both conditions completed the same protocol (same measures in the same order) and only the content of the interventions differed.

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Demographics Characteristics

Figure 1 shows the study's recruitment progression from screening to completion of study session. Out of 68 consented participants, 61 met eligibility criteria and 7 failed screening. The 7 consented individuals who failed screening smoked fewer than 5 cigarettes per day and had a breath CO level below 5 ppm. The data from one consented and eligible participant were excluded from analyses due to a non-study related hospitalization one week after completing the study session; thus, outcome data were not available for this participant. Analyses were conducted with data from 60 eligible participants.

Baseline demographic characteristics and smoking-related variables for the two groups were compared using Chi-square for categorical variables and independent-t tests for continuous variables (see Table 1). Between-group baseline differences were found on ethnicity ($p = .02$), FTND ($p = .04$), and baseline motivation to quit smoking ($p = .08$). Regression analyses were conducted to test whether these variables predicted the outcome. Only baseline motivation to quit smoking predicted treatment seeking behavior post-intervention $\beta = .29$, $p = .02$; therefore, it was included in the primary analyses as a covariate.

Specific Aim 1

We predicted that individuals in the MI condition would be more likely to engage in smoking cessation treatment compared to those in the control condition. Overall, 31.67% ($n =$

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19) participants sought treatment after the intervention and 68.33 % (41) did not. In the MI condition, 40% (n = 12) of participants sought treatment for smoking cessation following the intervention, compared to 23.3% (n = 7) of participants in the control condition. A logistic regression was conducted to test the effect of the intervention on smoking cessation treatment-seeking behavior with and without baseline motivation to quit smoking entered in the model as a covariate. When entering condition alone in the logistic regression model, the results showed that condition was not predictive of the outcome, β = .78, Wald X^2 (1) = 1.89, p = .17, OR = 2.19, 95% CI [.72, 6.70]. However, after controlling for baseline motivation to quit smoking, condition significantly predicted the outcome, β = 1.47, Wald X^2 (1) = 4.54, p = .03, OR = 4.34, 95% CI [CI = 1.13, 16.72], such that individuals in the MI condition were more likely to seek treatment to quit smoking than individuals in the health education control condition.

Table 2 shows the type of treatment sought by participants by group. A chi-square test for independence, with Fisher's exact correction, was conducted to examine preference of treatment between the groups. There were no significant differences between conditions on type of treatment sought, X^2 (1, n = 30) = 3.74, p = .50. A chi-test goodness of test was conducted within each group to determine whether at least one type of treatment was preferred over the others. These tests were corrected using the Fisher's Exact method, given that some of the cells had fewer than five cases. The chi-square goodness of fit test for the MI group showed that at least one type of treatment was preferred over the others, X^2 (3, N = 30) = 8.00, p = .046. However, follow-up, pair-wise comparison tests showed that individuals in the MI condition showed a non-significant preference for NRT over medications, X^2 (1, N = 30) = 4.50, p = .07, or combination therapy, X^2 (1, N = 30) = 4.50, p = .07. A similar analysis was conducted to assess whether smokers in the control condition prefer at least one type of treatment over the others. The chi-

square goodness of fit test for the control condition indicated that there was no significant difference in the type of treatment in which smokers in the health education condition engaged, X^2 (2, N = 30) = .29, p = .10.

Secondary Aim 2

Motivation to Quit Smoking. We predicted that the effect of the intervention on smoking cessation treatment-seeking behavior would be moderated by baseline motivation to quit smoking, such that the treatment effect would be larger among participants with lower baseline motivation to quit smoking. To test this hypothesis, we implemented a logistic regression analysis by entering baseline motivation to quit smoking, condition, and the interaction term between these two variables in the model. The logistic regression showed a main effect of baseline motivation to quit smoking, β = 2.51, Wald X^2 (1) = 4.425, p = .02, OR = 12.27, 95% CI [1.19, 126.75], a main effect of Condition, β = 3.80, Wald X^2 (1) = 4.98, p = .03, OR = 44.78, 95% CI [1.59, 1263.52], and a trending interaction, β = -1.15, Wald X^2 (1) = 3.59, p = .06, OR = .32, 95% CI [.10, 1.04]. To follow up, we dichotomized baseline motivation to quit smoking using a median split (Median = 5.50) and plotted the effect of the condition on seeking treatment to quit smoking by baseline motivation level (high and low). See Figure 2.

As predicted, these findings suggest that among individuals with low baseline motivation to quit smoking, the MI intervention had the greatest effect on treatment-seeking behavior, X^2 (1, n = 30) = 5.46, p = .02. Indeed, only in the MI condition did any individuals with low baseline motivation end up seeking treatment. Although this figure also suggests that health education had a greater effect among participants with high baseline motivation to quit smoking, this difference was not statistically significant, X^2 (1, n = 30) = .72, p = .79.

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Self-efficacy to Quit Smoking. We predicted that the effect of the intervention on smoking cessation treatment-seeking behavior would be moderated by baseline self-efficacy to quit smoking, such that the treatment effect would be larger among participants with lower baseline self-efficacy to quit smoking. We conducted a logistic regression, with and without baseline motivation to quit smoking entered in the model as a covariate, to test our hypothesis. When baseline motivation to quit smoking was entered in the model, we found a main effect of condition, $\beta = 1.69$, Wald $X^2(1) = 4.66$, $p = .03$, OR = 5.42, 95% CI [1.17, 25.12], but failed to find a main effect of baseline self-efficacy to quit smoking, $\beta = .39$, Wald $X^2(1) = .62$, $p = .43$, OR =1.47, 95% CI [.56, 3.85], or an interaction between baseline self-efficacy to quit smoking and condition, $\beta = -2.12$, Wald $X^2(1) = .57$, $p = .45$, OR = .81, 95% CI [.47, 1.40]. When baseline motivation to quit smoking was not included as a covariate in the model, we failed to find a main effect of condition, $\beta = 1.25$, Wald $X^2(1) = 3.24$, $p = .07$, OR = 3.50, 95% CI [.90, 13.66], a main effect of baseline self-efficacy to quit smoking, $\beta = .52$, Wald $X^2(1) = 1.26$, $p = .26$, OR = 1.69, 95% CI [.68, 4.19], or a significant interaction, $\beta = -.17$, Wald $X^2(1) = .431$, $p = .51$, OR = .84, 95% CI [.50, 1.41]. Thus, our hypothesis that baseline self-efficacy to quit smoking would moderate the effect of the intervention on treatment-seeking behavior was not supported.

