The Efficacy Of Brief Individual And Group Interventions Among Light And Intermittent Smokers

Beatriz Suro Maldonado
University of Texas at El Paso, bmsuromaldonado@miners.utep.edu

Follow this and additional works at: https://digitalcommons.utep.edu/open_etd
Part of the Clinical Psychology Commons

Recommended Citation
https://digitalcommons.utep.edu/open_etd/968
THE EFFICACY OF BRIEF INDIVIDUAL AND GROUP INTERVENTIONS AMONG LIGHT AND INTERMITTENT SMOKERS

BEATRIZ SURO MALDONADO
Master’s Program in Clinical Psychology

APPROVED:

_________________________________________
Lawrence D. Cohn, Ph.D., Chair

_________________________________________
John S. Wiebe, Ph.D.

_________________________________________
Julia Lechuga, Ph.D.

_________________________________________
Joao B. Ferreira-Pinto, Ph.D.

_________________________________________
Charles Ambler, Ph.D.
Dean of the Graduate School
Dedication

To my parents Linda Maldonado and Victor Rodriguez for always believing in me and for teaching me that hard work, discipline, dedication and sacrifices are vital to reach your dreams. To my grandmother Yolanda Diaz for all her love, kindness and guidance. I want to thank all of them for the unconditional support and encouragement to continue my graduate studies.
THE EFFICACY OF A BRIEF INDIVIDUAL AND GROUP INTERVENTIONS AMONG LIGHT AND INTERMITTENT SMOKERS

by

BEATRIZ SURO MALDONADO, B.A

THESIS

Presented to the Faculty of the Graduate School of
The University of Texas at El Paso
in Partial Fulfillment
of the Requirements
for the Degree of

MASTER OF ARTS

Department of Psychology
THE UNIVERSITY OF TEXAS AT EL PASO
May 2016
Acknowledgements

This study was funded by A Smoke Free Paso del Norte: An Initiative of Paso del Norte Health Foundation Grant No: 26-8113-72.

I would like to thank Dr. Cooper and Dr. Cohn for their encouragement and guidance with my thesis. I would also like to thank all the members of the Prevention and Treatment in Clinical Health Lab for their support and assistance with this study.
Abstract

Despite the decline in daily smoking between 2005 to 2013, light and intermittent smoking rates have increased. Few studies assessing smoking cessation in light (≤10 cigarettes per day) and intermittent smokers (nondaily smoking; LITS) exist. The current study assessed the efficacy of a brief smoking intervention for light smokers in a predominantly Hispanic young adult sample. Several smoking cessation predictors were identified. Two hundred fifty two light and intermittent smokers were recruited primarily from community health clinics and the University of Texas at El Paso (UTEP). Participants completed baseline measures assessing socio demographics, tobacco use and history, stage of change, and perceived competence (PC). Participants were randomly assigned to receive either the individual intervention (INDI) or group intervention (GI). At the three month follow-up, all participants smoking status, stage of change, nicotine dependence and PC were assessed. Logistic and linear regression models were used to identify predictors of smoking cessation, smoking reduction, motivation to change, and perceived competence. Independent variables included intervention format (INDI vs. GI), age, smoking status, nicotine dependence, and motivation to quit. At three months post testing, results indicated that both intervention conditions were associated with reduction in smoking related behaviors. Lower smoking status and higher motivation to quit at baseline significantly predicted smoking reduction at follow-up. However there was not a statistical significantly difference in cessation, reduction, motivation to quit or perceived competence between participants who received the INDI or the GI. Future efforts should focus on capitalizing on motivation to change and perceived competence to promote smoking cessation.
# Table of Contents

Acknowledgements ........................................................................................................... v

Abstract .......................................................................................................................... vi

Table of Contents ........................................................................................................... vii

List of Tables .................................................................................................................. ix

