READINESS TO CHANGE AND SMOKING EXPECTANCIES AMONG ADULT MALE SUBSTANCE USERS CURRENTLY IN SUBSTANCE USE TREATMENT

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Department of Psychology

by
Aaron French Waters
B.S., California Lutheran University, 2014
M.A., Louisiana State University, 2018
December 2020

ACKNOWLEDGEMENTS

I would like to express my gratitude for the many people who have assisted with the development and execution of this study. I would like to thank my primary mentor, Dr. Amy Copeland, who has provided me with guidance, knowledge, and support throughout this study. I am very grateful to have had the opportunity to work under her mentorship. I would like to thank my dissertation committee members, Drs. Calamia, Cherry, and Sasser for their assistance and feedback in the development of my dissertation. Thank you to my fellow graduate lab members, Melanie Roys, Shelby Stewart, and Zachary Harmony, for their help in the collection of data. I am forever grateful for your assistance. This study could not have been completed without the support of Dr. Copeland's Smoking and Substance Use Clinical Research Lab at LSU. I would like to thank St. Christopher's Addiction Wellness Center for their assistance with data collection and for allowing our research team to collect data at their facility. This study was supported by the LSU Department of Psychology Graduate Student Strategic Research Grant.

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ABSTRACT

The primary aims of the current study were to examine if smoking expectancies and readiness to quit smoking, important components in predicting smoking behavior and cessation, changed across time for adult smokers in substance use treatment. Participants (N = 51) were predominantly white (96.1%), adult, male smokers who were admitted to residential substance use treatment. Smoking outcome expectancies and readiness to change smoking were assessed among participants at treatment entry (n = 51), and subsequently at 30 days (n = 13), 60 days (n = 9), and 90 days (n = 3) from treatment entry. Ninety-day follow-up assessments were excluded from outcome analyses due to significant participant attrition. At baseline, the majority of participants were in the contemplation (40%) or preparation (action) (40%) stage of change for smoking cessation. Repeated measures analyses of variance (ANOVAs) revealed a significant decrease in health risk and negative affect reduction smoking expectancies across time points. Readiness to change smoking did not significantly differ across time points. Existing literature on smoking expectancies has shown that elevated health risk beliefs predict cessation treatment entry, whereas elevated expectations for negative affect reduction predict relapse after a cessation attempt. Findings in the current study suggest that manipulation of health risk expectancies at treatment entry may increase engagement in a subsequent cessation attempt. In addition, negative affect reduction expectancies may change with the acquisition of alternate skills to manage negative affect learned in substance use treatment. Although readiness to change smoking did not increase over time in substance use treatment, the majority of smokers at baseline were already in the contemplation and preparation stages for quitting smoking. Based on the current findings, the optimal time for smoking cessation intervention efforts may be between 30 to 60 days after entering substance use treatment.

INTRODUCTION

Overview of Smoking

Smoking is the leading cause of preventable death in the United States (U.S.), with approximately 480,000 deaths each year due to smoking-related causes (USDHHS, 2014). Within the last five decades, over 20 million people have died from tobacco-related illnesses in the U.S. (USDHHS, 2014). Numerous diseases and health problems are associated with smoking and approximately 300 billion dollars per year are lost in the U.S. due to health care expenditures/ loss of productivity related to smoking (USDHHS, 2014). Strategies in the U.S. have been employed to reduce smoking prevalence, including increased anti-smoking advertisements, access to cessation interventions, and taxes on cigarettes (USDHHS, 2014). Even though smoking rates in the U.S. have decreased significantly over the past 20 years, differences are present among subgroups of smokers. Individuals in substance use treatment smoke at much higher rates than the general population (USDHHS, 2014; Ward, Kedia, Webb, & Relyea, 2012). Further, among substance abusers, tobacco-related deaths are considerably higher when compared to the general population (Bandiera, Anteneh, Le, Delucchi, & Guydish, 2015). Therefore, researchers need to identify ways to effectively reduce smoking prevalence among individuals in substance use treatment.

Substance Use and Tobacco Mortality

Tobacco and substance use both independently contribute to the development of psychological and physiological diseases (Grant et al., 2016; Lim et al., 2012; USDHHS, 2014; Walker, Pratt, Schoenborn, & Druss, 2017). However, when tobacco and substance use occur comorbidly, the combination of the two disorders creates additional psychological and physiological conditions, and their comorbid occurrence places the individual at significant risk

for premature mortality. Hser, McCarthy, and Anglin (1994) conducted a longitudinal study in which they examined mortality rates for patients receiving substance use treatment and found that the death rate of smokers was four times more than that of nonsmokers at a 20-year follow-up. Hurt et al. (1996) conducted a retrospective study in which they examined mortality rates and causes of death among those receiving addiction treatment. It was determined that patients in addiction treatment were significantly more likely to die of tobacco-related causes rather than alcohol (Hurt et al., 1996). While the abuse of alcohol and licit/illicit substances may have more apparent short-term consequences than smoking, substance abusers who smoke are at an increased risk of dying from tobacco-related complications than from the substance for which they are seeking treatment (Hser et al., 1994; Hurt et al., 1996).

Oregon death records analyzed from 1999 to 2005 for the general population (e.g., those without any reported substance abuse or mental health problems) highlighted the alarming mortality statistics for substance abusers who smoke. Bandiera et al. (2015) examined 148,761 death records in Oregon occurring between 1999 and 2005 in which a physician completed a certificate stating whether the role of tobacco was involved in the death. Bandiera et al. (2015) identified three distinct categories within the sample of deceased individuals: the general population (no mental health history of diagnoses), those with substance abuse problems, those with mental health problems, and those with both substance abuse and mental health problems. Of the reported deaths in which the cause of death was known to be tobacco-related or not, 30.7% of deaths in the general population were attributable to tobacco, 30% of deaths in the mental health population were attributable to tobacco, 53.6% of deaths in the substance abuse population were attributable to tobacco, and 46.8% of deaths in the dual substance abuse and mental health problems population were attributable to tobacco (Bandiera et al., 2015). Further

analyses revealed that males and females in the substance abuse or dual problem group were significantly more likely to die from tobacco-related illnesses compared to the general population or those with just mental health problems. Tobacco-related deaths were found to occur more frequently at earlier ages (59 years of age and below) among those with substance abuse problems, mental health problems, and dual problems. However, for ages 60-69, the trend among tobacco-related deaths in these subgroups occurred at similar rates when compared to the general population. The high smoking prevalence among substance abusers, as well as the significantly increased rates of mortality due to comorbid substance abuse and tobacco use, has compelled investigations on how to effectively reduce smoking within this population.

Cessation Programs in Substance Use Treatment Settings

An association between continued smoking and craving/use of other substances has been documented within the literature. Among individuals with remitted alcohol use disorder, those identified as smokers at a 3-year follow-up were significantly more likely to report relapse to alcohol abuse or dependence than nonsmokers (Weinberger, Platt, Jiang, & Goodwin, 2015). Recent smoking and decreased confidence to stop smoking have been found to be predictive of drinking relapse among patients in concurrent substance abuse and tobacco cessation treatment (Holt, Litt, & Cooney, 2012). Research has also highlighted the association between increased smoking frequency and increased craving for cocaine and dual craving of cocaine and heroin among methadone-maintained outpatients (Epstein, Marrone, Heishman, Schmittner, & Preston, 2010). A meta-analysis investigating the relationship between cannabis and tobacco identified an association between tobacco use in substance abuse treatment and a decreased likelihood of abstinence from cannabis (Peters, Budney, & Carroll, 2012). Research also supports that resuming or starting to smoke after entering substance abuse treatment is associated with

decreased rates of abstinence for the substance in which treatment was initially sought. At a 12-month follow-up, patients in substance abuse treatment who quit smoking or who were nonsmokers tended to report more days abstinent from substances other than tobacco compared to those who remained smoking or those who resumed/ started smoking (Kohn, Tsoh, & Weisner, 2003). These findings indicate a greater risk of relapse on licit/illicit substances among patients who begin to smoke, or lapse, after starting substance abuse treatment (Kohn et al., 2003).

Given the associations identified between continued smoking and increased cravings/ decreased rates of abstinence for other substances among those in substance use treatment, there have been efforts made to include smoking cessation within substance use treatment settings. Thurgood, McNeill, Clark-Carter, and Brose (2016) conducted a meta-analysis examining the effectiveness of smoking cessation interventions for adults in substance use treatment or recovery. Specifically, they looked at 17 randomized controlled trials (RCTs) that included biochemically verified abstinence from smoking at either 6- or 12-month follow-up with substance use treatment outcomes included as a secondary aim. Thurgood et al. (2016) identified eight alcohol only treatment studies, five alcohol and drug treatment studies, and four drug only treatment studies that included an RCT for smoking cessation conducted from 1990 to 2014. Out of these 17 identified studies, 5 reported significant effects of smoking cessation (e.g., nicotine replacement therapy, behavioral support, and combination) at 6- or 12-month follow-up on reducing smoking rates for smokers in substance use treatment. The combination of cognitive-behavioral therapy, nicotine patch, and nicotine gum was found to produce the highest cessation rates at 12-month follow-up when compared to any of these treatments alone or a placebo gum condition. Two studies in which smoking cessation included contingency management (i.e.,

providing monetary incentives in exchange for biochemically verified abstinence) and relapse prevention also showed improvements in substance use outcomes. Lastly, none of the 17 studies within this meta-analysis reported that smoking cessation adversely affected substance use outcomes. These findings are inconsistent with common clinical lore that smoking cessation should be discouraged during treatment for substance use disorders, as it may place patients at risk for early relapse to their drug of choice. Many substance abuse staff maintain the view that coinciding change of both disorders may be too challenging for the individual to cope with at one time (Walsh, Bowman, Tzelepis, & Lecathelinais, 2005).

Bernstein and Stoduto (1999) conducted one of the first studies in which a smoking cessation program was implemented in a substance use treatment context, and that addressed staff acceptability of such a program. The study also assessed client and staff attitudes toward a smoking cessation program and motivation to quit smoking within the stages of change (J. O. Prochaska, Norcross, & DiClemente, 1994). Bernstein and Stoduto (1999) administered a choice-based smoking cessation program for staff and clients within a substance use treatment center. The staff at the facility, along with the researchers, developed the program so that the staff became more knowledgeable about tobacco use and more motivated to introduce a cessation program into their treatment setting. The program consisted of a smoking cessation awareness component (i.e., education about smoking and smoking/ substance use recovery) followed by an available cessation program. The facility was smoke-free, but had designated smoking areas on the campus. A majority of staff (98.2%) and clients (87.0%) reported that a smoking cessation program within substance use treatment would be a good idea. However, both staff and clients also reported that banning smoking from the facility would be problematic (Bernstein & Stoduto, 1999). Fifty five point 6% of staff and 38% of clients who smoked entered

the cessation program (Bernstein & Stoduto, 1999). Of the clients who participated in the cessation program and chose cessation as an end goal (vs. smoking reduction), 17.5% reported not smoking in the past 7 days, at the 6-month or 1-year follow-up. Among clients who engaged in the cessation program, a greater proportion reported progression versus regression in readiness to quit smoking (Bernstein & Stoduto, 1999). Disseminating educational information regarding smoking and smoking/ substance abuse among staff and clients may alter attitudes towards the inclusion and utilization of cessation in substance use treatment.

Past research has identified an underlying ambivalence towards cessation among smokers in substance use treatment (Asher et al., 2003; Richter, Hunt, Cupertino, Garrett, & Friedmann, 2012). As a result, one variable of interest in addressing smoking cessation for those with substance use disorders is how to increase the likelihood of patients utilizing available smoking cessation services. Guydish et al. (2016) conducted a study in which they sought to determine how the inclusion of a readiness group, or a readiness group with the inclusion of contingency management, affected rates of attending an available smoking cessation program among smokers in substance abuse treatment. The readiness group consisted of personalized feedback, didactic presentations, skills training personalized to the stage of change, and a facilitated personalized quit attempt with access to nicotine replacement therapy, while the contingency management group also included financial incentives. Guydish et al. (2016) determined that the inclusion of financial incentives did not increase the likelihood of a patient utilizing smoking cessation services. Rather, motivation and quitting rehearsal were predictive of a patient utilizing services provided. Furthermore, Guydish et al. (2016) found that after completing the readiness group, smokers significantly decreased their daily smoking rate and significantly lowered their nicotine dependence level from baseline. While contingency management is an effective method for

increasing abstinence in substance use populations (Higgins, Silverman, & Heil, 2007), Guydish et al. (2016) concluded that financial incentives might not be as important as pre-cessation motivational enhancement for smokers in substance abuse treatment. Nevertheless, these findings provide evidence that personalized motivational enhancement interventions can manipulate ambivalence towards cessation among smokers in substance abuse treatment.

Other research has sought to determine the effect of contingency management on smoking cessation for those in substance use treatment. Robles et al. (2005) utilized contingency management in a smoking cessation program for women in residential substance use treatment. Patients completed biochemically verified measures of smoking at 1-week pre-quit, through 4-weeks of a cessation program, and then again at 2-weeks post-intervention. Patients submitted significantly more negative biochemically verified samples for smoking abstinence during the intervention compared to the pre-quit week. However, the effects were no longer significant at 2 weeks post-intervention. Robles et al. (2005) reported that participants in their study were administered bupropion to manage comorbid depression. While bupropion has been found to improve cessation outcomes, the effects of other pharmacological treatments found to be efficacious (e.g., nicotine replacement therapy) for treating nicotine dependence were not made available to participants (Robles et al., 2005). Other research has documented that among substance users in treatment, those who successfully quit smoking reported using a combination of strategies including prayer, nicotine gum, behavioral and cognitive coping strategies, and nicotine fading (gradual reduction in daily smoking rate) (Richter, McCool, Okuyemi, Mayo, & Ahluwalia, 2002). Research has determined that among other populations utilizing contingency management in combination with usual care (i.e., pharmacological treatment and counseling) is significantly efficacious in producing prolonged abstinence from smoking. Kendzor et al. (2015)

found that low socioeconomic smokers receiving contingency management in addition to usual care were significantly more likely to be abstinent from smoking at a 12-week post quit follow-up compared to those receiving usual care only. In conclusion, the findings of Robles et al. (2005) suggest that contingency management alone may be helpful as a component of smoking cessation for smokers in substance use treatment, but that other components of cessation treatment (e.g., pharmacological and counseling) may be needed to produce lasting change.