Impulsivity. Based on prior literature, we hypothesized that impulsivity would moderate the effect of the intervention on treatment-seeking behavior, such that we expected the treatment effect to be larger among participants with higher Impulsivity scores at baseline. We implemented a logistic regression to test our hypothesis, with and without baseline motivation to quit smoking entered in the model. When baseline motivation to quit smoking was included as a covariate in the model, we found a main effect of baseline motivation to quit smoking, $\beta = .37$,

Wald $X^2(1) = 6.76$, $p = .01$, OR = 1.45, 95% CI [1.10, 1.91], a main effect of condition, β = 1.56,

Wald $X^2(1) = 4.94$, $p = .03$, OR = 4.74, 95% CI [1.10, 18.71], but failed to find a main effect of

Impulsivity, β = -.05, Wald $X^2(1) = .35$, $p = .56$, OR = .95, 95% CI [.81, 1.12], or an interaction

between Impulsivity and Condition, β = .03, Wald $X^2(1) = .37$, $p = .54$, OR = 1.03, 95% CI [.93,

1.14]. When baseline motivation to quit smoking was excluded from the model, we failed to find

a main effect of condition, β = .94, Wald $X^2(1) = 2.53$, $p = .11$, OR = 2.57, 95% CI [.80, 8.23], a

main effect of Impulsivity, β = -.02, Wald $X^2(1) = .10$, $p = .75$, OR = .98, 95% CI [.84, 1.13], or

an interaction between the two, β = 0.15, Wald $X^2(1) = .11$, $p = .74$, OR = .10, 95% CI [.93,

1.11]. These findings do not support our hypothesis that Impulsivity would moderate the effect

of the intervention on the outcome.

Treatment Expectancies. This study included three items about treatment expectancies,

which were measured before and after the intervention. These items were: 1) Quitting smoking

will help me become free of drugs and alcohol (Expectancy 1), 2) Quitting smoking will lead me

to relapse from substance/alcohol use (Expectancy 2), and 3) Counseling for smoking cessation

at the VA can help me quit smoking (Expectancy 3). Baseline and post-intervention means and

standard deviations are shown in Table 3.

Logistic regression analyses were conducted to examine the ability of baseline Treatment

Expectancies to moderate the effect of the intervention on smoking cessation treatment-seeking

behavior. We conducted these analyses with and without baseline motivation to quit smoking as

a covariate. We expected the effect of the intervention to be greater among individuals with

lower scores on the Treatment Expectancies at baseline. The findings show that baseline

treatment expectancies did not moderate the effect of the intervention on the study outcome. The

results remained the same when baseline motivation to quit smoking was excluded from the

logistic regression model. Results (including baseline motivation to quit smoking as a covariate) are presented in Table 4.

Secondary Aim 3

We hypothesize that the effect of the MI intervention on smoking cessation treatment-seeking behavior would be mediated by the changes in motivation and self-efficacy, such that we expect that participants who report the highest changes in motivation and self-efficacy as a result of the MI intervention will be more likely to seek smoking cessation treatment.

Motivation Change. Prior to conducting the mediation analysis to test the ability of motivation change to predict the effect of the intervention, we explored changes in motivation as a result of the intervention. Table 5 shows the means and standard deviations for baseline and post-intervention motivation to quit smoking per condition.

We conducted a Repeated Measures ANOVA to examine the effects of time, condition, and the interaction between the two. This analysis yielded a significant main effect only for Time, $F(1, 58) = 36.68$, $p < .01$, but no main effect of condition, $F(1, 58) = 1.59$, $p = 2.13$, or time by condition interaction, $F(1, 58) = 2.62$, $p = .11$. These results suggest that motivation to quit smoking increased significantly from baseline to post-intervention, regardless of condition.

Given that the groups did not differ in motivational change, mediation effects were unlikely. Nevertheless, we conducted a mediation analysis using the bootstrapping procedure via the PROCESS macro developed by Hayes (2013) to explore the ability of motivation to quit smoking to mediate the relationship between condition and outcome. Baseline motivation to quit smoking was included in the mediation models as a covariate. Although the effect of condition on treatment-seeking behavior was significant, $b = 1.48$, $SE = .69$, $p = .03$ (path c), neither the effect of condition on motivation change, (path a), $b = .56$, $SE = .54$, $p = .31$, nor the effect of

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motivation change on treatment seeking, (path b), b = .17, SE .18, p = .34, were significant. Moreover, the model showed that condition remained a significant predictor of treatment-seeking behavior when motivation change was entered in the model (c') b = 1.37, SE = .70, p = .05. Thus, these results do not support mediation by motivation change.