Chapter 1: Introduction ................................................................................................. 1
  1.1 Health Consequences of Smoking ........................................................................ 1
  1.2 Light Smokers and Hispanics ................................................................................. 2
  1.3 Cessations Interventions ....................................................................................... 5
    Pharmacological Interventions ................................................................................... 5
    Mental Health and Educational Interventions .......................................................... 6
    Health Education (HE) ............................................................................................. 7
    Motivational Interviewing (MI) ................................................................................ 7
    Trigger Management ................................................................................................ 9
    Group Interventions ................................................................................................. 10

Chapter 2: Method .......................................................................................................... 18
  2.1 Participants ............................................................................................................. 18
  2.2 Measures ............................................................................................................... 19
    Baseline Smoking Status (B.S.S) ............................................................................ 19
    Smoking Reduction ................................................................................................. 20
    Smoking Cessation .................................................................................................. 20
  2.3 Screening Procedure ............................................................................................ 22
  2.4 Intervention .......................................................................................................... 24
  2.5 Individual Intervention .......................................................................................... 24
    Motivational Enhancement (ME) .......................................................................... 24
    Trigger Management ............................................................................................... 25
    Health Education .................................................................................................... 26
    Booster Calls .......................................................................................................... 26
    Quit Tips .................................................................................................................. 27
  2.6 Group Intervention ............................................................................................... 27
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session One</td>
<td>27</td>
</tr>
<tr>
<td>Session Two</td>
<td>28</td>
</tr>
<tr>
<td>Session Three</td>
<td>28</td>
</tr>
<tr>
<td>2.7 Approach to Analyses</td>
<td>29</td>
</tr>
<tr>
<td>Chapter 3: Results</td>
<td>31</td>
</tr>
<tr>
<td>Chapter 4: Discussion</td>
<td>46</td>
</tr>
<tr>
<td>4.1 Limitations</td>
<td>55</td>
</tr>
<tr>
<td>4.2 Strengths</td>
<td>55</td>
</tr>
<tr>
<td>4.3 Future Directions</td>
<td>56</td>
</tr>
<tr>
<td>References</td>
<td>57</td>
</tr>
<tr>
<td>Appendix</td>
<td>81</td>
</tr>
<tr>
<td>Curriculum Vitae</td>
<td>105</td>
</tr>
</tbody>
</table>
# List of Tables

Table 3.2: Baseline smoking behaviors ................................................................. 33
Table 3.3: Correlation matrix of dependent variables at baseline and at 3 month follow-up...... 34
Table 3.4: Attrition sample smoking behaviors at baseline ...................................... 35
Table 3.5: Retest sample smoking behaviors at three month follow-up ....................... 36
Table 3.6: Hierarchical regression predicting smoking behaviors at 3 month follow-up ........ 38
Table 3.7: Retest sample by intervention condition at baseline .................................. 39
Table 3.8: Retest sample by intervention condition at 3 month follow-up ..................... 40
Table 3.9: Group intervention: number of participants by group size .......................... 40
Table 3.10: Logistic regression predicting cessation at 3 month follow-up ..................... 42
Table 3.11: Linear regression predicting smoking reduction at 3 month follow-up .......... 43
Table 3.13: Linear regression predicting perceived competence at three month follow-up .... 44
Chapter 1: Introduction

1.1 Health Consequences of Smoking

Currently tobacco use is one of the most preventable causes of death in the United States (U.S.). Although smoking rates continue to decline, in 2014 an estimated 55.2 million people in the U.S. were current smokers (Substance Abuse and Mental Health Services Association [SAMHSA], 2014). During the past decade in the U.S. the number of the nondaily smokers has increased. For example, between 2005 to 2013 daily smoking decreased from 80.8% to 76.9% but intermittent smoking increased from 19.2% to 23.1% (CDC, 2014a, 2012, 2011d, 2014b). Given this increase among LITS, the present research study examined the predictors of smoking cessation, smoking reduction, motivation to change, and perceived competence among this population.