Joseph, Willenbring, Nugent, and Nelson (2004) conducted a clinical trial looking at the long-term effects of a delayed (6-months) versus concurrent smoking cessation intervention for patients in alcohol dependence treatment. While long-term smoking rates were comparable between both groups at the 18-month follow-up, there were significant differences in alcohol use among groups. Specifically, those in the concurrent interventions had significantly lower alcohol abstinence rates at 6, 12, and 18-month follow-ups compared to those in the delayed intervention condition (Joseph et al., 2004). The findings of Joseph et al. (2004) provide some evidence that a delayed smoking cessation intervention may be better for long-term alcohol outcomes, but inconsequential in long-term smoking abstinence. Kalman et al. (2001) compared the long-term effects of a delayed (6-week) versus concurrent smoking cessation intervention for male smokers in substance abuse treatment. The delayed versus concurrent intervention did not yield significantly different outcomes on tobacco abstinence at final follow-up. Collectively, these studies indicate that the timing of cessation interventions for smokers in substance abuse treatment may be relevant to the successful cessation of both smoking and substance use disorders.

Smoking Expectancies

Outcome expectancies, the anticipated reinforcing and punishing effects of a substance

play an important role in the initiation, maintenance, and cessation of substance use and smoking (Bot, Engels, & Knibbe, 2005; Brandon, Juliano, & Copeland, 1999; Jones, Corbin, & Fromme, 2001; Leventhal & Schmitz, 2006). A sizeable literature has established smoking outcome expectancies as predictive of smoking motivation and consumption, nicotine dependence levels, motivation to quit smoking, and cessation outcomes (Brandon & Baker, 1991; Copeland, Brandon, & Quinn, 1995; Heinz, Kassel, Berbaum, & Mermelstein, 2010). Indeed, in several studies, expectancies have been targeted for change as an intervention strategy for behavior change related to both smoking and alcohol use (Copeland & Brandon, 2000; Darkes & Goldman, 1998). Brandon and Baker (1991) developed the Smoking Consequences Questionnaire (SCQ) to assess smoking expectancies among college students and identified four factor-analytically derived, reliable factors named—Negative Consequences (e.g., health risk, addiction sustainment, respiratory irritation, and negative social impression), Positive Reinforcement-Sensory Satisfaction (e.g., taste, sensorimotor manipulation, social facilitation, positive affect), Negative Reinforcement-Negative Affect Reduction (e.g., anxiety reduction, anger/irritability reduction, depression reduction), and Appetite-Weight Control. In the study, daily smokers reported higher positive reinforcement and negative reinforcement expectancies compared to occasional smokers, ex-smokers, triers, and those who had never smoked. In a subsequent study using the SCQ with adult, heavy smokers with considerable smoking experience and high levels of nicotine dependence Copeland et al. (1995) identified ten distinct, reliable factors and named the revised measure the SCQ-Adult (SCQ-A). The ten factors were named Negative Affect Reduction, Stimulation/State Enhancement, Health Risks, Taste/ Sensorimotor Manipulation, Social Facilitation, Appetite-Weight Control, Craving Reduction/Addiction, Negative Physical Feelings, Boredom Reduction, and Negative Social

Impression. Copeland et al. (1995) reported that with increased smoking experience, smoking expectancies become more refined and crystalized, consistent with expectancy theory (Goldman, Brown, Christiansen, & Smith, 1991).

Research has been conducted to determine which expectancies are predictive of cessation attempts, successful cessation, and relapse prevention. Lower negative affect reduction expectancies and higher health risk expectancies have been found to predict quit attempts and successful cessation (Copeland et al., 1995; McCaul et al., 2006; Rose, Chassin, Presson, & Sherman, 1996; Wetter et al., 1994). Rose et al. (1996) conducted a longitudinal study with young adult smokers and found that higher health consequence beliefs about smoking predicted quit attempts among heavy smokers. Furthermore, higher value of health was associated with successful cessation (Rose et al., 1996). McCaul et al. (2006) conducted a meta-analysis examining studies that identified motives to quit smoking among current smokers, ex-smokers, and smokers currently in a cessation program. Smoking-related health consequence beliefs were consistently reported as a primary reason for cessation attempts (McCaul et al., 2006). Therefore, there is evidence that expectancies regarding smoking-related health consequences are associated with motivation to quit smoking. In addition, negative affect reduction expectancies have significantly predicted abstinence versus relapse among smokers post-cessation. For example, Copeland et al. (1995) found that negative affect reduction expectancies predicted smoking rates at 1, 2, 4, and 6 months post-cessation among smokers who had participated in a smoking cessation intervention. Further, significant pre- to post-treatment decrease in negative affect reduction expectancies was found among abstainers versus relapsers. In another study using the SCQ, Wetter et al. (1994) found that higher expectancies for negative reinforcement predicted smoking at 1-week post-intervention, whereas higher expectancies for negative consequences

(e.g., health risks) significantly predicted abstinence (Wetter et al., 1994). Smoking expectancies have been found to change for smokers currently receiving cessation services (Copeland et al., 1995); however, there is also evidence that expectancies can be directly manipulated. Copeland and Brandon (2000) showed adult smokers videos related to smoking-related health risks or smoking-related mood management, followed by an interview to personalize the expectancy information. Smokers reported lower expectancies for negative affect reduction following the mood management manipulation, and smokers who viewed the health risks video reported increased motivation to quit smoking.

Identifying smoking expectancies unique to those with substance use disorders is an area of research that has received some attention. Hendricks, Peters, Thorne, Delucchi, and Hall (2014) conducted a study examining smoking expectancies related to adverse outcomes of quitting smoking among alcohol and drug users. Hendricks et al. (2014) found that adverse outcome expectancies (e.g., "my drug habit would increase if I quit," "my use of other drugs would increase," "the people close to me would make fun of me for trying to stop smoking," "I would feel like a traitor to my fellow smokers," "I would look less attractive than before," "I would not look as cool," and "I would feel like I had been bullied into quitting") were associated with a decreased desire to quit smoking and a decreased likelihood of reporting complete abstinence as a goal among those who reported using marijuana or opiates. Interestingly, substance users in this study reported that quitting smoking would not only harm their abstinence from other substances, but it would also have interpersonal consequences. Smoking expectancies for positive and negative reinforcement have also been observed within self-help groups, such as Alcoholics Anonymous. Reich, Dietrich, Finlayson, Fischer, and Martin (2008) found that smokers attending Alcoholics Anonymous reported negative affect reduction as the most

important effect of smoking. The findings of Reich et al. (2008) suggest a potential mechanism by which smoking is perpetuated among smokers who have sought treatment for substance use disorders. In the early stages of substance use treatment, individuals often find it challenging to cope with negative affect. Therefore, smoking may be one of the only strategies they have for managing negative affect. However, as they progress in treatment programs, they learn alternate, effective coping methods, and as a result, smoking expectancies for negative affect reduction may decrease. Further research can identify smoking expectancies that are particularly prevalent among those with substance use disorders and determine if and how their expectancies change as a function of substance use treatment. Such information can then inform smoking cessation interventions and tailor them best to meet the needs of this population of smokers.

Rohsenow, Colby, Martin, and Monti (2005) assessed smoking expectancies related to substance use among individuals admitted to residential substance abuse treatment. Expectancies regarding the interaction of smoking and substance use were assessed. Examples of these expectancies are, "Drinking or using drugs results in wanting a cigarette more," "Smoking gives me more desire for alcohol or drugs," "I have smoked a cigarette in order to try to decrease my urge to drink or use drugs," and "During treatment for my substance abuse problem, I believe that I should try to quit smoking." Positive smoking expectancies were found to be associated with smoking and increased substance use as well as smoking being used to combat substance use urges (Rohsenow et al., 2005).

Smoking and Stages of Change

The transtheoretical model provides a framework for understanding stages of behavioral change and the processes of change that have direct application to several health-related behaviors. The transtheoretical model integrates several theories of behavior change, including

Freudian, Skinnerian, and Rogerian, as well as the model of decision-making and self-efficacy theory. Within the transtheoretical model, six stages of change and ten processes that progress change have been identified (J. O. Prochaska, Redding, & Evers, 2015). Stages of change include precontemplation (e.g., no desire to change behavior in the next 6 months), contemplation (e.g., considering making changes in the next 6 months), preparation (e.g., intent on taking action soon), action (e.g., apparent modification in lifestyle has been made), maintenance (e.g., working to prevent relapse), and termination (e.g., zero temptation for relapse into past behavior). Processes that progress behavioral change include consciousness raising (e.g., learning new information to support change), dramatic relief (e.g., increased emotional experiences), self-reevaluation (e.g., assessment of self with and without unhealthy behavior), environmental reevaluation (e.g., assessment of unhealthy behavior on the environment), self-liberation (e.g., belief that change can be made), social liberation (e.g., changes to the environment that support change), counterconditioning (e.g., developing alternative healthy behaviors), stimulus control (e.g., removal of cues for unhealthy behavior/ addition of cues to prompt healthy alternatives), contingency management (e.g., a reward for engagement in health behavior), and helping relationships (e.g., building social support for behavior change) (J. O. Prochaska et al., 2015).

Stages of change have been widely documented in tobacco literature regarding smoking behavior and smoking cessation (DiClemente & Prochaska, 1982; DiClemente et al., 1991; J. O. Prochaska & DiClemente, 1983). Most notably, DiClemente et al. (1991) identified smoking habits, smoking history, and follow-up cessation rates across stages of change in smokers in a minimal intervention smoking cessation study. As would be expected, preparation stage smokers were found to smoke significantly fewer cigarettes, were less nicotine dependent, obtained less pleasure from smoking, and reported the greatest number of past quit attempts compared to

precontemplators and contemplators (DiClemente et al., 1991). Furthermore, preparation stage smokers were found to be most confident in their ability to quit smoking, followed by contemplators, and then precontemplators. Preparation stage smokers reported the lowest scores of positive aspects of smoking, followed by contemplators, and then precontemplators. For reported negative aspects of smoking, precontemplators reported the lowest scores followed by contemplators, and then preparation stage smokers (DiClemente et al., 1991). Preparation stage smokers were found to be the most active in behavioral and cognitive processes employed to quit smoking, with contemplators being more similar to preparation stage smokers on cognitive processes, but more similar to precontemplators on behavioral processes. At 1-month follow-up, significantly more of the abstainers were initially identified as preparation stage smokers compared to contemplators and precontemplators, and at 6-month follow-up, approximately 80% of preparation stage smokers reported making a 24-hour quit attempt in the past 6 months (DiClemente et al., 1991). Stages of change are predictive of smoking quit attempts and success rates in smoking cessation programs. How these stages of change for smoking may evolve for those with substance use disorders over the duration of time they are in substance use treatment has not been investigated.

In the context of smokers in substance use treatment it is likely that readiness to quit smoking and motivation for smoking cessation varies throughout substance use treatment. As a patient progresses through substance use treatment, he/she is likely to progress through stages of change for the substance for which treatment was sought. Given that a patient stays in substance use treatment, he/she may fall in action (e.g., apparent modification in lifestyle has been made) or maintenance (e.g., working to prevent relapse) stages of change. These stages have been found to be associated with the self-liberation, counterconditioning, helping relationships,

reinforcement management, and stimulus control processes of change (J. O. Prochaska et al., 2015). It is possible that the processes of change resulting from engagement in substance use treatment may generalize to smoking and progress stage change for smoking behavior. Future research examining the indirect affect of engagement in substance use treatment on stages of change for smoking may provide insight into the most appropriate time to provide cessation in substance use treatment.

The Present Study

Among individuals diagnosed with substance use disorders, smoking rates are disproportionality high as compared with the general population (Cookson et al., 2014; USDHHS, 2014; Ward et al., 2012), and tobacco-related mortality is significantly increased among substance abusers who smoke (Bandiera et al., 2015). Research has identified that quitting smoking while quitting other substances, is associated with improved long-term abstinence for primary substances of choice (Kohn et al., 2003; J. J. Prochaska, Delucchi, & Hall, 2004; Tsoh, Chi, Mertens, & Weisner, 2011). In contrast, there is research supporting that postponing smoking cessation during substance use treatment is associated with improved long-term abstinence for the substance that treatment was initially sought (Joseph et al., 2004). There has been a substantial effort in the development of smoking cessation interventions for those in substance use treatment. Yet, findings have been inconsistent as to if and how these interventions should overlap in order to optimize success in changing both behaviors. As a result, smoking cessation has not been consistently made available to smokers in substance use treatment, and smoking rates among this population remain disproportionately high.