Self-efficacy Change. Prior to conducting the mediation analysis to test the ability of self-efficacy change to predict the effect of the intervention, we explored changes in self-efficacy in the context of the intervention. We conducted a Repeated Measures ANCOVA. Baseline motivation to quit smoking was included in the model as a covariate. This analysis yielded a significant effect of time, $F (1, 57) = 7.54$, p = .01. We failed to find a significant effect of condition, $F (1, 57) = .00$, p = .99, or interaction between condition and time, $F (1, 57) = 1.60$, p = .21. These results suggest that self-efficacy to quit smoking scores increased significantly from baseline to post-intervention, regardless of condition.

A similar mediation analysis approach was used to explore the ability of self-efficacy change to mediate the relationship between condition and outcome. Although the effect of condition on treatment-seeking behavior was significant, b = 1.48, SE = .69, p = .03 (path c), neither the effect of condition on self-efficacy change (path a), b = .69, SE = .54, p = .21, nor the effect of self-efficacy change on treatment-seeking behavior (path b), b = .18, SE = .16, p = .25, were significant. In addition, the model showed that condition remained a significant predictor of treatment-seeking behavior when self-efficacy change was entered in the model (c`), b = 1.36, SE = .70, p = .05. These findings do not support mediation by self-efficacy change.

A similar mediation analysis was used to explore the ability of treatment expectancy change to mediate the relationship between condition and outcome. The mediation model that included treatment expectancy 1 as a mediator showed that although the effect of condition on

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treatment-seeking behavior was significant, b = 1.48, SE = .69, *p* = .03 (path c), neither the effect the effect of condition on expectancy change 1 (path a), b = .15, SE = .25, *p* = .57, nor the effect of self-expectancy change 1 on treatment-seeking behavior (path b), b = .08, SE = .33, *p* = .81, were significant. In addition, the model showed that condition remained a significant predictor of treatment-seeking behavior when self-efficacy change was entered in the model (c`), b = 1.46, SE = .69, *p* = .03. These findings do not support mediation by expectancy 1 change.

The mediation model with treatment expectancy 2 change included as a mediator showed a significant effect of condition on treatment-seeking behavior was significant (path c), b = 1.49, SE = .69, *p* = .03 (path c). However, neither the effect of condition on expectancy 2 change (path a), b = -.02, SE = .25, *p* = .92, nor the effect of self-expectancy 2 change on treatment-seeking behavior (path b), b = .20, SE = .32, *p* = .52, were significant. Furthermore, condition remained a significantly predictor of treatment-seeking behavior, b = 1.48, SE = .69, *p* = .03 (c`), when treatment expectancy change 2 was entered in the model. These findings do not support mediation by expectancy 2 change.

The mediation model with treatment expectancy 3 change included as a mediator showed a significant effect of condition on treatment-seeking behavior was significant (path c), b = 1.52, SE = .71, *p* = .03. However, neither the effect of condition on expectancy 3 change (path a), b = -.48, SE = .32, *p* = .14, nor the effect of self-expectancy 3 change on treatment-seeking behavior (path b), b = .08, SE = .27, *p* = .76, were significant. Furthermore, condition remained a significantly predictor of treatment-seeking behavior, b = 1.51, SE = .71, *p* = .03 (c`), when treatment expectancy 3 change was entered in the model. These findings do not support mediation by expectancy 3 change.

Exploratory Analyses

During chart review, we collected information on the participants' number of co-morbid psychiatric diagnoses, number of medical conditions, number of psychotropic medications, and number of medications prescribed for medical needs. We explored whether the intervention's effectiveness differed depending on the psychological and health presentation of participants. First, we tested whether the two conditions differed in these variables at baseline by conducting an Independent Samples *t*-tests. See Table 6. The groups were indistinguishable in number of co-morbid psychiatric diagnoses, number of psychotropic medications, number of medical conditions, and number of medications for medical conditions at baseline. Then, we calculated the phi coefficient between the outcome--treatment-seeking behavior--and the variables mentioned above. See Table 7. We found that treatment-seeking behavior was significantly related to number of medical conditions and number of medications taken for these conditions.

We also explored whether the effect of the intervention on the outcome was moderated by number of psychiatric diagnoses, number of medical conditions, number of psychotropic medications, or number of medications. We conducted a logistic regression to explore the latter, which did not reveal significant interactions between condition and any of these variables. Taken together, these exploratory analyses suggest that participants with a larger number of medical diagnoses and who are prescribed a larger number of medications to treat these conditions are more likely to engage in smoking cessation treatment, independent of type of intervention.

Treatment Fidelity

Our intention was to match the two conditions on session length. As expected, length of session (minutes) did not significantly differ between the MI ($M = 35.14$, $SD = 5.64$) and Health Education ($M = 38.00$, $SD = 7.42$) conditions, $t (56) = 1.64$, $p = .11$.

We used two methods to assess treatment integrity. The first method consisted of a patient self-report measure of topics covered during the session. Items 1 – 10 included topics covered during the MI session and items 11 – 18 included topics covered during the Health Education Control session. The supervisor – blind to condition - also rated the therapist, on 7-point Liker scales, on empathy, MI spirit, giving information, MI adherent behaviors, reflections, and open questions. Higher scores on MI recordings indicated higher levels of adherence to the MI spirit, whereas lower scores on the Control recordings indicated lower levels of adherence to the MI spirit in that condition.

Independent *t*-tests were conducted to examine differences between groups on the self-report measure of topics covered during the session. The first *t*-test showed that participants in the MI condition ($M = 9.14$, $SD = 1.22$) endorsed items consistent with the MI session significantly more than participants in the control group ($M = 8.00$, $SD = 1.67$), $t (58) = -2.97$, *p* $< .01$. The second *t*-test showed that participants in the control condition ($M = 5.07$, $SD = 1.20$) endorsed items consistent with the control session significantly more than participants in the MI condition ($M = 2.57$, $SD = 1.94$), $t (58) = -2.97$, *p* $< .01$. Analysis of the supervisor rated audio recordings revealed a significant difference in MI spirit adherence between the MI ($M = 27.40$, $SD = 4.20$) and Health Education ($M = 17.70$, $SD = 1.42$) conditions, $t (18) = -6.93$, p $< .01$, suggesting higher adherence to the MI spirit when conducting the MI intervention.