Tobacco use has severe health effects and there is substantial evidence indicating that smoking damages almost every organ of the body, increases the risk of smoking related diseases, and diminishes overall health status. Even though there have been fewer smoking related deaths over the past years, cigarette smoking causes more than 480,000 deaths each year in the United States (CDC, 2012). Cigarette smoking is responsible for about one third of all cancers, including lung, liver and colorectal cancer. Smoking also causes various lung diseases such as chronic bronchitis, pneumonia and emphysema. Smoking also increases the risk of heart disease, including stroke, heart attack, vascular disease, and aneurysm (NIDA, 2014). Furthermore, smokers report having poorer health, missing more days at work and using more health care than non- smokers (CDC, 2014a). The health cost of smoking continues to increase and now approaches $300 billion annually. For instance, medical costs account for at least $130 billion annually and productivity losses account for more than $150 billion annually (CDC, 2014b).
Due to increasing health risks and the costs of smoking, many adult smokers attempt to quit smoking. Although quitting smoking can be very difficult for most people, the health benefits of smoking cessation are immediate and include reduced risks for cancers, heart disease, and strokes (NIDA, 2014). Even though some smokers are able to quit without help, many others need assistance. The clinical guidelines to treat tobacco dependence recommends that clinicians should use both counseling and pharmacotherapy in order for treatment to be effective for smoking cessation (Fiore et al., 2008).

1.2 Light Smokers and Hispanics

According to Fish et al. (2014) the number of smokers in the United States is decreasing, although there is an increased presence of light smokers, individuals who smoke 10 or fewer cigarettes per day (CPD). Similar to light smoking, intermittent smoking is defined as smoking on a nondaily basis (Schane et al., 2010). The authors of the clinical guidelines for tobacco dependence considered a light smoker to be anyone who smokes 10 or fewer cigarettes per day (Fiore et al. 2008). For the purpose of the current study, we used the term “light smoker” to refer to daily smokers who smoke 10 or fewer CPD and we used the term “intermittent smoker” to refer to non daily smokers. LITS appear to be a challenge to health care professionals because LITS do not consider themselves as “smokers,” therefore in most cases they are under identified (Fergusson et al., 1995; Schane et al., 2009a; Shiffman et al., 2009a). This propensity not to label oneself as a smoker reinforces the belief that light and intermittent smoking does not carry significant health risks. For this reason, many light smokers may not believe smoking risk information provided by health care professionals, for example “I don’t smoke that much so it’s not that bad.”

Light and intermittent smokers, like heavy smokers, benefit from quitting smoking.
Smoking at any level is harmful, and nondaily smokers are not exempt from the health effects of smoking (USDHHS, 2010). For example, light and nondaily smokers are at increased risk for cardiovascular diseases, lung and gastrointestinal cancers, lower respiratory tract infections, cataracts, and compromised reproductive health (Luoto, et al., 2000; Schane et al., 2010; USDHHS, 2010). In comparison to nonsmokers, light smokers are three times more likely to suffer from an ischemic heart disease (Bjartveit et al., 2005). Understanding the factors that contribute to smoking and cessation behaviors among light and intermittent smokers is essential to the development and implementation of smoking cessations interventions.