These inconsistencies compelled the current study, in which the primary aim was to determine how fundamental constructs, such as smoking expectancies and readiness to change,

vary during substance use treatment. Readiness to change has been well documented as a predictor of quit attempts and successful cessation among smokers (DiClemente & Prochaska, 1982; DiClemente et al., 1991; J. O. Prochaska & DiClemente, 1983). Health consequence expectancies have been found to predict motivation to quit and quit attempts (McCaul et al., 2006; Rose et al., 1996) and negative affect reduction expectancies have been found to predict continued smoking behavior as well as poor success in cessation programs (Copeland et al., 1995; Wetter et al., 1994). During substance use treatment, patients are exposed to health-related behaviors (e.g., dietary and exercise) and psychoeducation about substance use disorders, and they are also taught new coping skills to deal with stress and negative emotions. It was anticipated that exposure to health information and the introduction of new coping skills might generalize to patients' smoking behavior in substance use treatment. Based on past research on readiness to change and smoking expectancies, the current study examined when substance user smokers may be most receptive to engaging in a smoking cessation program during substance use treatment. The current study consisted of three specific aims,1) identify changes in readiness to quit smoking over the course of substance use treatment, 2) identify changes in health risk expectancies over the course of substance use treatment, and 3) identify changes in negative affect reduction expectancies over the course of substance use treatment. In relation to aim 1, it was hypothesized that readiness to quit smoking would increase over time spent in substance use treatment as smokers learn new coping skills and information about the health consequences of other substances. Learning new coping skills and information about the health consequences of other substances was hypothesized to generalize to smoking behavior, increasing readiness to quit. In relation to aim 2, it was hypothesized that health risk expectancies would increase over time as smokers in substance use treatment learned about the negative health risks related to their

substance of choice, hypothesized to generalize to health risk smoking expectancies. Lastly, in relation to aim 3, it was hypothesized that negative affect reduction expectancies would decrease over time as smokers in substance use treatment learned new coping strategies to manage negative affect, hypothesized to generalize to negative affect reduction smoking expectancies. The goal of the current study was to identify how readiness to quit smoking and smoking expectancies changed over the course of substance use treatment in order to have a more accurate understanding of when the implementation of a cessation program may be most beneficial for this population.

METHODS

Participants

Power Analysis

An a priori repeated measures analysis of variance (ANOVA) power analysis was conducted using G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2013). Since there were no existing studies identified in the literature that were similar to the present study and proposed methodology, an estimated medium effect size was used to determine sample size. It was determined that a sample size of at least 46 participants was required to detect a medium effect (partial eta-squared = 0.03) with power of 0.8, and alpha set at 0.05.

Recruitment

Participants were recruited from St. Christopher's Addiction Wellness Center in Baton Rouge, LA. St. Christopher's is a multi-modality based substance use treatment center that focuses on treating substance use disorders through evidence-based treatments and 12-step involvement. St. Christopher's provides and encourages long-term treatment that can last from 6-months to 1 year. The first author was checking the electronic medical record (EMR) system used by St. Christopher's several times a week to identify newly admitted patients. When a newly admitted patient was identified, a researcher would go to St. Christopher's and attempt to recruit the patient into the study within seven days of a patient's admittance to treatment. A researcher in Baton Rouge had several times scheduled throughout the week to meet with newly admitted patients to reduce the possibility of patients not being recruited within seven days of admittance to St. Christopher's. If a patient agreed to participate, the researcher reviewed the consent and HIPAA agreement form with the potential participant (See Appendix A for Consent Form; See Appendix B for HIPAA Agreement Form).

Criteria for eligibility. In order for participants to be eligible they had to be 1) admitted at St. Christopher's during the dates of data collection; 2) ≥ 18 years of age at the initial study visit; 3) a current smoker (i.e., at least weekly smoking and an expired carbon monoxide monitor reading of 8 ≥ parts per million); 4) not mandated by court system to attend substance use treatment; and 5) able to demonstrate a 7th grade reading level or higher.

Criteria for exclusion. Individuals were excluded from the study if they were: 1) discharged from St. Christopher's; 2) < 18 years of age; 3) not current smokers as determined above; 4) mandated by court system to attend substance use treatment; or 5) unable to demonstrate a 7th grade reading level or higher.

Measures and Materials

All participants completed an assessment of literacy at baseline. All participants completed the demographic and smoking questionnaire, breath analysis for carbon monoxide, and assessments of readiness to change, smoking expectancies, and nicotine dependence at baseline, 30-day, 60-day, and 90-day follow-ups. The first author would access St. Christopher's charts to retrieve substance use and mental health history information for participants.

Literacy

The Rapid Estimate of Adult Literacy in Medicine—Short Form (REALM - SF; Arozullah et al., 2007). The REALM – SF is a 7-item word recognition test that provides a valid quick assessment of patient health literacy. Additionally, the REALM – SF can be used to evaluate grade level reading ability (e.g., 3rd grade and below, fourth to sixth grade, seventh to eight grade, and high school). (See Appendix C for the REALM – SF).

Questionnaire

The demographic questionnaire is a brief self-report questionnaire that was used to gather

demographic information as well as basic information on current and past smoking behavior. (See Appendix D for the Demographic Questionnaire).

Substance Use and Mental Health Form

Newly admitted patients to St. Christopher's would meet with a psychiatrist or psychiatric nurse practitioner for a psychiatric evaluation and psychosocial assessment in which diagnoses were made per the Diagnostic and Statistical Manual-5th Edition (DSM-5). Other psychosocial assessment information (e.g., number of substance use treatment programs attended, last use of any substance, age of first substance use, and longest period of abstinence from substances) was retrieved from the intake completed by staff (e.g., counselor or tech) upon a patient's admittance to St. Christopher's. (See Appendix E for Substance Use and Mental Health Form).

Readiness to Change

University of Rhode Island Stages of Change Assessment (URICA; McConnaughy, Prochaska, & Velicer, 1983). The URICA is a 32-item self-report questionnaire that measures readiness for behavioral change. Four subscales, including precontemplation, contemplation, preparation (action), and maintenance are used to compute a total readiness score. The URICA has been found to have good reliability with coefficient alpha's ranging from 0.88 to 0.89 across subscales. Of these 32-items, more recent research on the URICA has suggested the omission of 4-items (1 from each subscale) for a total of 28-items used in the calculation of the total readiness score (Carbonari & DiClemente, 2000; DiClemente & Hughes, 1990). Items are rated on a 5-point scale ranging from 1, "strongly disagree," to 5, "strongly agree." To calculate the readiness to change score, the mean scores for all subscales are calculated. The mean score from the precontemplation subscale is subtracted from the sum of mean scores of the contemplation,

preparation (action), and maintenance subscales to calculate readiness to change. Higher total scores are associated with increased readiness to change. The readiness to change score can be transformed from a continuous variable to a categorical variable to identify progression through stages of change. The URICA is a widely used, reliable and valid measure to assess motivation for behavior change in smokers and those with substance use disorders (Norcross, Krebs, & Prochaska, 2011). (See Appendix F for the URICA).

Smoking Expectancies

Smoking Consequences Questionnaire – Adult (SCQ - A; Copeland et al., 1995). The SCQ-A is a 55-item self-report measure that assesses several smoking expectancies among adult smokers. There are ten domains of smoking expectancies, including negative affect reduction, stimulation/state enhancement, health risks, taste/sensorimotor manipulation, social facilitation, appetite/ weight control, craving/addiction, negative physical feelings, boredom reduction, and social impression. For the current study, only the negative affect reduction and health risks subscales were included in the main analyses. Items are rated on a 10-point scale ranging from 0, "completely unlikely," to 9, "completely likely" for each domain, with higher scores reflecting the increased likelihood of believing an expectancy to occur after smoking. The SCQ-A has been found to have great reliability with coefficient alpha's ranging from 0.97 to 0.78 across domains. (See Appendix G for the SCQ – A).

Smoking

Carbon Monoxide Monitor Reading (Benowitz et al., 2002). A carbon monoxide monitor is a non-intrusive and well established biochemical measure of assessing current smoking status. A participant blows through a tube, which measures parts per million (ppm) of

carbon monoxide in expired breath. A cut-off of 8 ppm or above has been established as an appropriate cut-off for identifying current smokers.

The Fagerström Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991). The FTND is a 6-item self-report measure that assesses nicotine dependence. Different items have different response options (e.g., yes/no vs. categorical responses). Each response option is associated with a number of points used to calculate a single score. Higher scores are associated with increased nicotine dependence. The FTND has been found to have poor internal consistency with a reported coefficient alpha of 0.61. However, research has attributed this poor internal consistency to the low number of items within this measure. It is widely used within research looking at smoking. (See Appendix H for the FTND).

Study Procedure

Initial Visit

At the initial meeting, the researcher and participant would first review the consent forms, study requirements, and potential risks of participation. If a patient was eligible and expressed interest in participating, he was assigned a participant ID and then was administered the REALM – SF to assess for literacy. If a participant was able to demonstrate a 7th grade reading level or higher he then completed the baseline assessment, including a demographic and smoking questionnaire, breath analysis for carbon monoxide level, the URICA, the SCQ – A, and the FTND. Participants were then informed that a researcher would come to St. Christopher's to conduct the follow-up appointment 30 days from the prior assessment. Participants could be met within 4 days before or after their follow-up assessment date in order to provide flexibility in scheduling. After baseline assessments were completed, the first author obtained additional information from the patient's chart, including documentation on substance

use and mental health history. This information was transferred onto a hard copy form. Only the first author had access to patient charts. The first author completed all Substance Use and Mental Health Forms. The Substance Use and Mental Health Forms were stored with other baseline assessment measures in a confidential and secure location.

Thirty- and Sixty-day Assessment

At the 30- and 60-day follow-up, participants completed all baseline assessments including the demographic and smoking questionnaire, breath analysis for carbon monoxide, and the URICA, SCQ – A, and FTND. Upon completion of each follow-up assessment, a researcher would come to St. Christopher's to conduct the next follow-up appointment 30 days from the prior assessment. Participants could be met within 4 days before or after their follow-up assessment date in order to provide flexibility in scheduling.

Ninety-day Assessment

At the 90-day follow-up, participants followed study protocols outlined in the 30- and 60-day follow-up visits. After the participant completed the study measures, he was informed to contact the researcher with any questions.

Revision to Follow-up Assessment Procedure. As data collection proceeded, the completion of follow-up assessments became increasingly difficult due to several program changes at St. Christopher's. First, the head admissions counselor resigned from St. Christopher's. This resulted in shorter treatment stays, as the admissions counselor had actively recruited patients to commit to long-term treatment. Several staff who had initially agreed to assist with data collection were no longer working at St. Christopher's or were working in other positions within the facility. In response to these unexpected difficulties, the protocol for collecting follow-up assessments was revised. The research team consulted directly with

treatment staff as to how to improve completion of follow-up assessments, and staff suggested that the researchers contact on-site staff or counselors prior to follow-up assessments to obtain updates on participant phase transition or discharge. Researchers would contact staff or counselors several days in advance of follow-up assessments in an attempt to locate participants prior to transitions or discharges.

Confidentiality of Materials

Once a participant completed self-report measures, a researcher brought those materials to Louisiana State University (LSU) where they were kept in the Smoking and Substance Use Research Laboratory in a locked filing cabinet.

Institutional Review Board

The current study was reviewed and approved by the LSU Institutional Review Board and the Institutional Review Board at St. Christopher's Addiction Wellness Center. A Certificate of Confidentiality from the National Institute of Drug Abuse was requested and approved to protect participant information. A Certificate of Confidentiality provides additional protection to participants by allowing the researchers the right "to refuse to disclose identifying information on research participants in any civil, criminal, administrative, legislative, or other proceeding, whether at the federal, state, or local level." (National Institute on Drug Abuse, 2015). The Certificate of Confidentiality was one additional step taken to ensure data collected was not used in a way that could potentially put participants at risk.

Study Design

Readiness to change has been established as a predictor of quit attempts and successful cessation among smokers (DiClemente & Prochaska, 1982; DiClemente et al., 1991; J. O. Prochaska & DiClemente, 1983). Furthermore, health risk smoking expectancies and negative

affect reduction smoking expectancies have been identified as predictors of motivation to quit and quit attempts (McCaul et al., 2006; Rose et al., 1996) and have been found to predict continued smoking behavior as well as poor success in cessation program (Copeland et al., 1995; Wetter et al., 1994). However, to our knowledge, no studies have tracked how readiness to quit smoking and these specific smoking expectancies change for smokers in long-term substance use treatment. During substance use treatment, smokers learn about health consequences related to their primary substance use disorder and effective coping strategies to manage negative affect. It was hypothesized that information learned in substance use treatment would generalize to smoking behavior, change readiness to quit smoking, and health risk and negative affect reduction expectancies over time.

The current study consists of three specific aims. The first aim was to identify if readiness to quit smoking changed over the course of substance use treatment. The second aim was to identify if health risk expectancies changed over the course of substance use treatment. Lastly, the third aim was to identify if negative affect reduction expectancies changed over the course of substance use treatment. For these aims changes in readiness to quit smoking, health risk expectancies, and negative affect reduction expectancies were analyzed separately as they have been found to be distinct constructs within the literature in regard to predicting different smoking-related behaviors (e.g., intention to quit, continued smoking, and success in cessation).

Aim 1

For aim 1, a longitudinal design was used to identify if readiness to quit smoking changed over the course of 90 days in substance use treatment at four predetermined time points.

Hypothesis 1. For aim 1, it was hypothesized that readiness to quit smoking would increase over time as a result of smokers in substance use treatment learning new coping skills

and information about the negative health risks of their substance of choice. The acquisition of skills and information were hypothesized to generalize to smoking behavior, making smokers more receptive to quitting smoking and in turn increasing readiness to quit smoking.

Aim 2

For aim 2, a longitudinal design was used to identify if health risk expectancies changed over the course of 90 days in substance use treatment at four predetermined time points.

Hypothesis 2. For aim 2, it was hypothesized that health risk smoking expectancies would increase over time as a result of smokers in substance use treatment learning health-oriented information and information about the negative health effects of other substances. The information learned in treatment about the negative health effects of other substances was hypothesized to generalize to health risk smoking expectancies.

Aim 3

For aim 3, a longitudinal design was used to identify if negative affect reduction expectancies changed over the course of 90 days in substance use treatment at four predetermined time points.