Table 1

Demographic Characteristics and Smoking Variables of Participants at Baseline for Full Sample and by Condition (N = 60)

Variable	MI Condition *n* (%)	Control Condition *n* (%)	*p*
Age (M, SD)	50.17 (11.96)	48.30 (11.75)	.54
Male	28 (93.3)	29 (96.7)	.55
Race			
American Indian/Alaskan Native	1 (3.3)	0	.29
Asian	0	1 (3.3)	
Native Hawaiian/Other Pacific Islander	0	0	
African American	17 (56.7)	12 (40.0)	
Caucasian	12 (40.0)	17 (56.7)	
Hispanic	0	5 (16.7)	.02*
Marital Status			
Single	11 (36.7)	10 (33.3)	.23
Married	7 (23.3)	2 (6.7)	
Separated	5 (16.7)	8 (26.7)	
Divorced	7 (23.3)	8 (26.7)	
Widowed	0	2 (6.7)	
Income			
Under $10,000	16 (53.3)	13 (43.3)	.61
$10,000 - $19,000	7 (23.3)	8 (26.7)	
$20,000 – $29,000	2 (6.7)	4 (13.3)	
$30,000 – $39,000	0	1 (3.3)	
$40,000 – $49,000	2 (6.7)	1 (3.3)	
$50,000 – $59,000	1 (3.3)	1 (3.3)	
$60,000 – $69,000	0	0	
$70,000 – $79,000	1 (3.3)	0	
$80,000 – $89,000	0	2 (6.7)	
Over $90,000	1 (3.3)	0	
Education			
Did not graduate HS	0	2 (6.7)	.17
High school graduate	11 (36.7)	4 (13.3)	
Some college	11 (36.7)	15 (50.0)	
Technical school/Associates	4 (13.3)	7 (23.3)	
4-year college	1 (3.3)	1 (3.3)	
Some school beyond 4-year college	3 (10)	1 (3.3)	
Professional degree (MD, JD, PhD)	0	0	
CPD (M, SD)	17.7 (9.68)	16.43 (7.62)	.58
FTND (M, SD)	4.33 (1.06)	3.733 (1.17)	.04*
Years Smoking (M, SD)	30.63 (14.95)	29.05 (14.75)	.68

Table 1 (Continued)

Variable	MI Condition *n* (%)	Control Condition *n* (%)	*p*
CO (M, SD)	29.93 (16.30)	28.23 (12.79)	.66
Baseline Motivation to Quit Smoking (M, SD)	4.97 (2.92)	6.30 (2.87)	.08
Baseline Self-efficacy to Quit Smoking (M, SD)	4.90 (2.78)	6.00 (2.63)	.12
Impulsivity (M, SD)	69.43 (13.60)	68.59 (12.95)	.81
Expectancy 1 (M, SD)	3.07 (1.55)	3.10 (1.58)	.94
Expectancy 2 (M, SD)	1.43 (1.01)	1.50 (0.93)	.79
Expectancy 3 (M, SD)	3.57 (1.19)	3.63 (0.99)	.82

Note: HS = High School; *MD* = Medical Doctor; *JD* = Juris Doctor; *Ph.D.* = Doctor in Philosophy; *CPD* = Cigarettes Per Day; *FTND* = Fagerstrom Test for Nicotine Dependence; *CO* = Carbon Monoxide Level (ppm); *The Contemplation Ladder* was used to measure Baseline Motivation to Quit Smoking; Impulsivity was measured using the *Barratt Impulsivity Scale*; Self-efficacy to Quit Smoking was measured with a single item asking participants to rate how confident they are about their ability to quit smoking; Expectancies for treatment were measured with three items assessing whether they believe that smoking cessation treatment could interfere with their substance and alcohol use treatment and whether they think the VA could help them quit smoking.

Table 2

Type of Treatment Sought by Participants by Condition

Type of Treatment	MI	Health Education Control
Counseling	3	2
NRT	7	3
Medication	1	0
Combination Therapy	1	2

Note: NRT = Nicotine Replacement Therapy; Medication = Buproprion or Chantix; Combination Therapy = Counseling + Medication

Table 3

Means and Standard Deviations for Baseline and Post-Intervention Treatment Expectancies by

Condition

	Baseline			Post-Intervention		
	MI	Control	*p*	MI	Control	*p*
Expectancy 1	3.07 (1.55)	3.10 (1.58)	.94	3.43 (1.61)	3.33 (1.67)	.81
Expectancy 2	1.43 (1.01)	1.50 (0.93)	.79	1.40 (.894)	1.47 (0.90)	.77
Expectancy 3	3.57 (1.19)	3.63 (0.99)	.82	3.97 (1.38)	4.50 (0.78)	.07

Table 4

Summary of Logistic Regression Analysis for Treatment Expectancies Predicting Treatment-Seeking Behavior while Controlling for Baseline Motivation to Quit Smoking

Predictor	*B*	*SE B*	e^B
Expectancy 1			
Baseline Motivation	.39**	.15	1.47
Condition	4.04*	1.92	56.96
Expectancy 1	1.23	.81	3.42
Condition x Expectancy 1	-.73	.48	.48
Expectancy 2			
Baseline Motivation	.42**	.15	1.52
Condition	.38	1.19	.75
Expectancy 2	-1.18	1.15	.31
Condition x Expectancy 2	.81	.74	.25
Expectancy 3			
Baseline Motivation	.38**	.14	1.45
Condition	2.31	2.32	10.10
Expectancy 3	.40	1.00	1.49
Condition x Expectancy 3	-.23	.59	.78