Since the current study has a predominantly Hispanic sample, it is imperative to distinguish several characteristics that pertain to this specific population. Light and intermittent smoking is common among minorities, especially among Hispanics (Wortley et al., 2003; Hassmiller et al., 2003; Tong et al., 2006; Sacks et al., 2012). A 2003 survey conducted by the U.S Bureau of the Census reported that Hispanics were three times more likely to be intermittent smokers compared to non-Hispanic Whites (Trinidad et al., 2009). Other studies have compared nondaily smokers to daily smokers and have found a greater number of ethnic minorities, particularly Hispanics, among nondaily smokers (Tong et al., 2006; Trinidad et al., 2009; Fagan et al., 2009; Reitzel et al., 2009). Zhou et al. (2009) reported that Latinos were more likely to be non-daily smokers compare to other ethnic groups (Hassmiller et al., 2003; Husten et al., 1998; Palinkas et al., 1993). Furthermore, a California Health Interview Survey (CHIS) reported that more than 70% of Latino smokers either did not smoke daily or smoked less than 5 cpd (Zhu et al., 2007). Findings from large scale surveys confirmed previous studies suggesting that many Latinos smoke infrequently (Gilpin et al., 1997a; Hassmiller et al., 2003; Husten et al., 1998; Palinkas et al., 1993). Future research should seek to develop more efficacious smoking
cessation interventions targeting LITS. In addition, future research should seek to develop smoking prevention and cessation strategies among Hispanics. The proposed study addresses these issues.

Hispanics are the largest, fastest growing and youngest minority group in the U.S (Slobig et al., 2014). For this reason, it is crucial to identify the characteristics that distinguish light and intermittent Hispanic smokers from LITS in other ethnic groups. For example, Hispanics have a higher likelihood of nondaily smoking than African Americans and non-Hispanic Whites (Rodriguez et al., 2009; Kandel et al., 2000; Levinson et al., 2004; Wortley et al., 2003). Indeed, the leading causes of death among Hispanics living in the U.S. are smoking-related (Webb et al., 2010). For example, lung cancer is the leading cause of cancer death among Hispanic men and the second leading cause of cancer death among Hispanic women. Despite these health threats, ironically Levinson et al., (2006) reported that Hispanics initiated more quit attempts compared to non-Hispanic Whites. This finding suggests that Hispanics are heavily invested in quitting. Indeed, Hispanics are highly motivated by concerns about their families’ health, and want to set a good example for their children (Fry, 2010; Slobig et al., 2014; National Research Council, 2012). Hispanics also report more quit attempts compared to other ethnicities. However, Hispanics are less likely to use smoking cessation medications to assist them in quitting smoking. For example, among a sample of Colorado Latino smokers, most participants perceived smoking as a weakness, not an illness. Additionally, most smokers refuse using medication for smoking cessation because they feared and disliked medications in general but specifically smoking cessation medications (Levinson et al., 2006).

Studies have also found most Hispanics attempt to quit smoking by themselves, with little use of cessation medications or support services (Carter et al., 2011; Zinser et al., 2011).
Hispanics are less likely than other ethnic groups to report receiving advice from a physician to quit smoking (CDC, 2011). Furthermore, there is evidence that Hispanic smokers experience lower levels of practitioner intervention in the health care system. For example, a recent study found that Hispanics reported using less tobacco counseling than non-Hispanic Whites (Li, Horner, & Delva, 2012). Similarly, Houston et al. (2005) found that Hispanics were less likely to report receiving smoking cessation advice from their health care providers compared to non-Hispanics Whites and African Americans. Taken together, these results suggest there is a gap between the advice given to Hispanics and their willingness to act on it. The present study described below seeks to address both of these gaps.

1.3 Cessation Interventions

Pharmacological Interventions

Nicotine replacement therapy (NRT) is considered to be a safe and effective pharmacological intervention for smoking cessation (Shiffman, 2007; Hollands et al., 2013). Multiple studies have demonstrated that higher doses of nicotine gum, patch, and lozenge are effective in heavy smokers but not in light smokers (Hatsukami et al., 2007; Herrera et al., 1995; Shiffman et al., 2002; Hollands et al., 2013). Studies of smoking cessation treatment among light smokers have produced mixed findings regarding the benefit of pharmacotherapy for light smokers (Ahluwalia et al., 2006; Gariti et al., 2009; Shiffman, 2005). For example, one study of African American light smokers found that 2 mg nicotine gum did not significantly increase the likelihood of smoking cessation compared to placebo (Ahluwalia et al., 2006). In contrast, a randomized placebo controlled trial demonstrated that the use of the nicotine lozenge significantly helped maintain abstinence rates for a year among light smokers compared to placebo (Shiffman, 2005). However their definition of light smoking was 15 cpd or fewer, which is more than the most recently used cut-off of 10 or fewer cpd. Finally, a recent double-
blind placebo-controlled study examined the efficacy of bupropion in African American light smokers (Cox et al., 2012). Their results indicated that participants who were given bupropion, a smoking cessation medication, were almost three times as likely to quit smoking at week 7 compared with participants who were given placebo. However, at a 26-week follow-up there were no significant cessation-rate differences.