Hypothesis 3. For aim 3, it was hypothesized that negative affect reduction smoking expectancies would decrease over time as a result of smokers in substance use treatment learning other coping skills to manage negative affect other than smoking. Coping skills learned to manage negative affect were expected to generalize to negative affect reduction smoking expectancies.

Statistical Procedure

Before conducting the statistical analyses to test the 3 hypotheses, analyses were conducted to identify participants who completed assessments past baseline and which

participants had missing data on self-report measures across assessments. Participants identified as having completed baseline and one or more follow-up assessments were included in final analyses. Comparison analyses were conducted on baseline variables and measures to identify significant differences between participants who complete the baseline assessment only and participants who completed the baseline assessment and one or more follow-up assessments. Mean substitution, a conservative approach, was used to account for missing data on the URICA and SCQ-A for aims 1, 2, and 3. Statistical Package for the Social Sciences (SPSS) version 24 was employed to determine the reliability of measures included, such as the URICA, SCQ-A, and FTND. A correlation table was generated to determine if any of the demographic variables (age, education, employment, ethnicity), as well as information taken from the Substance Use and Mental Health Form including diagnostic variables (substance use disorders and psychological disorders), number of substance use treatment programs attended, last use of any substance, age of first substance use, and longest period of abstinence from substances were correlated with measures used in aims 1, 2, and 3. Baseline variables that correlated with the URICA, SCQ-A Health Risks subscale, and SCQ-A Negative Affect Reduction subscale were not included in the analyses for aims 1, 2, and 3 due to the small sample size. A second correlation table was generated to identify correlations between the variables described above in the overall sample.

SPSS version 24 was employed to conduct repeated measures ANOVAs for aims 1, 2, and 3. Readiness to change, health risk smoking expectancies, and negative affect reduction smoking expectancies were the three continuous variables assessed across time. Bonferonni correction, the most conservative correction that can be performed, was applied to all repeated measures ANOVAs to control for the increased probability of a Type 1 error occurring.

RESULTS

Participant Recruitment and Follow-up

Of the 132 patients who were admitted to St. Christopher's between March 26th, 2019 and December 12th, 2019, 102 patients were contacted to participate in the current study. Of the 30 patients who were not contacted, 19 were not reached within seven days from being admitted to St. Christopher's due to researcher availability, 2 were unavailable due to being ill/ hospitalized, and 9 decided against entering treatment at St. Christopher's. Out of the 102 patients, 52 were eligible and interested in participating, and 50 were excluded. Reasons for exclusion included being court-ordered for treatment (n = 4), having a CO reading being below 8 ppm (n = 2), identifying as a nonsmoker (n = 19), being under 18 years of age (n = 3), and not being interested due to a number of reasons (e.g., lack of incentives and persuasion from other patients to not participate) (n = 22). During the baseline assessment, one participant was excluded due to psychosis, which became apparent after he consented to participate. A total of 51 participants completed the baseline assessment, 13 completed the 30-day follow-up, 9 completed the 60-day follow-up, and 3 completed the 90-day follow-up. Some participants who completed the 30-day follow-up were not available for the 60-day follow-up, and some of the participants who did not complete the 30-day follow-up were later available for the 60-day follow-up. Sixteen participants completed the baseline assessment and one or more of the follow-ups, including the 30-day or 60-day follow-up, or both. These 16 participants were included in the analyses to test the 3 hypotheses. Mean substitution was not implemented for the 90-day follow-up assessment as so few participants completed this follow-up assessment. See Figure 1 for participant retention.

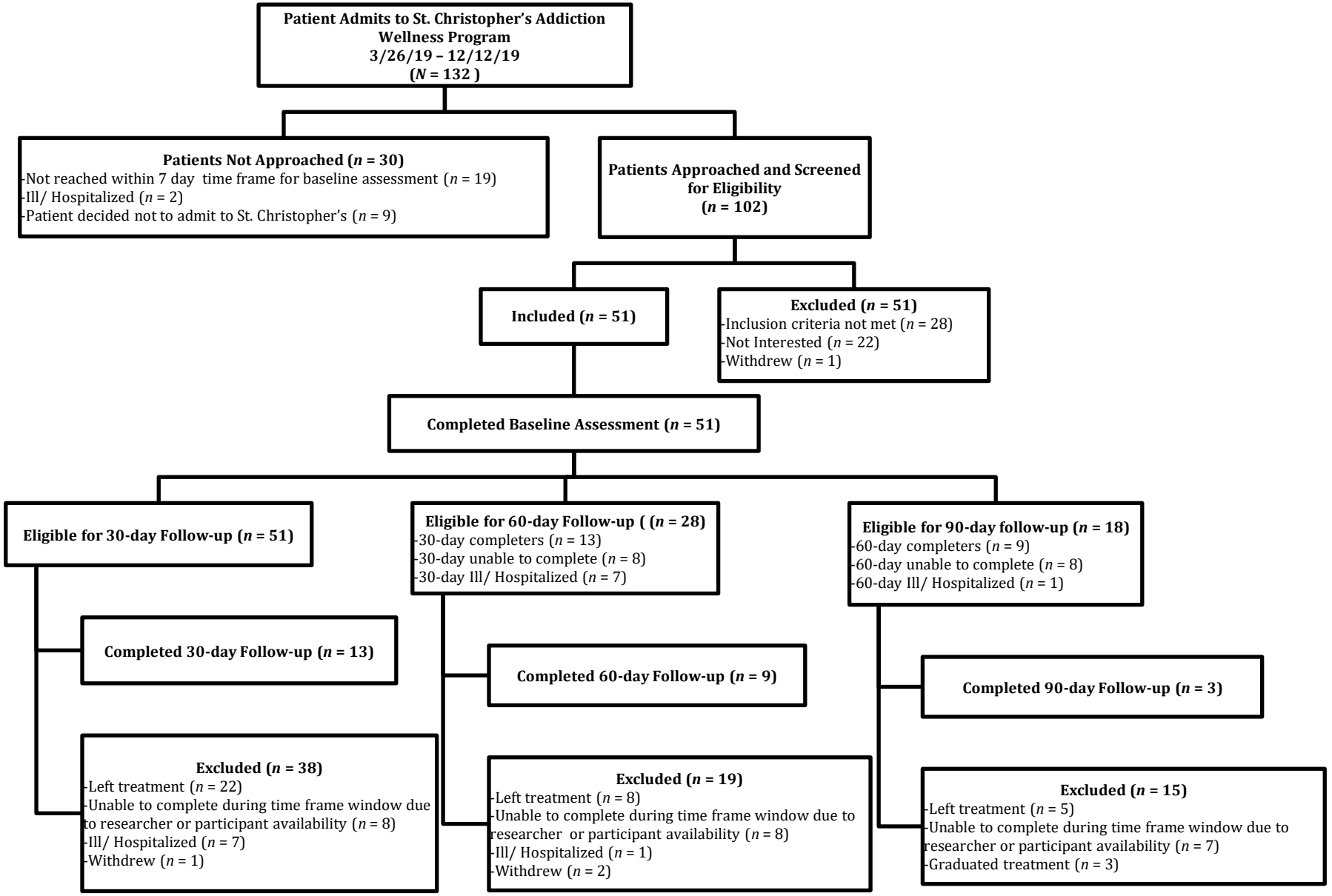

Figure 1. Participant Retention through Study Phases

Participant Characteristics

Characteristics of Overall Sample

Participants (N = 51) were adults currently enrolled in substance use treatment at St. Christopher's Addiction Wellness Center in Baton Rouge, LA. The overall sample was male (100%) and the majority was White (96.1%). Mean age was 31.1 (SD = 11.0) years. On average, participants reported smoking for 12.9 years (SD = 11.0), and most were daily smokers (90.2%). See Table 1 for baseline characteristics for the overall sample, participants who completed the baseline assessment only, and participants who completed the baseline assessment and one or more follow-ups.

Table 1. Participant Characteristics

Characteristics	Baseline (n = 35), *M (SD)* or %	Past Baseline Completers (n = 16), *M (SD)* or %	All Participants (N = 51), *M (SD)* or %
Last use of any substance (days)	10.1 (9.6)	8.7 (10.4)	9.6 (9.8)
Age of first substance use	13.2 (3.5)	11.9 (2.0)	12.7 (3.1)
Number of treatment centers attended	1.4 (1.6)	1.9 (2.1)	1.6 (1.8)
Longest period of abstinence	539.3 (831.9)	341.7 (527.6)	466.5 (733.0)
CO monitor reading (ppm)	27.6 (15.2)	29.5 (13.6)	28.2 (14.6)
Age	32.2 (10.4)	28.6 (12.4)	31.1 (11.0)
Education (years)	13.3 (2.1)	13.7 (2.4)	13.4 (2.2)
Annual household income	50,964.4 (39,310.4)	33,933.3 (38,246.4)	45,528.9 (39,382.7)
Employment status (% unemployed)	42.9%	62.5%	49%
Ethnicity (% white)	94.3%	100%	96.1%
Cigarettes smoked per day	16.2 (8.5)	14.9 (7.2)	15.8 (8.1)
How many serious quit attempts prior to STC	2.1 (3.2)	1.4 (1.8)	1.9 (2.9)
Number of substance use disorders*	1.6 (1.0)	2.2 (0.8)	1.8 (1.0)
Number of other psychological disorders	1.0 (0.8)	1.4 (0.8)	1.1 (0.8)
FTND	4.9 (2.0)	4.1 (2.8)	4.7 (2.3)
URICA	8.7 (3.4)	8.8 (3.9)	8.7 (3.5)
SCQ-A Health Risks	7.2 (2.6)	8.2 (1.1)	7.5 (2.3)
SCQ-A Negative Affect Reduction	6.2 (2.7)	5.2 (2.0)	5.9 (2.5)

Note: *M* = Mean, *SD* = Standard Deviation

* Denotes significance ($p \leq 0.05$) on demographic variables between participants who completed baseline assessments and those who completed baseline and one or more follow-ups.

Characteristics of Participants Included in Analyses for Aims 1, 2, and 3

Participants (N = 16) included in aims 1, 2, and 3 were all male (100%) and White (100%), and the mean age was 28.6 (SD = 12.4) years. On average, participants reported smoking for 12.7 years (SD = 13.3), and the majority of the sample identified as daily smokers (93.8%).

Reliability of Measures

The URICA consisted of 32-items (28 were used in analyses) and had good internal reliability ($\alpha = 0.87$). The two domains taken from the SCQ-A displayed good to excellent internal reliability. The SCQ-A Negative Affect Reduction domain consisted of 9-items and displayed excellent internal reliability ($\alpha = 0.95$). The SCQ-A Health Risks domain consisted of 4-items and displayed good internal reliability ($\alpha = 0.88$). The FTND consisted of 6-items and displayed poor internal reliability ($\alpha = 0.58$). Past research has found the FTND to have questionable internal reliability, which was anticipated in the current study. The URICA was used as the outcome measure in aim 1, the SCQ-A Health Risks domain was used as the outcome measure in aim 2, and the SCQ-A Negative Affect Reduction domain was used as the outcome measure in aim 3.

Baseline Measures

Overall Sample Baseline Measures

On the URICA, the mean readiness to change score was 8.7 (SD = 3.5). The URICA was transformed to a categorical variable to identify the prevalence of specific stages. Analyses indicated that in the overall sample, 35.4% of participants were in the precontemplation stage, 33.3% of participants were in the contemplation stage, 29.2% were in the preparation (action) stage, and 2.1% were in the maintenance stage. On the SCQ-A Health Risks subscale the mean

score was 7.5 (*SD* = 2.3) and on the SCQ-A Negative Affect Reduction subscale the mean score was 5.9 (*SD* = 2.5).

Participant Comparisons on Baseline Measures

Analyses were run to identify differences on baseline characteristics and measures between participants who completed the baseline assessment only (*n* = 35) and those who completed the baseline assessment and one or more follow-ups (*n* = 16).

Comparisons on Baseline Characteristics. The only significant difference on baseline characteristics was the number of substance use disorders present, reported by the psychiatrist or nurse practitioner, between those who completed the baseline assessment only (*M* = 1.6, *SD* = 1.0) and those who completed the baseline assessment and one or more follow-ups (*M* = 2.2, *SD* = 0.8), *t* (41) = -2.02, *p* = 0.050. Participants who completed the baseline assessment and one or more follow-up assessments tended to have more substance use disorders.

URICA. On the URICA, there was no significant difference between participants who completed the baseline assessment only (*M* = 8.7, *SD* = 3.4) and participants who completed the baseline assessment and one or more follow-ups (*M* = 8.8, *SD* = 3.9), *t* (46) = -0.09, *p* = 0.926. The baseline assessment URICA readiness to change score was transformed to a categorical variable to examine prevalence of reported stage of change between participants who completed the baseline assessment only and participants who completed the baseline and one or more follow-ups. Analyses indicated among participants who completed the baseline assessment only, 42.4% were in the precontemplation stage, 30.3% were in the contemplation stage, 24.2% were in the preparation (action) stage, and 3% were in the maintenance stage. Among participants who completed baseline and one or more follow-ups 20% were in the precontemplation stage, 40%

were in the contemplation stage, 40% were in the preparation (action) stage, and none were in the maintenance stage.

SCQ-A Health Risks. On the SCQ-A Health Risks subscale, there was no significant difference between participants who completed the baseline assessment only (M = 7.2, SD = 2.6) and participants who completed the baseline assessment and one or more follow-ups (M = 8.2, SD = 1.1), t (46.87) = -1.91, p = 0.062.

SCQ-A Negative Affect Reduction. On the SCQ-A Negative Affect Reduction subscale, there was no significant difference between the participants who completed the baseline assessment only (M = 6.2, SD = 2.7) and participants who completed the baseline assessment and one or more follow-ups (M = 5.2, SD = 2.0), t (47) = 1.20, p = 0.238.