*Note: * $p < .05$, ** $p < .01$, * $p < .001$.*

Table 5

Baseline and Post-Intervention Statistics for Motivation to Quit Smoking and Self-Efficacy

	Baseline			Post-Intervention		
	MI	Control	p	MI	Control	p
Motivation to Quit	4.97 (2.92)	6.30 (2.87)	.08	7.10 (3.25)	7.53 (2.61)	.57
Self-efficacy	4.90 (2.92)	6.00 (2.63)	.12	6.57 (3.20)	6.90 (2.51)	.66

Table 6

Baseline Characteristics for Co-Morbid Psychiatric Diagnoses, Psychotropic Medications,

Medical Conditions, and Medications Taken for Medical Conditions.

	MI	Control	
	M (SD)	M (SD)	*p*
Psychiatric diagnoses	2.37 (1.00)	2.63 (1.47)	.41
Psychotropic medications	2.03 (1.56)	2.10 (1.49)	.87
Medical conditions	6.57 (4.47)	6.47 (3.24)	.92
Medications (health)	7.00 (4.43)	5.37 (4.34)	.15

Table 7

Correlations Between Outcome and Number of Psychiatric Conditions, Number of Psychotropic

Medications, Number of Medical Conditions, And Number of Medications for Medical

Conditions.

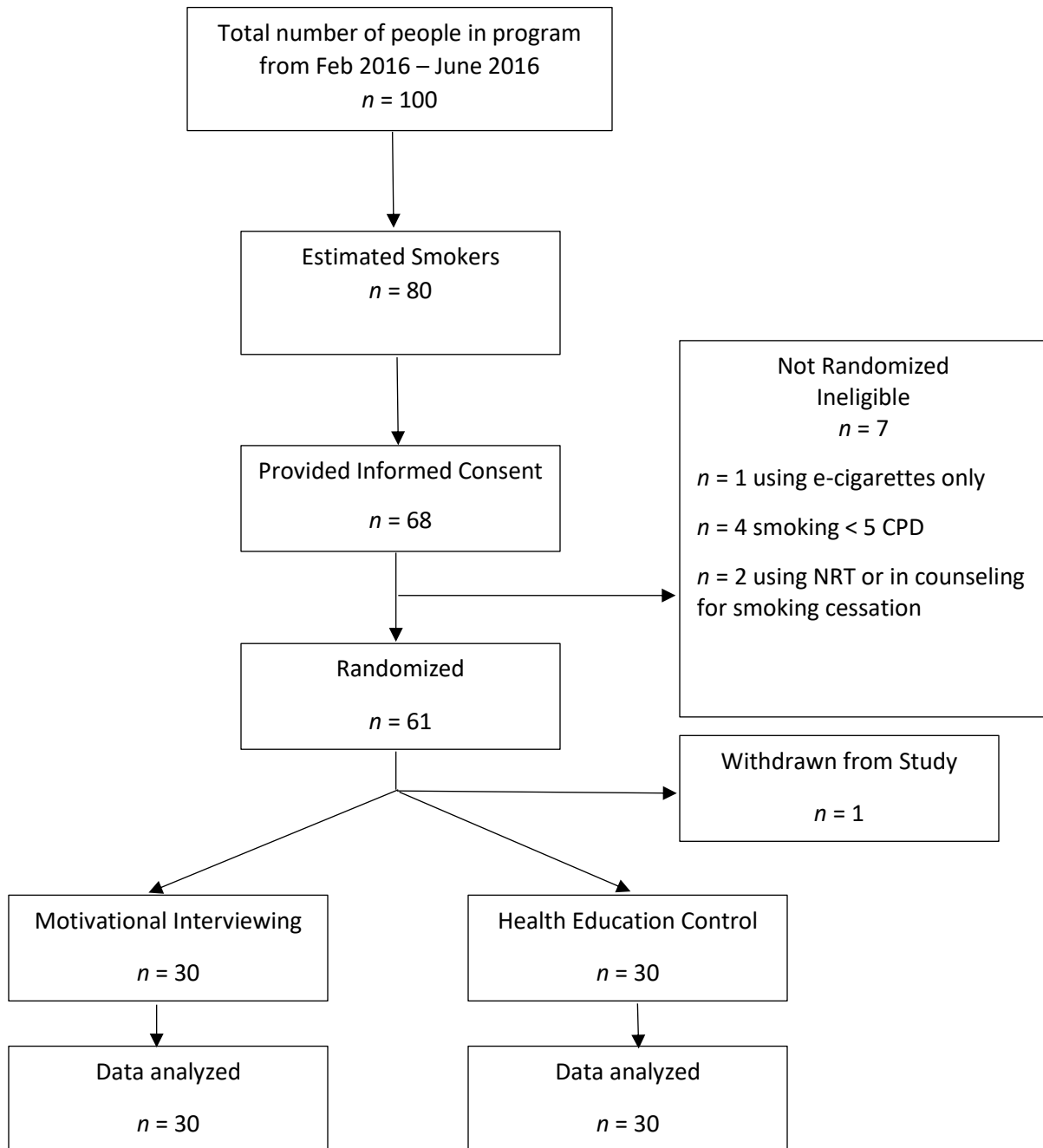|	Psychiatric diagnoses	Medical conditions	Psychotropic medications	Medications (Health)
Treatment-seeking Behavior	-.015	.273*	-.006	.454***

Note: * *p* < .05, ** *p* < .01, *** *p* < .001.