Nonetheless, it is unclear whether pharmacotherapy is an effective intervention for light and intermittent smokers, as these smokers are not typically enrolled in clinical trials (Schane et al., 2010). Additionally, among ethnic minorities, pharmacotherapy interventions for smoking cessation have been understudied (Robles et al., 2008). As a result, there is limited knowledge regarding the efficacy of pharmacotherapy in LITS. For example, Hispanic smokers might be motivated to quit smoking but receive less advice from physicians about smoking cessation and feel uncomfortable using smoking-cessation pharmacotherapy to help them quit (Levinson et al., 2004; Levinson 2006). Therefore, the use of NRT in LITS is not yet justified by empirical research.

**Mental Health and Educational Interventions**

Numerous smoking cessation interventions have used health education (HE) as a smoking cessation strategy. HE interventions provide information regarding health consequences of smoking, and the benefits of quitting smoking (Torrijos & Glantz, 2006). In addition, HE interventions also provide individuals with advice about selecting and implementing smoking cessation strategies. Several studies suggest that smokers underestimate the health risks of smoking (Kristiansen, Harding, & Eiser, 1983; Sutton, 1995a; Viscusi, 1990, 1992). For this reason, HE interventions need to provide information that corrects this misconception.
Health Education (HE)

Several studies have investigated the efficacy of HE interventions. One study compared the efficacy of smoking cessation approaches such as HE to motivational interviewing (MI) among African Americans light smokers. Participants were randomly assigned to 1 of 4 treatment groups: nicotine gum plus health education (HE) counseling, nicotine gum plus motivational interviewing (MI) counseling, placebo gum plus HE counseling, or placebo gum plus MI counseling. Results indicated participants who received nicotine gum in either MI or HE were no more likely to quit smoking than those who received placebo gum. Participants who received HE plus placebo gum were twice as likely to quit smoking in comparison to participants who received MI plus placebo gum (Nollen et al., 2006). Additionally, Webb and colleagues (2010) compared the efficacy of group-based Cognitive Behavior Therapy (CBT) plus Transdermal Nicotine Patch (TNP) for smoking cessation to HE plus TNP in a sample of African American light smokers. Results from this study indicated that light smokers who received CBT plus TNP had higher quit rates than those in the HE plus TNP, and remained abstinence for up to 6 months. Similarly, Ahluwalia and colleagues (2006) compared MI to HE with light smokers and found HE to be a better predictor of smoking cessation than MI. Additionally, Schnoll et al. (2005) compared CBT to HE with cancer patients and found that the CBT intervention did not significantly enhance quit rates compared to HE. Hence, previous studies suggest HE is a cost-effective intervention that might effectively assist smokers quit smoking.