Correlations

Baseline Correlations of Overall Sample

Education was negatively correlated with longest period of abstinence from substances (r = -0.33, p = 0.049) and positively correlated with age (r = 0.31, p = 0.037). Years smoking was positively correlated with age (r = 0.81, p = 0.000). Cigarettes smoked per day was positively correlated with CO reading (r = 0.61, p = 0.000), age (r = 0.31, p = 0.034), and years smoking (r = 0.46, p = 0.001). Number of substance use disorders present was positively correlated with age of first substance use (r = 0.34, p = 0.026) and negatively correlated with age (r = -0.34, p = 0.024). The FTND was positively correlated with CO reading (r = 0.33, p = 0.022), age (r = 0.35, p = 0.015), years smoking (r = 0.42, p = 0.003), and cigarettes smoked per day (r = 0.55, p = 0.000). The SCQ-A Health Risks subscale was positively correlated with number of substance use treatment centers attended (r = 0.37, p = 0.013), years smoking (r = 0.35, p = 0.016), and the URICA (r = 0.41, p = 0.005). The SCQ-A Negative Affect Reduction subscale was negatively

correlated with days since last use of any substances (r = -0.47, p = 0.002) and positively correlated with the FTND (r = 0.39, p = 0.006), the URICA (r = 0.36, p = 0.015), and the SCQ-A Health Risks subscale (r = 0.39, p = 0.007). See Table 2 for correlations of the overall sample.

Table 2. Correlations among baseline study variables for overall sample (N = 51)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Last use of substance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2. Age of first use	-0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3. # Treatment centers	-0.09	-0.09	-	-	-	-	-	-	-	-	-	-	-	-	-
4. Longest abstinence	-0.15	0.04	0.06	-	-	-	-	-	-	-	-	-	-	-	-
5. CO (ppm) [a]	-0.29	-0.20	0.00	-0.07	-	-	-	-	-	-	-	-	-	-	-
6. Age	0.20	0.03	0.01	0.20	-0.04	-	-	-	-	-	-	-	-	-	-
7. Education	0.29	-0.15	0.27	**-0.33***	-0.18	**0.31***	-	-	-	-	-	-	-	-	-
8. Years smoking	0.17	-0.17	-0.07	0.16	0.09	**0.81*****	0.21	-	-	-	-	-	-	-	-
9. CPD [b]	-0.16	-0.23	-0.20	0.05	**0.61*****	**0.31***	-0.02	**0.46****	-	-	-	-	-	-	-
10. Quit attempts prior	-0.12	0.00	0.18	0.33	0.08	-0.04	0.04	-0.07	0.10	-	-	-	-	-	-
11. SUD [c]	-0.16	**0.34***	-0.03	-0.16	-0.15	**-0.34***	0.02	-0.27	-0.26	-0.19	-	-	-	-	-
12. Psychological disorders	-0.18	-0.01	-0.14	0.01	0.02	-0.15	-0.11	-0.10	-0.03	-0.03	0.27	-	-	-	-
13. FTND	-0.21	-0.04	-0.05	0.14	**0.33***	**0.35***	-0.18	**0.42****	**0.55*****	0.11	-0.25	-0.16	-	-	-
14. URICA	-0.11	0.09	0.20	0.13	0.20	-0.04	-0.24	0.03	0.03	-0.01	0.01	-0.19	0.14	-	-
15. SCQ-A Health Risks	-0.05	-0.09	**0.37***	0.15	0.27	0.26	0.14	**0.35***	0.07	0.17	0.08	0.05	0.21	**0.41****	-
16. SCQ-A Negative Affect	**-0.47****	0.01	0.16	0.14	0.22	0.09	-0.21	0.08	0.12	0.10	0.01	-0.07	**0.39****	**0.36***	**0.39****

[a] CO (ppm) = Carbon monoxide (parts per million)

[b] CPD = Cigarettes per day

[c] SUD = Substance use disorders

*$p \leq 0.05$; **$p \leq 0.01$, ***$p \leq 0.001$

Baseline Correlations of Participants Included in Analyses for Aims 1, 2, and 3

Education was negatively correlated with CO reading (r = -0.50, p = 0.050.) Years smoking was positively correlated with age (r = 0.94, p = 0.000). Cigarettes smoked per day was positively correlated with CO reading (r = 0.52, p = 0.047), age (r = 0.62, p = 0.013), and years smoking (r = 0.69, p = 0.004). Number of smoking quit attempts prior to entering St. Christopher's was positively correlated with longest period of abstinence from substances (r = 0.58, p = 0.048). Number of psychological disorders was negatively correlated with age (r = -0.59, p = 0.026) and education (r = -0.67, p = 0.008). The FTND was positively correlated with CO reading (r = 0.65, p = 0.009), years smoking (r = 0.62, p = 0.013), and cigarettes smoked per day (r = 0.86, p = 0.000). The SCQ-A Health Risks subscale was positively correlated with the URICA (r = 0.56, p = 0.026). The SCQ-A Negative Affect Reduction subscale was negatively correlated with days since last use of any substances (r = -0.58, p = 0.023) and positively correlated with CO reading (r = 0.67, p = 0.005), cigarettes smoked per day (r = 0.59, p = 0.021), and the FTND (r = 0.57, p = 0.026). See Table 3 for correlations of the participants included in analyses for aims 1, 2, and 3.

Table 3. Correlations among baseline study variables for main analyses sample (n = 16)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Last use of substance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2. Age of first use	-0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3. # Treatment centers	0.09	0.12	-	-	-	-	-	-	-	-	-	-	-	-	-
4. Longest abstinence	-0.05	0.14	0.28	-	-	-	-	-	-	-	-	-	-	-	-
5. CO reading [a]	-0.44	-0.21	-0.03	0.05	-	-	-	-	-	-	-	-	-	-	-
6. Age	-0.07	0.29	-0.14	0.31	-0.04	-	-	-	-	-	-	-	-	-	-
7. Education	0.29	0.27	0.31	0.39	**-0.50***	0.42	-	-	-	-	-	-	-	-	-
8. Years smoking	-0.04	0.16	-0.11	0.44	0.15	**0.94*****	0.25	-	-	-	-	-	-	-	-
9. CPD [b]	-0.35	0.00	-0.07	-0.08	**0.52***	**0.62***	0.01	**0.69****	-	-	-	-	-	-	-
10. Quit attempts prior	-0.30	0.03	0.01	**0.58***	0.47	-0.04	-0.08	0.04	0.05	-	-	-	-	-	-
11. SUD [c]	0.05	0.03	0.15	-0.02	-0.27	-0.42	0.02	-0.39	-0.23	-0.19	-	-	-	-	-
12. Psychological disorders	-0.11	-0.17	-0.17	-0.45	0.10	**-0.59***	**-0.67****	-0.42	-0.25	-0.24	0.47	-	-	-	-
13. FTND	-0.41	-0.32	0.02	-0.12	**0.65****	0.50	-0.09	**0.62***	**0.86*****	0.25	-0.45	-0.26	-	-	-
14. URICA	0.20	-0.09	0.04	0.19	0.28	0.09	-0.10	0.13	0.06	-0.09	-0.22	-0.13	0.03	-	-
15. SCQ-A Health Risks	0.25	0.32	0.17	0.31	0.21	0.20	0.19	0.15	0.13	0.23	-0.04	-0.51	0.12	**0.56***	-
16. SCQ-A Negative Affect	**-0.58***	0.00	-0.03	0.05	**0.67****	0.16	-0.08	0.17	**0.59***	0.46	0.10	-0.16	**0.57***	0.08	0.21

[a] CO (ppm) = Carbon monoxide (parts per million)

[b] CPD = Cigarettes per day

[c] SUD = Substance use disorders

*$p \leq 0.05$; **$p \leq 0.01$, ***$p \leq 0.001$

Missing Data

If a participant was unable to be reached within the time frame window for a follow-up assessment, due to participant or researcher availability, a researcher attempted to contact him at the next time point. As a result, there were several participants who completed the 60-day follow-up who were missing data from the 30-day visit and several participants who completed the 30-day follow-up who were missing data from the 60-day follow-up. Of these participants who completed one or more follow-ups, 13 completed the 30-day follow-up, 9 completed the 60-day follow-up, and 3 completed the 90-day follow-up. 16 participants were identified as completing the baseline assessment and one or more follow-up assessments. Of these 16 participants, there was one who did not respond to items on the baseline URICA and one who did not respond to items on the baseline SCQ-A Health Risks subscale. However, both of these participants completed all of the 30- and 60-day follow-up measures and were included in the main outcome analyses. Missing value analyses were conducted to identify the percentage of missing data across time points for scores on the URICA, SCQ-A Health Risks subscale, and the SCQ-A Negative Affect Reduction subscale. On the URICA, 6.3% (n = 1) of data was missing at baseline, 18.8% (n = 3) of data was missing at 30-day follow-up, and 43.8% (n = 7) of data was missing at the 60-day follow-up. On the SCQ-A Health Risks subscale, 6.3% (n = 1) of data was missing at baseline, 18.8% (n = 3) of data was missing at 30-day follow-up, and 43.8% (n = 7) of data was missing at the 60-day follow-up. On the SCQ-A Negative Affect Reduction subscale, 0% (n = 0) of data was missing at baseline, 18.8% (n = 3) of data was missing at 30-day follow-up, and 43.8% (n = 7) of data was missing at the 60-day follow-up. At baseline and 30- and 60-day follow-up, mean substitution was implemented for scores on outcome variables. For tests of the 3 main hypotheses, data from the 90-day follow-up were excluded, as mean substitution was

not appropriate for such a small sample size. Mean substitution was implemented to handle missing data only on outcome variables (e.g., URICA, SCQ-A Health Risks subscale, and SCQ-A Negative Affect Reduction subscale). While mean substitution does have limitations, it is a conservative procedure for handling missing data (Tabachnick & Fidell, 2013). Mean substitution was implemented to reduce the risk of a Type I error occurring. For the URICA, mean substitution was calculated for the Readiness to Change score, a continuous variable. For the SCQ-A mean substitution was used for the final scores on each subscale (e.g., the mean of each subscale). See Table 4 for scores on outcome variables with mean substitution implemented.

Table 4. Scores on outcome variables with mean substitution implemented (n = 16)

	Baseline	30-day follow-up	60-day follow-up
	M (*SD*)	*M* (*SD*)	*M* (*SD*)
URICA	8.8 (3.8)	9.0 (2.6)	8.6 (2.2)
SCQ-A Health Risks	8.2 (1.0)	8.1 (1.4)	6.4 (2.2)
SCQ-A Negative Affect	5.2 (2.0)	5.5 (1.8)	3.8 (1.9)

Note: *M* = Mean, *SD* = Standard Deviation

Aim 1

Repeated Measures ANOVA

A repeated measures ANOVA was conducted to determine differences on URICA scores across assessments. Bonferonni correction was applied to post hoc analyses to control for the increased probability of a Type 1 error occurring.

Mauchly's Test of Sphericity revealed the assumption of sphericity had not been violated, χ^2 (2) = 5.56, p = 0.062. A repeated measures ANOVA revealed that URICA scores did not

differ significantly between time points F (2, 30) = 0.09, p = 0.912. See Table 4 for scores on the URICA across time points.

Aim 2

Repeated Measures ANOVA

A repeated measures ANOVA was conducted to determine differences in SCQ-A Health Risks subscale scores across assessments. Bonferonni correction was applied to post hoc analyses to control for the increased probability of a Type 1 error occurring.

Mauchly's Test of Sphericity revealed the assumption of sphericity had not been violated, χ^2 (2) = 4.55, p = 0.103. A repeated measures ANOVA revealed that SCQ-A Health Risks subscale scores differed significantly between time points F (2, 30) = 5.68, p = 0.008, ηp^2 = 0.28. Post hoc tests using Bonferroni correction detected no significant difference between baseline (M = 8.2, SD = 1.0) and 30-day follow-up (M = 8.1, SD = 1.4) (p = 1.000). There were no significant differences between baseline (M = 8.2, SD = 1.0) and 60-day follow-up (M = 6.4, SD = 2.2) (p = 0.068). However, there was a significant difference between 30-day follow-up (M = 8.1, SD = 1.4) and 60-day follow-up (M = 6.4, SD = 2.2) (p = 0.050). See Table 4 for scores on the SCQ-A Health Risks subscale across time points.

Aim 3

Repeated Measures ANOVA

A repeated measures ANOVA was conducted to determine differences in SCQ-A Negative Affect Reduction subscale scores across assessments. Bonferonni correction was applied to post hoc analyses to control for the increased probability of a Type 1 error occurring.

Mauchly's Test of Sphericity revealed the assumption of sphericity had not been violated, χ^2 (2) = 1.61, p = 0.446. A repeated measures ANOVA revealed that SCQ-A Negative Affect

Reduction subscale scores differed significantly between time points F (2, 30) = 6.70, p = 0.004, ηp^2 = 0.31. Post hoc tests using Bonferroni correction detected no significant difference between baseline (M = 5.2, SD = 2.0) and 30-day follow-up (M = 5.5, SD = 1.8) (p = 1.000). There was a significant differences between baseline (M = 5.2, SD = 2.0) and 60-day follow-up (M = 3.8, SD = 1.9) (p = 0.018) and a significant difference between 30-day follow-up (M = 5.5, SD = 1.8) and 60-day follow-up (M = 3.8, SD = 1.9) (p = 0.030). See Table 4 for scores on the SCQ-A Negative Affect Reduction subscale across time points.