Figure 1. Participant flow through consent, screening, and enrollment.

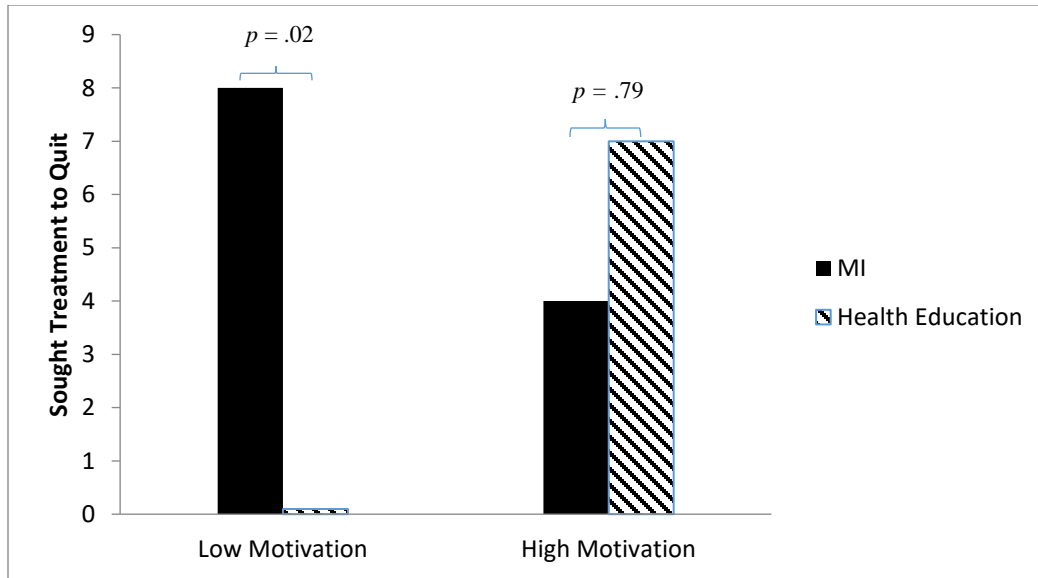*Figure 2.* Effect of intervention on treatment-seeking behavior by baseline motivation to quit smoking.

The present randomized, controlled study provides support for the usefulness of MI in engaging veteran cigarette smokers undergoing treatment for substance use in smoking cessation treatment. We found that veteran smokers randomized to the MI condition were more likely to engage in smoking cessation treatment compared to veteran smokers randomized to the health education condition, when group differences in baseline motivation were accounted for.   There was a tendency for veteran smokers in the MI condition to prefer NRT over counseling. This observation is consistent with previous studies that have found greater preference for NRT among smokers with a history of substance dependence (Cooney, Cooney, Perry, Carbone, Cohen et al., 2009). Although the interaction just missed statistical significance, our results also suggest that the MI intervention was most effective among veterans who had low baseline motivation to quit smoking. These results are consistent with MI theory, as this intervention was developed to increase motivation among individuals who are ambivalent about behavioral change and have low motivation to do so (Miller & Rollnick, 2002).

Our results are consistent with previous studies that found a significant effect of MI on increasing treatment-seeking behavior compared to psychoeducation and treatment-as-usual control groups (e.g., Daley et al., 1998; Martino et al., 1999; Steinberg et al., 2004). A recent quasi-experimental pilot study examined the effect of two group MI (tobacco-related vs. general substance use-related) interventions on smoking cessation treatment-seeking behavior in a sample of homeless veterans seeking treatment for alcohol use in an outpatient clinic (Santa Ana,

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LaRowe, Armeson, Lamb, & Hartwell, 2016). That study found that a multi-session, tobacco-modified version of group MI enhanced motivation to quit smoking and led to significantly higher treatment-seeking behavior compared to a group MI condition that focused on general abstinence from substances. In addition, participants in the latter study engaged in the same pattern of treatment-seeking behavior as participants in our present study, such that a larger number of veterans requested NRT compared to other smoking cessation aids (smoking cessation classes or combination of classes and NRT). One advantage of our study over the previous quasi-experimental design is that stronger evidence of causality is provided by the randomized design. It also demonstrated similar results in the context of a brief, individual MI intervention. Thus, the efficacy of tobacco-related MI may translate across treatment modalities and across treatment lengths. Our small, randomized-controlled study provides further evidence of the utility of MI in engaging veteran smokers undergoing treatment for substance use in treatment for smoking cessation.

Although our study is consistent with previous studies testing the effect of MI on smoking-cessation treatment behavior among different populations, these studies did not examine the mechanisms of change driving the effect of the intervention on the outcome. In the present study, we were interested in exploring the processes by which our brief MI intervention could lead to smoking cessation treatment-seeking behavior. We hypothesized that changes in motivation and self-efficacy would underlie the effect of MI on the study outcome. This study did not provide a clear understanding as to how the brief MI intervention worked, as motivation to quit smoking and self-efficacy significantly improved for the entire sample, regardless of condition. Mediation analyses showed that motivation and self-efficacy did not mediate the effect of the intervention on the study outcome.

One possible explanation for the lack of mediational evidence is that our study was small and, as such, was powered to test only the main effect of the intervention (MI vs. Health Education) on smoking cessation treatment-seeking behavior. Although we were interested in exploring the mechanisms of change regarding MI, our study was not powered for mediation analyses. Another possible explanation for the lack of mediational evidence is that the measures may not have been sensitive enough to detect particular aspects of motivation and self-efficacy that may lead individuals to change their behavior. Previous research suggests that motivation, for instance, could be a multidimensional and dynamic process (Simmons, Heckman, Ditre, & Brandon., 2010), which the Contemplation Ladder may not capture. Last but not least, it is worth noting that our lack of mediational evidence in this area could also be explained by the makeup of our sample and the treatment setting. Our participants were veterans who actively sought out substance use treatment for one reason or another (self-imposed motivation to change behavior or court mandated treatment for substance use). It may be that their motivation and self-efficacy to change problematic behaviors were already influenced by their enrollment in the substance use program.