Motivational Interviewing (MI)

MI is a client-centered intervention, with the purpose of enhancing readiness to change by helping clients explore and resolve ambivalence. Previous studies suggest MI is effective in treating addictive behaviors and other health threatening behaviors, such as smoking cigarettes
(Madson, Loignon, & Lane, 2009). MI has been found to increase smokers' readiness to quit (Butler et al., 1999), increase quit attempts (Borreli et al., 2005; Wakefield et al., 2004), reduce smoking level (Borreli et al., 2005), and in some studies enhance cessation (Curry, 2003; Fiore et al., 2008; Pbert et al., 2006; Soria et al., 2006; Valanis et al., 2001). For example, Borris and colleagues (2010) examined the efficacy of four individually delivered MI counseling sessions for smoking cessation among college students. All students were randomized to receive the treatment or comparison intervention. Participants in both conditions received up to four individual sessions of MI. In the treatment condition, participants received MI focused on motivating and helping participants quit smoking whereas in the comparison condition participants received MI focused on increasing fruits and vegetables intake (Harris et al., 2010). At follow-up and at the end of the study no significant differences were found between treatment and comparison condition for smoking cessation. However, making at least one quit attempt and smoking reduction were significantly greater for students in the treatment condition than students in the comparison condition at follow-up and at the end of treatment. A recent study by Mujika and colleagues (2014) tested the efficacy of a motivational interviewing based smoking cessation intervention with nurses. Nurses who smoked were randomized into two groups: motivational interviewing based intervention and usual care. Motivational interviewing based intervention consisted of four individual MI sessions and usual care consisted of brief advice in a single session. At three month follow-up, compared with usual care, more nurses in the MI intervention had quit smoking. The findings of this study demonstrate that MI based smoking cessation intervention is potentially effective for reducing smoking levels among the nursing population. A study by Butler and colleagues (1999) compared the cost effectiveness of MI and brief advice to quit smoking. Smokers who had visited a medical practitioner were randomized to receive
either motivational interviewing or brief advice during one consultation. The MI intervention was more effective than brief advice on each outcome including quit attempts and cessation. Although, the cost effectiveness analyses revealed that MI was not cost effective in relation to brief advice. Notably, a recent meta-analysis of MI smoking cessation interventions indicated that compared to brief advice, MI resulted in higher quit rates, yielding a modest but significant increase in quitting with a risk ratio (RR) of 1.26; 95% confidence interval (CI) ranging from 1.16 to 1.36; 28 studies, N = 16,803 (Hawley et al., 2015). Thus, MI produced better outcomes than brief advice, especially among highly motivated smokers.

**Trigger Management**

Trigger management is particularly important in light and intermittent smokers, since increased smoking has been associated with external cues such as drinking coffee, alcohol consumption, and being around other smokers (e.g., Krukowski, Solomon, & Naud, 2005). Light and intermittent smokers usually smoke essentially for the rewarding effects of nicotine and have minor or no withdrawal symptoms (Shiffman, 2009). The urge to smoke a cigarette is sustained by conditioning. For example, it is very common for light smokers to report smoking a cigarette after a meal, while drinking coffee or alcohol, or with friends and family members who also smoke (Benowitz, 2010). While there are few studies, researchers have often assumed that intermittent smokers (ITS) are “social smokers.” Social smokers are characterized by smoking exclusively when being around other smokers, and they tend to smoke for socializing purposes (Oksuza, Mutlua, & Malhanb, 2007); social smoking behavior is correlated with drinking alcohol (Dierker et al., 2006; Philpot et al., 1999; Stanton et al., 1996). Furthermore, Shiffman and colleagues (2009a) assessed smoking patterns in non-daily adults smokers over a period of three weeks. Results indicated that participants smoked on a non daily basis, since 20% of all
cigarettes were smoked in different short periods of time (i.e., within an hour of another cigarette), suggesting that cigarettes were smoked when drinking and socializing. This finding suggests that social drinking encourages some ITS to smoke in concentrated amounts. Previous studies have demonstrated an association between drinking and smoking within light and intermittent smokers (Kirchner & Sayette, 2007; Shiffman & Paty, 2006). As these studies suggest, light and intermittent smokers experience internal and external triggers that might impact their smoking, thus a trigger management component might be beneficial to help light smokers develop effective coping strategies.