DISCUSSION

The purpose of the current study was to determine whether readiness to change, health risk smoking expectancies and negative affect reduction smoking expectancies differed between baseline assessment, 30-day follow-up, and 60-day follow-up for smokers in substance use treatment. In relation to aim 1, it was hypothesized that readiness to quit smoking would increase over time as smokers in substance use treatment learned new coping skills and information about the negative health risks of other substances. It was hypothesized that this information would generalize to smoking behavior, and thereby increase readiness to quit smoking. In relation to aim 2, it was hypothesized that health risk smoking expectancies would increase over time as smokers in substance use treatment learned health-oriented information and information about the negative health effects of substance abuse. The information learned in treatment about the negative health effects of other substances was hypothesized to generalize to smoking. In relation to aim 3, it was hypothesized that negative affect reduction smoking expectancies would decrease over time due to smokers in substance use treatment learning other coping skills to manage negative affect other than smoking. Analyses indicated changes in readiness to quit smoking were not significantly different across assessments. This finding was contrary to the hypothesis that readiness to quit smoking would increase with time spent in substance use treatment. There was a significant change over time in expectancies for health risks, but it was in the opposite direction of that hypothesized. That is, health risk expectancies significantly decreased over time in treatment. Lastly, there was a significant change over time in negative affect reduction expectancies occurring in the hypothesized direction with decreased scores identified at the 60-day assessment.

Baseline Characteristics and Measures

Overall Sample

In the overall sample, a majority of participants were identified as being in either the precontemplation or contemplation stage of change on the URICA upon entry to St. Christopher's. There are several possible explanations as to why smokers entering substance use treatment may not be interested or ambivalent towards quitting smoking. In the overall sample, continuous baseline URICA scores were positively correlated with health risk smoking expectancies, indicating that participants in earlier stages of change tended to have lower health risk smoking expectancies. Consistent with the current findings, past research has found increased value of health to be predictive of successful cessation and health-related beliefs about the consequences of smoking to be a strong predictor of motivation to quit smoking (Copeland et al., 1995; McCaul et al., 2006; Rose et al., 1996). Interestingly, in the overall sample, continuous baseline URICA scores were positively correlated with negative affect reduction smoking expectancies, indicating that participants in earlier stages of changed tended to have lower expectancies for smoking to reduce negative affect. Higher negative affect reduction and negative reinforcement expectancies have been found to be predictive of post-cessation smoking outcomes (Copeland et al., 1995; Wetter et al., 1994). Findings from the overall sample at baseline indicate that it might be beneficial to provide stage-matched intervention (e.g., consciousness raising) for precontemplator and contemplator smokers, who were identified to have lower health risk expectancies upon entering substance use treatment. The association between lower negative affect reduction expectancies and earlier stages of change may also provide opportunity for intervention. Smokers in early stages of change who do not have high

expectancies for smoking to reduce negative affect may be more receptive to learning coping skills other than smoking to manage negative affect.

Participant Comparisons on Baseline Measures

A significant number of participants who completed the baseline assessment only were excluded from analyses for aims 1, 2, and 3. Comparison analyses between participants who completed the baseline assessment only and participants who completed the baseline assessment and one or more follow-ups revealed one significant difference. Participants who completed the baseline assessment and one or more follow-ups were identified as having significantly more substance use disorders compared to participants who only completed baseline. This difference in groups is somewhat intuitive, as it would be expected that those with a greater number of substance use disorders would likely stay longer in substance use treatment. No other significant differences were found between participants who completed the baseline assessment only and those who completed baseline and one or more follow-up assessments on the baseline URICA, SCQ-A Health Risks subscale, and SCQ-A Negative Affect Reduction subscale. Comparison analyses provided evidence that those who completed the baseline assessment only and those who completed the baseline assessment and one or more follow-up assessments were not significantly different on baseline measures.

Main Outcomes

Aim 1

It was hypothesized in aim 1 that readiness to quit smoking would significantly increase over time as an indirect effect of being in a long-term multimodal substance use treatment center. However, this hypothesis was not supported as no significant difference was identified in readiness to quit scores across assessments. At St. Christopher's, patients learn behavioral and

cognitive coping strategies to manage distress/ prevent relapse and learn about the negative health consequences of substance abuse through psychoeducation. The apparent incongruity between readiness to change substance use and readiness to change smoking behavior may be explained by the substance use treatment context and culture. Individuals in early substance use recovery report receiving advice to postpone smoking cessation attempts from a variety of sources, including treatment center staff (Richter et al., 2002). It is therefore likely that even smokers who are currently contemplating a cessation attempt would not progress in readiness to quit smoking when they are being told cessation is inadvisable or even detrimental to their substance use recovery. In past research, investigators have concluded that cessation interventions for smokers in substance use treatment should include evidence-based information regarding the myriad benefits of quitting smoking (Hendricks et al., 2014). The provision of this information would be consistent with strategies such as 'consciousness raising' that are suggested by J. O. Prochaska and DiClemente (1982) as stage-matched processes of change for assisting precontemplators and contemplators to progress to the next stage of readiness or motivation toward addictive behavior change. Within the current study, a majority of participants who completed the baseline assessment and one or more follow-up assessments were in the precontemplation or contemplation stage of change at baseline. Implementing consciousness raising interventions, such as providing information about the causes, consequences, and treatments related to smoking, for smokers in early stages of substance use treatment may be beneficial for increasing readiness to quit smoking among this population (J. O. Prochaska et al., 2015). Of course, there is also an extensive literature within addictive behavior change in which motivation for change is addressed directly via motivational enhancement strategies and brief motivational interventions (BMIs) in which the patient's ambivalence toward change is expected

and acknowledged, and the patient is provided with treatment information only upon request (Miller & Rose, 2009). Research has shown that even providing brief advice about quitting smoking increases motivation to quit among smokers in substance abuse treatment (Rohsenow et al., 2014). In addition, pre-cessation motivational enhancement interventions have been found to be useful for increasing interest in cessation programs in the context of substance abuse treatment (Guydish et al., 2016). While interventions targeting motivation to quit smoking have been found to be successful, most are implemented in the early stages of treatment and motivation to quit is assessed in a similar time frame. The purpose of the current study was to determine if readiness to quit smoking was malleable to attendance in long-term substance use treatment, which was not supported. Interventions, such as BMIs or brief advice, may be necessary to increase readiness to quit for smokers in substance use treatment. Future research should focus efforts on tailoring proactive interventions to increase motivation to quit among smokers in substance use treatment.

Aim 2

In relation to aim 2, it was hypothesized that smoking expectancies for health risks would increase over time in substance use treatment. This hypothesis was based on the rationale that psychoeducational components of substance use treatment programs regarding health risks associated with substance use would generalize to patients' smoking behavior as well, and this would be reflected in increased health risk smoking expectancies over time. Contrary to prediction, smoking expectancies for health risks significantly decreased over time in treatment. The significant decrease was detected from the 30-day follow-up assessment to the 60-day follow-up assessment. This unexpected finding may again be due to a lack of information, or misinformation, that smokers receive in substance use treatment regarding the significant health

risks associated with continued smoking and the substantial health improvements associated with cessation. It is established in the literature that smokers with substance use comorbidities are more likely to die from smoking-related illness than alcohol use and are at an increased risk for mortality (Bandiera et al., 2015; Hser et al., 1994; Hurt et al., 1996). Although research on the negative health consequences of smoking for those with substance use disorders has been documented, this information may not be widely disseminated to staff or patients in substance use treatment centers. A recent meta-analysis determined that among mental health professionals (e.g., nurses, psychiatrists, and clinical psychologists) treating mental illness and substance use disorders, almost half reported negative attitudes towards patients quitting smoking and acceptance towards patients continuing to smoke (Sheals, Tombor, McNeill, & Shahab, 2016). Interestingly, staff in substance use treatment centers have been found to be supportive of cessation for patients as a result of health concerns (Richter et al., 2012). However, support of cessation for patients due to health concerns among staff was partly accounted for by the belief that smoking would exacerbate physiological conditions due to the use of other substances (Richter et al., 2012). This provides further support of a potential gap in the information disseminated to staff in substance use treatment centers regarding the significance of health consequences of smoking within this population.

A potential avenue for future research is the development of interventions aimed at educating mental health professionals and patients about the health consequences of smoking for those in substance use treatment. In conclusion, it may be necessary to provide psychoeducation regarding the health risks of smoking in substance use treatment to proactively address misconceptions about the health consequences of smoking in this context. The decrease in health risk expectancies over time offers support that smoking cessation services should be offered at

treatment entry, or within the first 30 days, of substance use treatment as this is when health risk expectancies were found to be the highest. Of note, the current study did not include a proactive strategy in which smoking expectancies for health risks were specifically targeted for change. In previous studies in which expectancies have been changed, they were targeted by a manipulation in which information was presented to challenge the belief (e.g., there are effective alternatives to smoking for reducing negative affect) or to augment existing beliefs (e.g., personalizing smoking-related health risk information) to reinforce or increase health risk expectancies (Copeland & Brandon, 2000). Future research should attempt to target the manipulation of health risk smoking expectancies among smokers in substance use treatment.

Aim 3

In relation to Aim 3, it was hypothesized that negative affect reduction expectancies would decrease over time in substance use treatment, as patients acquire alternative skills to manage their negative moods. This hypothesis was supported, as there was a significant change in negative affect reduction expectancies as a function of time or experience in substance use treatment with lowest scores reported at the 60-day follow-up. It was anticipated that knowledge from substance use treatment would generalize from substance use to smoking and that knowledge would be sufficient (albeit indirect) to modify existing smoking expectancies for negative affect reduction. The findings indicate that generalization did occur and was robust enough to modify expectancies. St. Christopher's multimodal program utilizes evidence-based treatments, including dialectical behavior therapy skills and acceptance commitment therapy as components of group and individual therapy (STC, 2016). A core component of both these evidence-based treatments is mindfulness (Luoma, Hayes, & Walser, 2007; McKay, Wood, & Brantley, 2019). Research has shown mindful attention to be negatively associated with negative

affect among smokers (Paulus, Langdon, Wetter, & Zvolensky, 2018). Among those in cessation programs, mindfulness has been associated with decreased expectancies of smoking to improve mood (Spears et al., 2019). Although St. Christopher's program is not entirely centered on the use of mindfulness-based interventions in the treatment of substance use disorders, exposure to such interventions may have generalized to smoking behavior and negative affect reduction smoking expectancies. Findings suggest that it may be beneficial to provide cessation services later in treatment when patients have established other coping strategies to manage negative affect other than smoking. While treatment at St. Christopher's incorporates interventions with mindfulness components, future research should identify which specific coping skills to manage negative affect developed in substance use treatment are linked to decreases in negative affect reduction smoking expectancies. It may be the case that negative affect reduction smoking expectancies can also be directly addressed and challenged in the context of substance use treatment, in order to be significantly modified. For example, this might entail teaching patients effective, alternate, concrete skills to manage negative mood (e.g., deep breathing, relaxation) without resorting to smoking. Another strategy might be to challenge the validity of the belief by developing competing cognitions, such as smoking is only a temporary fix for negative mood and precludes the smoker from addressing the source of negative affect and potentially resolving it. In previous studies, efforts to then personalize this information have been effective in changing expectancies in the desired direction (Copeland & Brandon, 2000). Future research is needed to determine if negative affect reduction expectancies can be challenged earlier on in substance use treatment prior to 60 days.

Limitations

There were several notable limitations to the current study, such that the current findings

should be interpreted with caution. First, the study was significantly underpowered. A power analysis indicated that a sample of at least 46 participants completing all four assessments was required to detect meaningful differences over time if they occurred. While the required sample size was not met, the most conservative methods of handling missing data and performing statistical analyses were implemented to prevent a Type I error occurrence. Out of the patients admitted to St. Christopher's during recruitment for the current study, only 38.6% completed the baseline assessment and only 12.1% completed the baseline assessment and one or more follow-ups. Mean substitution was implemented for 22.9% of data used in aims 1 and 2 and 20.8% of data used in aim 3. The small sample used in aims 1, 2, and 3 was highly biased based on self-selection to stay in treatment and is most likely unrepresentative of smokers in substance use treatment. It was identified that participants who completed the baseline assessment only and those who completed the baseline and one or more follow-ups did not significantly differ on baseline assessments and measures other than the number of substance use disorders present. It was hypothesized that coping skills learned in substance use treatment would indirectly generalize from substance use to smoking and this generalization would modify readiness to quit smoking and negative affect reduction smoking expectancies. While negative affect reduction smoking expectancies did decrease, potentially due to the acquisition of coping skills learned in substance use treatment, the current study did not include a measure of coping skills. Future research examining changes in readiness to quit smoking and negative affect reduction smoking expectancies in the context of substance use treatment should include a measure of coping skills, specifically, cognitive coping skills.

Overall changes to St. Christopher's program contributed to difficulties with baseline and follow-up data collection. Strategies were implemented in an effort to overcome these

difficulties. Prior to beginning study recruitment, a presentation was provided to the staff at St. Christopher's, giving an overview of the study in an effort to build staff "buy-in" to assist with data collection. In the early phases of study recruitment, several staff who had initially agreed to assist in the collection of data were no longer working at St. Christopher's or were working in other positions within the facility. The reduction in staff assistance led to researchers spending increased time attempting to locate participants for baseline assessments and follow-ups. There was also a turnover in the retention of researchers who were recruiting participants and administering baseline measures. The loss of researchers who were available to recruit and administer baseline assessments led to a number of patients being ineligible to participate due to seven days passing following their admittance to St. Christopher's. As a result, other researchers assisting with data collection were reassigned from collecting follow-up assessments to help with baseline data collection. In the early phases of data collection, the treatment center changed ownership and the head admissions coordinator resigned. The head admissions coordinator would actively recruit patients and their families to commit to long-term treatment. Following his resignation, a number of patients were found to be discharging treatment or transitioning to a lower level of care earlier than usual.