We also found that number of medical conditions and prescribed medications for these conditions predicted smoking cessation treatment-seeking behavior. It is possible that patients who have more diagnoses and are using more medications are the ones who are most comfortable seeking help in general, which could explain why they also seek smoking cessation help. Another explanation is that individuals with more medical conditions may be more likely to have access to and contact with health providers at the VA, which could increase opportunities for individuals to ask for smoking cessation aid.

Limitations

Although the findings of the present study are encouraging, it has a number of limitations that are worth considering. First, we only collected outcome data on the participants exiting a four-week outpatient treatment program for substance use and did not collect follow-up data on the participants' smoking status. The ultimate goal is to promote actual smoking cessation, so future studies should extend outcomes to include this behavior change in addition to initial treatment-seeking. Albeit, MI alone may be insufficient for producing smoking cessation in many individuals, which is why treatment-seeking and engagement are worthy proximal outcomes. Second, we did not record smoking cessation treatment compliance. Future studies may find this information valuable, as just requesting services does not necessarily mean that these services are going to be utilized effectively. Third, our randomization was not entirely effective as there were significant differences between groups on key baseline variables, particularly motivation to quit smoking. Fourth, the study was conducted at an outpatient substance use clinic at a VA hospital. The results from this study may not represent the general population or groups of smokers with different needs. Fifth, the weekly tobacco recovery education class posed a limitation for this study as it provided information to participants that could have motivated them to seek help quitting smoking. However, this class has not resulted in more than 10% spontaneous smoking cessation treatment-seeking behavior and it was provided to all participants in this study regardless of condition. Although not a limitation, we included an active control group, which might have reduced the likelihood of finding differences between groups, and it prevented us from quantifying the effect of MI compared to no treatment. Finally, as noted earlier, our study was powered only to examine the effectiveness of an MI intervention on engaging veteran smokers undergoing treatment for substance dependence in smoking

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cessation treatment. As an exploratory aim, we wanted to examine the intervention's

mechanisms of change. However, our study was not powered for mediation analyses. Future

studies may consider replicating this study with a larger sample size, powered for more

sophisticated process analyses.

Conclusion and Implications

In conclusion, this study found that veteran smokers undergoing treatment for substance

dependence may be receptive to messages about smoking cessation. However, the way in which

these messages are delivered appears to make a difference. In the case of our study, an MI

approach led to more veteran smokers seeking help to quit smoking (40%) than a health

education modality. It is important to note, however, that 23% of participants in the health

education condition sought treatment to quit smoking, which is higher than would be expected

for non-active control groups. Previous studies that included usual care control groups found a

rate of treatment-seeking behavior approximately 10% (Daley et al., 1998; Martino et al., 1999;

Steinberg et al., 2004).   This suggests that educating veteran smokers about the health effects of

cigarette smoking is somewhat helpful; however, using an MI approach with this population

appears to be more effective in leading veteran smokers to take action to quit smoking. The

findings from the health education control condition could be more promising than problematic,

as it may elucidate the fact that simply discussing smoking cessation with individuals and the

consequences on their health may make them more likely to seek smoking cessation treatments.

The latter may support the idea that something is better than nothing and in settings that lack MI

training, health education may lead some smokers to seek services to quit smoking.

Although it was not measured in our study, smokers (veterans or not) who are undergoing

treatment for smoking cessation do not appear to be at risk for relapse to other abused substances

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(e.g., Cooney et al., 2009). In fact, ample evidence suggests that concurrent smoking cessation and substance dependence treatment are more likely to maintain patients' recovery from substances. This evidence points to the importance of engaging individuals in treatment for smoking cessation, as this is the first step towards quitting smoking. Furthermore, in medical settings, brief motivational interventions may be all that is feasible to deliver to patients. Although small, this study showed that a brief motivational intervention promoted access to smoking cessation resources, and such an intervention could be implemented in many types of treatment environments, including primary care and other specialty clinics. Given the relative success seen in our study, it would be interesting to see how effective brief MI interventions are in other medical settings and how they might dovetail with utilization of the 5A's by healthcare providers. Of course, this motivational intervention will need to be paired with evidence-based cessation interventions to capitalize upon the motivational enhancement. Possibilities for such interventions include pharmacotherapy, brief physician advice (e.g., the "5 A's"), telephone quitlines, self-help (e.g., Brandon, Simmons, Sutton, Unrod, Harrell et al., 2016), through intensive face-to-face counseling (see Fiore et al., 2008, for review of interventions and efficacies). In sum, this study provides encouragement that even for a population as challenging as veterans receiving substance abuse treatment, a brief motivational intervention can initiate the process of smoking cessation, with its numerous documented downstream health benefits.