**Group Interventions**

Group format interventions are cost-effective formats for delivering smoking cessation services (Stead & Lancaster, 2009). Group interventions promote social support as an important tool, which allows collective learning and sharing of experiences that could assist in cessation. A study by Mohamed (2011) compared individual to group interventions, and found that the group interventions increased smoking cessation rates. Other researchers have indicated that group interventions are more useful for assisting highly motivated smokers to quit smoking in comparison to less intensive interventions (Stead & Lancaster, 2005). Finally, one longitudinal study of three years reported that smokers who received a group counseling in one session of 6 hours had a 50% success rate in long-term cessation (Moshammer & Neuberger, 2006).

Even though there is evidence that demonstrates higher cessation rates in-group formats, there seems to be conflicting findings. For example, one study (Ramos et al., 2010) found no significant differences in cessation rates between an intensive individual and an intensive group intervention. Similarly, a meta-analysis of 50 controlled trials revealed no significant differences in smoking cessation rates between group and individual interventions (Mottillo et al., 2009).
Results indicated there were no significant differences between the odds ratio (OR) for individual counseling (23 RCTs, n= 8646) which was 1.49 (95% confidence interval (CI) = 1.08–2.07) and 1.76 (95% CI = 1.11–2.93) for group counseling (12 RCTs, n = 3600). In addition, a recent review suggested that both group and individual formats are equivalent in promoting cessation (Stead & Lancaster, 2009). Finally, one study examined group versus individual smoking cessation formats in Hispanics and indicated that participants in the group interventions had higher cessation rates than those in the individual format (Nevid & Javier, 1997). These findings suggest that future studies should focus on using group interventions to assist individuals in quitting smoking.

Currently the literature reports few cessation trials that focus on light smokers. The study by Ahluwalia and colleagues (2006) used a 2 by 2 placebo-controlled randomized design that focused on African Americans who smoked on at least 25 of the past 30 days and consumed 10 or fewer cpd. Participants were randomized into one of four treatment conditions: nicotine gum plus health education (HE), nicotine gum plus motivational interviewing (MI), placebo gum plus HE, and placebo gum plus MI. Results indicated that nicotine gum was no more effective than placebo gum, and HE was more effective than MI. Specifically, participants that received HE counseling were 2.17 times more likely to quit smoking than participants that received the MI counseling. A recent double-blind placebo-controlled study examined the efficacy of bupropion in African American light smokers (Cox et al., 2012). Participants were randomized to receive bupropion or placebo for 7 weeks, plus received six HE sessions. Participants that received bupropion had significantly higher cessation rates after 7 weeks compared with placebo. However, at a 26-week follow-up, no significant cessation-rate differences were observed. Finally, a study by Cabriales and colleagues (2012) assessed the efficacy of a brief smoking
cessation intervention among two hundred and fourteen Hispanic LITS. Participants were randomized to receive an immediate (IMDI) or delayed (DI) brief cessation intervention. The intervention components included CO feedback, Motivational Enhancement (ME), trigger management, and HE. Results suggest that at the three-month follow-up, intervention condition was not associated with smoking cessation. Nonetheless, participants in the IMDI were more inclined to increase their readiness to quit in comparison to participants in the DI (Cabriales et al., 2012). In conclusion, using targeted and tailored interventions for smoking populations has been suggested (Fiore et al., 2008). Hence, future studies should focus on offering cessation interventions to light and intermittent smokers.