Regarding issues with initial baseline recruitment, a number of patients reported not being interested for several reasons. Throughout data collection, several patients reported disinterest in participation due to the lack of incentives for the time it took to complete the four assessments. Unfortunately, the inclusion of incentives posed ethical problems as participants had to be smokers in order to be eligible for the study. Incentivizing participation could have potentially led to patients at St. Christopher's to begin smoking in order to receive incentives for participation. During the middle phase of baseline data collection, it was determined that patients

were reporting disinterest due to one participant advising others not to participate. The participant was informing others that he believed the proposed sample size addressed in the consent form was not adequately powered. The researcher collecting baseline data with this participant discussed how the proposed sample size was determined. Another researcher met with this participant at a later date to address that the sample size proposed in the consent form was sufficient and to please refrain from discussing the study with other patients. Furthermore, to circumvent this problem, the researcher collecting baseline data had staff at St. Christopher's bring patients to the office where data was collected. This change in procedure was done in lieu of the researcher approaching patients in the milieu where they could be swayed by the opinions of others. This seemed to reduce the influence of patients deterring potential participants. The EMR charting system posed a problem in identifying newly admitted patients. The EMR charting system labeled potential admits to St. Christopher's the same as newly admitted patients. As a result, there were several instances where the first author contacted one of the study recruitment researchers to meet with a potential participant only to find out that the patient had decided against coming to treatment. One of the researchers was actively working at St. Christopher's and became a point of contact to identify if a patient admitted into treatment and could be contacted for recruitment.

The collection of follow-up assessments became significantly more difficult as data collection proceeded. As mentioned earlier, the head admissions counselor and several staff resigned from their positions throughout the early to middle stages of data collection and there was a transition in ownership. Several of the staff who had initially agreed to assist researchers with collecting follow-up data resigned or transitioned to other roles within the facility. Researchers significantly increased the number of days and times they would attempt to follow-

up with participants, which was not always successful. Identifying when a participant was transitioning from one level of care to the next or discharging from the program was also problematic for collecting follow-ups. This information was not available within the EMR system. To address this problem, the researcher conducting follow-ups would call counselors or staff days prior to the anticipated follow-up date to check the patient's discharge/transition date in an attempt to follow-up prior to discharge/ transition.

Finally, there were changes made to the medical and psychological intake evaluation format and a transition to a new EMR charting system, which resulted in difficulty in collecting some information for the Substance Use and Mental Health Form. The old EMR charting system included a psychosocial assessment form that was used to develop items on the Substance Use and Mental Health Form used in the current study. The new EMR charting system did not use this same psychosocial assessment form. Information pertaining to previous mental health treatment (other than substance use treatment) was not collected from the EMR charting system. Within the psychiatrist and nurse practitioner notes in the EMR charting system, the explanation for prescription of certain medications was not always clear. A number of medications have off-label psychiatric uses, which made it unclear as to the reason for a prescription if not stated explicitly. For example, gabapentin is prescribed as an adjunctive medication for alcohol use disorder (Mason, Quello, & Shadan, 2018), yet it is also prescribed for seizures (Chadwick et al., 1998) and diabetic neuropathy (Moore, Wiffen, Derry, & Rice, 2014). Due to the variability in the explicit identification of the purpose of prescribed medication, this information was not collected.

Conclusion

The results of the current study provide some insight into when smokers in substance use

treatment may be most receptive to quitting smoking. It was determined that readiness to quit smoking did not differ significantly by assessment, while negative affect reduction and health risk smoking expectancies were both found to significantly decrease at the 60-day follow-up. Results may seem contradictory as decreased negative affect reduction expectancies and increased health risk expectancies have been found to be predictive of quit attempts and successful cessation (Copeland et al., 1995). It may be beneficial to incorporate a manipulation to challenge the beliefs or to augment existing beliefs related to health risk expectancies early on in substance use treatment. Coping skills learned in substance use treatment may generalize to smoking behavior and reduce negative affect reduction smoking expectancies as a patient progresses through treatment. It may be especially important to include "pre-cessation readiness" or motivational enhancement interventions to increase readiness to quit, which have been found to be effective in prior literature (Guydish et al., 2016). Smokers in substance use treatment may need more comprehensive multicomponent cessation interventions to elicit change. In conclusion, it may be beneficial to provide cessation services between 30 and 60 days after entering substance use treatment when there has been an opportunity to augment health risk expectancies, provide pre-cessation motivational enhancement, and develop generalizable coping skills to manage negative affect. Future studies of this type should address issues of external validity and determine whether similar results are found in an adequately powered study, and whether similar results would be obtained with a population with diverse demographics, as the current study included only white males of a similar sociodemographic. Readiness to change and smoking outcome expectancies are important factors in determining the optimal timing of smoking cessation for smokers in substance use treatment, and further research is needed to understand the role of these constructs within this context.

APPENDIX A. CONSENT FORM

Study Title: *Readiness to Change and Smoking Expectancies Among Adult Male Substance Users Currently in Substance Use Treatment*

Study Purpose and Procedure: The purpose of this research project is to identify changes in smoking expectancies and readiness to quit smoking among adult males in substance use treatment.

The study requires that you complete several surveys at different times, including questionnaires regarding your use of cigarettes and other nicotine products, expectancies related to smoking, and readiness to quit smoking as well as a breathalyzer to determine current smoking. Additionally, information from your St. Christopher's chart will be used to gather pertinent information regarding current and past psychological/medical history.

Risks/Discomforts: Participation in the study is not known to cause any physical or psychological risk or discomfort. Confidentiality is protected through use of a secured office and locked filing cabinet where all completed study materials will be stored. While every effort is being made to preserve confidentiality, there is always a remote possibility that thieves could obtain your data. Again, this is very unlikely given the multiple steps taken to assure that completed study measures kept protected.

Benefits: You will be contributing to our knowledge regarding smoking behavior among those in substance use treatment.

Alternatives: There are not alternatives for discontinuing participation. If you would like resources regarding smoking cessation a list of referrals will be provided, but we cannot attest to their efficacy.

Contact: Amy L. Copeland, Ph.D., M.P., the Principal Investigator, can be reached at copelan@lsu.edu. The Co-Investigator, Aaron Waters, M.A., can be reached at awater7@lsu.edu

Performance Sites: St. Christopher's Addiction Wellness Center

Number of Participants: The maximum number of participants we plan to enroll is 200.

Subjects:

Inclusion: In order to participate in the study, participants must be 1) currently admitted at St. Christopher's, 2) be ≥ 18 years of age at the initial study visit, 3) be a current smoker (e.g., report at least weekly smoking and provide an expired carbon monoxide monitor reading of 8 $\geq$ parts per million), 4) not mandated by court system to attend substance use treatment, and 5) demonstrate a 7th grade reading level or higher.

Exclusion: Participants will be excluded if any of the above criteria are not met.

Privacy: Results of this study may be published, but no names or identifying information will be included in the publication. All personal information obtained in this study will be kept confidential. Your responses will be labeled only with a study identification number within an electronic database.

Financial Information: There is no financial compensation for participation in this study.

Right to Refuse: Participation in this study is voluntary, and you may withdraw from the study at any time without prejudicing your future relations with St. Christopher's Addiction Wellness Center.

Unforeseeable Risks: As with any study, confidentiality is a concern, however, confidentiality risk is unlikely given the steps we have taken to ensure that participant identifying information is kept confidential. Confidentiality is protected using locked filing cabinets in secured rooms at Louisiana State University. Additionally, we have obtained a Certificate of Confidentiality through the National Institutes of Health.

Study-related illness or injury: Participants are instructed to seek necessary medical care from their physician and contact the Principal Investigator, Dr. Amy Copeland (copelan@lsu.edu) in the event of a study-related illness or injury.

New Findings: Any significant new findings developed from the study data or independent sources during the course of research which may influence your willingness to continue in the study will be explained to you.

Withdrawal: Participants may withdraw from the study at any time.

Removal: Obvious disruption, harm or threat of harm to other study participants or members of the research team will conclude in participant removal from the study. Additionally, if a participant leaves treatment at St. Christopher's they will be removed.

Certificate of Confidentiality: To help us protect your privacy, we have obtained a Certificate of Confidentiality from the National Institutes of Health. With this Certificate, the researchers cannot be forced to disclose information that may identify you, even by a court subpoena, in any federal, state, or local civil, criminal, administrative, legislative, or other proceedings. The researchers will use the Certificate to resist any demands for information that would identify you, except as explained below.

The Certificate cannot be used to resist a demand for information from personnel of the United States Government that is used for auditing or evaluation of federally funded projects or for information that must be disclosed in order to meet the requirements of the federal Food and Drug Administration (FDA).

You should understand that a Certificate of Confidentiality does not prevent you or a member of your family from voluntarily releasing information about yourself or your involvement in this research. If an insurer, employer, or other person obtains your written consent to receive research information, then the researchers may not use the Certificate to withhold that information.

The Certificate of Confidentiality does not prevent the researchers from disclosing voluntarily, without your consent, information that would identify you as a participant in the research project under the following circumstances: reporting of child abuse and intent to hurt self or others.

Signatures: "The study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigators. For injury or illness, call your physician, or the Student Health Center if you are an LSU student. If I have questions about subject's rights or other concerns, I can contact Dennis Landin, Chairman, LSU Institutional Review Board, (225) 578-8692, irb@lsu.edu, or www.lsu.edu/research. I agree to participate in the study described above and acknowledge the researcher's obligation to provide me with a copy of this consent form if signed by me."

Subject Signature: _____ Date: _____

Illiterate subjects: When ANY subjects are likely to be illiterate, the "reader statement" and signature line below are included.)

"The study subject has indicated to me that he/she is unable to read. I certify that I read this consent form to the subject and explained by completing the signature line above, the subject agreed to participate."

Signature of Reader: _____ Date: _____

For research involving the collection of identifiable private information or identifiable biospecimens one of the following must be listed on the consent form:

Identifiers might be removed from the identifiable private information or identifiable biospecimens. After removal, the information or biospecimens may be used for future research studies or distributed to another investigator for future research studies without additional informed consent.

Yes, I give permission_____
Signature

No, I do not give permission_____

APPENDIX B. HIPAA AGREEMENT FORM

Authorization to Use or Disclose (Release) Health Information that Identifies You for a Research Study

If you sign this document, you give permission to St. Christopher's Addiction Wellness Center (St. Christopher's) to use or disclose (release) your health information that identifies you for the research study described here:

The current study titled, *Readiness to Change and Smoking Expectancies Among Adult Male Substance Users Currently in Substance Use Treatment*, is being conducted at St. Christopher's. The study aims to identify changes in smoking expectancies and readiness to quit smoking among adult males in substance use treatment.

The health information that we may use or disclose (release) for this research includes:

The current study will use information pertaining to a participant's substance use and mental health history that will be collected from medical chart records through St. Christopher's online charting system.

The health information listed above may be used by and/or disclosed (released) to: The Copeland Smoking and Substance Use Clinical Research Lab.

St. Christopher's is required by law to protect your health information. By signing this document, you authorize St. Christopher's to use and/or disclose (release) your health information for this research. Those persons who receive your health information may not be required by Federal privacy laws (such as the Privacy Rule) to protect it and may share your information with others without your permission, if permitted by laws governing them.

Please note that St. Christopher's may not condition (withhold or refuse) treating you on whether you sign this Authorization.

Please note that you may change your mind and revoke (take back) this Authorization at any time, except to the extent that St. Christopher's has already acted based on this Authorization. To revoke this Authorization, you must write to:

St. Christopher's Addiction Wellness Center
150 Cora Drive
Baton Rouge, LA 70815
(225) 387-1611

This Authorization does not have an expiration date.

_____	_____
Signature of participant or participant's personal representative	Date
_____	_____
Printed name of participant or participant's personal representative	If applicable, a description of the personal representative's authority to sign for the participant

APPENDIX C. THE RAPID ESTIMATE OF ADULT LITERACY IN MEDICINE — SHORT FORM

Patient ID #: _____ Date: _____

Behavior _____

Exercise _____

Menopause _____

Rectal _____

Antibiotics _____

Anemia _____

Jaundice _____

TOTAL SCORE _____

APPENDIX D. DEMOGRAPHIC AND SMOKING QUESTIONNAIRE

TO BE COMPLETED BY RESEARCHER

Date: _____

Participant ID#: _____

Assessment #: _____

Treatment (Primary, EC, IOP, 12-Step): _____

Carbon Monoxide Monitor Reading: _____

TO BE COMPLETED BY PARTICIPANT

1. Age: _____ 2. Sex (circle one) MALE FEMALE

3. Highest level of education completed (in years): _____

4. Annual household income: _____

5. What is your current employment status? (circle one)
   a. Unemployed
   b. Part-time employed
   c. Full-time employed

6. With which ethnic/ racial group do you most identify yourself? (circle one)
   a. Caucasian
   b. African-American
   c. Asian
   d. Hispanic
   e. Other

7. How often do you smoke? (circle one)
   a. Daily
   b. Weekly
   c. Monthly
   d. Yearly

8. Do you smoke cigarettes every day? (circle one)
    a. Yes
    b. No

    (If YES, please answer question #9-10.
    If NO, please skip to #11)

9. How many years have you been smoking daily? _____

10. How many cigarettes per day do you smoke on average? _____

11. How many serious attempts (at least 24 hours) have you made to quit smoking **PRIOR** to entering St. Christopher's substance use treatment center? _____

12. How many serious attempts (at least 24 hours) have you made to quit smoking **SINCE** you have been in substance use treatment at St. Christopher's? _____

13. Do you use any type of electronic cigarette or vape? (circle one)
    a. Yes
    b. No

14. Do you use any other types of smokeless tobacco (e.g., chewing tobacco)? (circle one)
    a. Yes
    b. No

15. How are you currently paying for substance use treatment at St. Christopher's? (circle one)
    a. Medicaid/Medicare
    b. Private health insurance
    c. Out of pocket