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Appendix A:

VA Approval Letter

Research & Development Committee
James A. Haley Veterans' Hospital
13000 Bruce B. Downs Blvd. • Tampa, FL 33612 • 813-972-2000

APPROVAL - Initial Review (Final Approval)

Date: January 8, 2016
From: Paula C. Bickford, Ph.D., Chairperson
Investigator: Jaime L. Winn, PhD
Protocol: A Motivational Interviewing Intervention to Increase Utilization of Smoking Cessation Services among Veterans Undergoing Substance Use Treatment
ID: 006392 Prom#: N/A Protocol#: 23518

The following items were reviewed and approved at the 01/08/2016 meeting:
* Biosafety Form (10-0398 rev. 1) - None Declared (10/21/2015)
* Budget Page (11/18/2015)
* Conflict of Interest - USF Menzie (10/21/2015)
* Conflict of Interest - USF Thomas (10/21/2015)
* Conflict of Interest - USF Winn (10/21/2015)
* Conflict of Interest - VA Winn (10/21/2015)
* Consent Form - Stamped 12/18/2015 - 12/15/2016 (12/17/2015; 4)
* Data Security Checklist (10/21/2015)
* HIPAA Authorization (11/03/2015)
* IRB Approval Letter - Initial (12/18/2015)
* Personnel-Study Specific (10/21/2015)
* Follow-up Questionairre (10/21/2105)
* Recruitment Handout (10/21/2105)
* Appendix D (10/21/2015)
* Barratt Impulsiveness Scale (10/21/2015)
* Contemplation Ladder (10/21/2015)
* Data Capture Sheet (10/21/2015)
* Demographic Form (10/21/2015)
* eIRB Application (10/21/2015)
* MITI (10/21/2015)
* Screening Form (10/21/2015)
* Self-Efficacy Status Form (10/21/2015)
* Smoking Status Form (10/21/2015)
* Treatment Expectancies (10/21/2015)
* Treatment Fidelity - Patient Report (10/21/2015)
* Privacy Act Officer Checklist - Post-IRB Review (01/07/2016)
* Privacy Act Officer Checklist - Initial (10/21/2015)
* Protocol (08/26/2015)
* Request to Review Research Proposal/Project (10/21/2015)

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Appendix A: VA Approval Letter

No Continuing Review is scheduled. A Continuing Review must be submitted and approved prior to the expiration date.
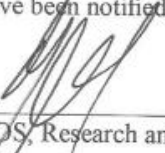
This research project has received administrative and scientific quality review by the VA R&DC. The scientific review finds the project offers: clarity of purpose or hypothesis, appropriateness of study design and procedural repeatability, significance of statistical procedure and/or power, contribution of useful knowledge and relevance to the patient care mission of the Department of Veterans Affairs.

R&D/C has approved all notification(s) of all relevant committee and subcommittee approval(s).

_____   ___1/8/16___
R&D Committee Member   Date

I have been notified by the R&D/C of this approval, and as such approval to conduct this research is granted.

_____   ___1/8/16___
ACOS, Research and Development   Date

Robert R. Campbell, JD MPH PhD is the Acting ACOS for Research Service as well as the Executive Secretary of the R&D Committee.

REMINDERS:
It is the Principal Investigator's responsibility to assure that all continuing reviews and modifications are submitted as required:
-- Continuing review(s) by all applicable committee(s) must occur at least every 365 days.
-- Modifications related to Safety must be submitted to the JAHVH SRS Committee and the USF IBC, if applicable.
-- Modifications related to Privacy and Information Security must be submitted to the PO/ISO, if applicable.
-- Modifications related to addition of personnel. The JAHVH Research Service must be notified and personnel processed prior to their being added to the study.

In studies that involve the use of separate consents and HIPAA authorizations, please assure that BOTH are signed by the subject. Copies of both must be sent to medical records.

1. Your proposal was reviewed both scientifically and administratively and fully approved by the Research and Development Committee.

2. Documentation from the USF Health Sciences IRB has been received granting approval. Having both R&D, IRB, and Privacy Officer approvals, the project is now fully approved and subjects may now be admitted to the study.

USF
UNIVERSITY OF
SOUTH FLORIDA

RESEARCH INTEGRITY AND COMPLIANCE
Institutional Review Boards, FWA No. 00001669
12901 Bruce B. Downs Blvd., MDC035 • Tampa, FL 33612-4799
(813) 974-5638 • FAX (813) 974-7091

December 18, 2015

Jaime Winn, Ph.D
James A. Haley Veterans' Hospital
13000 Bruce B Downs Blvd
116A
Tampa, FL   33612

RE: **Expedited Approval for Initial Review**
IRB#: Pro00023518
Title: A Motivational Interviewing Intervention to Increase Utilization of Smoking Cessation
        Services among Veterans Undergoing Substance Use Treatment

Study Approval Period: 12/18/2015 to 12/18/2016

Dear Dr. Winn:

On 12/18/2015, the Institutional Review Board (IRB) reviewed and **APPROVED** the above
application and all documents contained within, including those outlined below.

Approved Item(s):
Protocol Document(s):

Protocol

Consent/Assent Document(s)*:

Informed Consent Form.pdf
HIPAA VA form (not stamped by the IRB)

*Please use only the official IRB stamped informed consent/assent document(s) found under the
"Attachments" tab. Please note, these consent/assent document(s) are only valid during the
approval period indicated at the top of the form(s).

It was the determination of the IRB that your study qualified for expedited review which
includes activities that (1) present no more than minimal risk to human subjects, and (2) involve
only procedures listed in one or more of the categories outlined below. The IRB may review
research through the expedited review procedure authorized by 45CFR46.110 and 21 CFR
56.110. The research proposed in this study is categorized under the following expedited review

Appendix B: USF IRB Approval Letter

category:

(5) Research involving materials (data, documents, records, or specimens) that have been collected, or will be collected solely for nonresearch purposes (such as medical treatment or diagnosis).

(6) Collection of data from voice, video, digital, or image recordings made for research purposes.

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

As the principal investigator of this study, it is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB. Any changes to the approved research must be submitted to the IRB for review and approval via an amendment. Additionally, all unanticipated problems must be reported to the USF IRB within five (5) calendar days.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

John Schinka, Ph.D., Chairperson
USF Institutional Review Board