APPENDIX E. SUBSTANCE USE AND MENTAL HEALTH FORM

TO BE TAKEN FROM PSYCHOSOCIAL ASSESSMENT IN PATIENT CHART:

1.When was last use of any substance? _____

2. What was last substance used prior to entering treatment? _____

3. What is substance of choice? _____

4. Age of first use and substance used: _____

5. Number of treatment centers attended: _____

6. Longest period of completed abstinence from substances: _____

7. Substances used during month prior to admission to substance use treatment (circle below):

a. Alcohol	f. Amphetamines	j. Hallucinogens
b. Cannabis	g. Opiates	k. Ecstasy
c. Cocaine (crack)	h. Benzodiazepines	l. Bath salts
d. Cocaine (powder)	i. Inhalants	
e. Methamphetamine	k. steroids	

8. Current suicidal ideation? YES NO

9. Past suicidal ideation? YES NO

10. Mental health treatment

Date: _____ Condition being treated: _____

Date: _____ Condition being treated: _____

Date: _____ Condition being treated: _____

Date: _____ Condition being treated: _____

Date: _____ Condition being treated: _____

Date: _____ Condition being treated: _____

11. Medications

Current medication: _____

Current medication: _____

Current medication: _____

Current medication: _____

12. DSM – 5 Criteria for Substances of Choice

Substance use disorder: _____ Severity: _____

Substance use disorder: _____ Severity: _____

TO BE TAKEN FROM PSYCHIATRIST OR NURSE PRACTITIONER NOTE IN PATIENT CHART:

Substance use disorders present:

Substance use disorder: _____ Severity: _____

Substance use disorder: _____ Severity: _____

Substance use disorder: _____ Severity: _____

Substance use disorder: _____ Severity: _____

Other psychological disorders present:

Disorder: _____ Severity: _____

Disorder: _____ Severity: _____

Disorder: _____ Severity: _____

Disorder: _____ Severity: _____

APPENDIX F. UNIVERSITY OF RHODE ISLAND STAGES OF CHANGE ASSESSMENT

Please indicate the extent to which you tend to agree or disagree with each statement. In each case, make your choice in terms of how you feel right now, not what you have felt in the past or would like to feel.

For all the statements that refer to your "problem", answer in terms of your smoking. And "here" refers to the place of treatment.

There are FIVE possible responses to each of the items in the questionnaire:
1 = Strongly Disagree 2 = Disagree 3 = Undecided 4 = Agree 5 = Strongly Agree

1.	As far as I'm concerned, I don't have any problems that need changing.	_____
2.	I think I might be ready for some self-improvement.	_____
3.	I am doing something about the problems that had been bothering me.	_____
4.	It might be worthwhile to work on my problem.	_____
5.	I'm not the problem one. It doesn't make much sense for me to be here.	_____
6.	It worries me that I might slip back on a problem I have already changed, so I am here to seek help.	_____
7.	I am finally doing some work on my problem.	_____
8.	I've been thinking that I might want to change something about myself.	_____
9.	I have been successful in working on my problem but I'm not sure I can keep up the effort on my own.	_____
10.	At times my problem is difficult, but I'm working on it.	_____
11.	Being here is pretty much a waste of time for me because the problem doesn't have to do with me.	_____
12.	I'm hoping this place will help me to better understand myself.	_____
13.	I guess I have faults, but there's nothing that I really need to change.	_____
14.	I am really working hard to change.	_____
15.	I have a problem and I really think I should work at it.	_____
16.	I'm not following through with what I had already changed as well as I had hoped, and I'm here to prevent a relapse of the problem.	_____
17.	Even though I'm not always successful in changing, I am at least working on my problem.	_____
18.	I thought once I had resolved my problem I would be free of it, but sometimes I still find myself struggling with it.	_____
19.	I wish I had more ideas on how to solve the problem.	_____
20.	I have started working on my problems but I would like help.	_____
21.	Maybe this place will be able to help me.	_____

22.	I may need a boost right now to help me maintain the changes I've already made.	_____
23.	I may be part of the problem, but I don't really think I am.	_____
24.	I hope that someone here will have some good advice for me.	_____
25.	Anyone can talk about changing; I'm actually doing something about it.	_____
26.	All this talk about psychology is boring. Why can't people just forget about their problems?	_____
27.	I'm here to prevent myself from having a relapse of my problem.	_____
28.	It is frustrating, but I feel I might be having a recurrence of a problem I thought I had resolved.	_____
29.	I have worries but so does the next guy. Why spend time thinking about them?	_____
30.	I am actively working on my problem.	_____
31.	I would rather cope with my faults than try to change them.	_____
32.	After all I had done to try to change my problem, every now and again it comes back to haunt me.	_____

APPENDIX G. SMOKING CONSEQUENCES QUESTIONNAIRE – ADULT

Instructions: This questionnaire is designed to assess beliefs people have about the consequences of smoking a cigarette. We are interested in your general expectations about the consequences of your smoking. Below is a list of statements. Each statement contains a possible consequence of smoking. For each of the statements listed below, please rate how LIKELY or UNLIKELY you believe each consequence is <u>for you</u> when you smoke. If the consequence seems LIKELY to you, circle a number from 5-9. That is, if you believe that a consequence would never happen, circle 0; if you believe a consequence would happen every time you smoke, circle 9. Use the guide below to aid you further. For example, if a consequence seems completely likely to you, you would circle 9. If it seems a little unlikely to you, you would circle 4.

0 Completely Extremely **1** **2** Very **3** **4** A little **5** A little **6** **7** Very **8** **9** Completely Extremely Somewhat Somewhat Extremely

←----------**UNLIKELY**----------X----------**LIKELY**----------→

	UNLIKELY									LIKELY
1. Cigarettes taste good.	0	1	2	3	4	5	6	7	8	9
2. Smoking controls my appetite.	0	1	2	3	4	5	6	7	8	9
3. My throat burns after smoking.	0	1	2	3	4	5	6	7	8	9
4. Cigarettes help me deal with anxiety or worry.	0	1	2	3	4	5	6	7	8	9
5. Nicotine "fits" can be controlled by smoking.	0	1	2	3	4	5	6	7	8	9
6. When I'm angry, a cigarette can calm me down.	0	1	2	3	4	5	6	7	8	9
7. When I'm alone, a cigarette can help me pass the time.	0	1	2	3	4	5	6	7	8	9
8. I become more addicted the more I smoke.	0	1	2	3	4	5	6	7	8	9
9. If I'm tense, a cigarette helps me to relax.	0	1	2	3	4	5	6	7	8	9
10. Cigarettes keep me from overeating.	0	1	2	3	4	5	6	7	8	9
11. Smoking a cigarette energizes me.	0	1	2	3	4	5	6	7	8	9
12. Cigarettes help me deal with anger.	0	1	2	3	4	5	6	7	8	9
13. Smoking calms me down when I feel nervous.	0	1	2	3	4	5	6	7	8	9
14. Cigarettes make my lungs hurt.	0	1	2	3	4	5	6	7	8	9
15. I feel like I do a better job when I am smoking.	0	1	2	3	4	5	6	7	8	9
16. A cigarette can give me energy when I'm bored and tired.	0	1	2	3	4	5	6	7	8	9
17. Cigarettes can really make me feel good.	0	1	2	3	4	5	6	7	8	9
18. When I'm feeling happy, smoking helps me keep that feeling.	0	1	2	3	4	5	6	7	8	9
19. I will enjoy the flavor of a cigarette.	0	1	2	3	4	5	6	7	8	9
20. If I have nothing to do, a smoke can help kill time.	0	1	2	3	4	5	6	7	8	9
21. I will enjoy feeling a cigarette on my tongue and lips.	0	1	2	3	4	5	6	7	8	9
22. Smoking will satisfy my nicotine cravings.	0	1	2	3	4	5	6	7	8	9
23. I feel like part of a group when I'm around other smokers.	0	1	2	3	4	5	6	7	8	9
24. Smoking makes me seem less attractive.	0	1	2	3	4	5	6	7	8	9
25. By smoking, I risk heart disease and lung cancer.	0	1	2	3	4	5	6	7	8	9

26. Smoking makes me enjoy people more.	0	1	2	3	4	5	6	7	8	9
27. Cigarettes help me reduce or handle tension.	0	1	2	3	4	5	6	7	8	9
28. I feel better physically after having a cigarette.	0	1	2	3	4	5	6	7	8	9
29. I enjoy parties more when I am smoking.	0	1	2	3	4	5	6	7	8	9
30. People think less of me if they see me smoking.	0	1	2	3	4	5	6	7	8	9
31. A cigarette can satisfy my urge to smoke.	0	1	2	3	4	5	6	7	8	9
32. Just handling a cigarette is pleasurable.	0	1	2	3	4	5	6	7	8	9
33. If I'm feeling irritable, a smoke will help me relax.	0	1	2	3	4	5	6	7	8	9
34. Smoking irritates my mouth and throat.	0	1	2	3	4	5	6	7	8	9
35. When I feel bored and tired, a cigarette can really help.	0	1	2	3	4	5	6	7	8	9
36. I will become more dependent on nicotine if I continue smoking.	0	1	2	3	4	5	6	7	8	9
37. Smoking helps me control my weight.	0	1	2	3	4	5	6	7	8	9
38. When I'm upset with someone, a cigarette helps me cope.	0	1	2	3	4	5	6	7	8	9
39. The more I smoke, the more I risk my health.	0	1	2	3	4	5	6	7	8	9
40. Cigarettes keep me from eating more than I should.	0	1	2	3	4	5	6	7	8	9
41. I enjoy the steps I take to light up.	0	1	2	3	4	5	6	7	8	9
42. Conversations seem more special if we are all smoking.	0	1	2	3	4	5	6	7	8	9
43. I look ridiculous while smoking.	0	1	2	3	4	5	6	7	8	9
44. Smoking keeps my weight down.	0	1	2	3	4	5	6	7	8	9
45. I like the way a cigarette makes me feel physically.	0	1	2	3	4	5	6	7	8	9
46. Smoking is hazardous to my health.	0	1	2	3	4	5	6	7	8	9
47. I enjoy feeling the smoke hit my mouth and the back of my throat.	0	1	2	3	4	5	6	7	8	9
48. When I smoke, the taste is pleasant.	0	1	2	3	4	5	6	7	8	9
49. I like to watch the smoke from my cigarette.	0	1	2	3	4	5	6	7	8	9
50. When I am worrying about something, a cigarette is helpful.	0	1	2	3	4	5	6	7	8	9
51. Smoking temporarily reduces those repeated urges for cigarettes.	0	1	2	3	4	5	6	7	8	9
52. I enjoy the taste sensations while smoking.	0	1	2	3	4	5	6	7	8	9
53. I feel more at ease with other people if I have a cigarette.	0	1	2	3	4	5	6	7	8	9
54. Cigarettes are good for dealing with boredom.	0	1	2	3	4	5	6	7	8	9
55. Smoking is taking years off my life.	0	1	2	3	4	5	6	7	8	9

APPENDIX H. FAGERSTRÖM TEST FOR NICOTINE DEPENDENCE

1. How soon after you wake up do you smoke your first cigarette?
    a. Within 5 minutes
    b. 6-30 minutes
    c. 31-60 minutes
    d. After 60 minutes

2. Do you find it difficult to refrain from smoking in places where it is forbidden e.g., in church, at the library, in the cinema, etc.?
    a. Yes
    b. No

3. Which cigarette would you hate most to give up?
    a. The first one in the morning
    b. All others

4. How many cigarettes do you smoke a day?
    a. 10 or less
    b. 11-20
    c. 21-30
    d. 31 or more

5. Do you smoke more frequently during the first hours after waking than during the rest of the day?
    a. Yes
    b. No

6. Do you smoke if you are so ill that you are in bed most of the day?
    a. Yes
    b. No

APPENDIX I. IRB APPROVAL

ACTION ON PROTOCOL APPROVAL REQUEST

Institutional Review Board
Dr. Dennis Landin, Chair
130 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8692
F: 225.578.5983
irb@lsu.edu
lsu.edu/research

TO: Amy Copeland
Psychology

FROM: Dennis Landin
Chair, Institutional Review Board

DATE: January 10, 2019

RE: **IRB#** 4165

TITLE: Readiness to change and smoking expectancies among adult male substance users currently in substance use treatment

New Protocol/Modification/Continuation: New Protocol

Review type: Full ____ Expedited _X_ **Review date:** 12/12/2018

Risk Factor: Minimal ___X___ Uncertain _____ Greater Than Minimal_____

Approved_____X_____ **Disapproved**_____

Approval Date: 1/10/2019 **Approval Expiration Date:** 1/9/2020

Re-review frequency: (annual unless otherwise stated)

Number of subjects approved: 200

LSU Proposal Number (if applicable):

By: Dennis Landin, Chairman DLandin

PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING –
Continuing approval is CONDITIONAL on:

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants, including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
7. Notification of the IRB of a serious compliance failure.
8. **SPECIAL NOTE: When emailing more than one recipient, make sure you use bcc.**

**All investigators and support staff have access to copies of the Belmont Report, LSU's Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at http://www.lsu.edu/irb*

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VITA

Aaron F. Waters, originally from Marin County, California, completed his Bachelor of Science in psychology from California Lutheran University (CLU) in 2014, his Masters of Arts in clinical psychology from Louisiana State University (LSU) in 2018, and his Doctorate of Philosophy in clinical psychology from LSU in fall 2020. During Aaron's time at LSU he worked under the supervision of Dr. Amy L. Copeland. Aaron's current research interests focus on determining ways to increase success in smoking cessation for at-risk populations.