1.4 Predictors of Cessation

In order to increase the efficacy of smoking cessation interventions, it is important to identify possible predictors of cessation. Based on an extensive literature review five predictors were identified: intervention format (INDI vs GI), age, smoking status, nicotine dependence, and motivation to quit. Several studies have examined the efficacy of different interventions, such as individual and group interventions (Nevid & Javier, 1997; Ramos et al., 2010). Multiple studies have found a correlation between age and smoking cessation. For instance, Kotz and colleagues (2009) suggested that older adult smokers were more likely to use some form of smoking cessation treatment. Results from this study demonstrated the use of any NRT increased 54% among those ages 55 to 64 compared to 32.6% among those ages 16 to 24. Furthermore, Gökbayrak and colleagues (2015) indicated that age was a predictor of relapse. Results suggested older participants ages 25 to 64 were less likely to relapse than participants from ages 18 to 24. Lower smoking status has also predicted cessation. Previous studies have suggested that light and intermittent smokers may be a “ready to quit” population because they are less
nicotine dependent than heavier smokers (Schane et al., 2009a; Tong et al., 2009; Nguyen & Zhu, 2009). A more recent study by Mooney et al. (2011) compared light and heavy smokers. Results suggested an association between low nicotine dependency and quit attempts, since nondaily smokers were more likely to attempt quitting smoking and to wait longer to smoke their first cigarette.

Motivation to quit at baseline has been found to predict smoking cessation (DiClemente et al., 1991). The central assumption of the Transtheoretical Model (TTM) is that therapeutic interventions should be matched to the motivational stage of the patient (Prochaska & DiClemente, 1983; Prochaska & Prochaska, 2010). The TTM claims that patients move through the stages of change in a spiral pattern (Norcross, Prochaska, Krebs, 2011). This implies that as an individual progresses toward sustained abstinence from tobacco, she/he experiences shifts in attitudes and behaviors as well as uses different coping behaviors at different times in this process (Perz, DiClemente & Carbonari, 1996). A study that examined whether the stages of change were useful for targeting a brief intervention to reduce smoking found that the intervention was more effective for smokers who were in the preparation stage (i.e., more motivated) in comparison to those who were in lower stages of change (i.e., less motivated) (Armitage & Arden, 2008).

1.5 Theoretical Approach

In order to guide the intervention and assessment sections of this study, three theoretical frameworks were applied: The Transtheoretical Model (TTM), Self-Determination Theory (SDT), and the Health Belief Model (HBM).

The Transtheoretical Model (TTM) describes a framework for understanding when people are ready to change, how they weigh the pros and cons of their behavior change, and their
beliefs about changing their behavior (Prochaska et al., 1992). Specifically, the TTM is a behavior change model that has been studied and used frequently in the field of tobacco smoking. (Prochaska & Velicer, 1997) This model integrates the stages of change (DiClemente et al., 1991; Velicer et al., 1995) as the central organizing construct for the process of quitting smoking. The TTM includes five stages: Precontemplation (not thinking of quitting), Contemplation (thinking of quitting within the next six months), Preparation (individuals are thinking of quitting within the next month), action (individuals have been quit within the past 6 months), and Maintenance (individuals have been quit for more than six months). Previous studies have demonstrated the effectiveness of the TTM for predicting motivation to quit smoking (e.g., Aveyard et al., 2009; Prochaska, Velicer, Prochaska, & Johnson, 2004; Spencer, Pagell, Hallion, & Adams, 2002; Velicer, Prochaska, & Redding, 2006). Accordingly, in the present study the TTM model will be used as an assessment of stage of change at baseline and follow-up to explore whether individuals experience a change in their readiness to quit smoking.

Self-determination theory (SDT) establishes that an understanding of an individual’s motivation requires consideration of innate psychological needs that lead towards optimal development (Ryan and Deci, 2000). The three psychological needs that have been identified within SDT are autonomy, competence, and relatedness. Research on SDT (Deci & Ryan, 1985; Sheldon, Williams, & Joiner, 2003) has indicated that autonomy and competence motivations are associated with long-term smoking cessation for adults (Curry, Wagner, & Grothaus, 1991; Williams, Gagne´, Ryan, & Deci, 2002). Essential to SDT are the concepts of autonomous motivation and perceived competence (Williams et al., 2006). A sequence from amotivation to intrinsic motivation is assumed (with extrinsic motivation in the middle) in which individuals who demonstrate intrinsic motivation produce better performance across tasks compared to
individuals with the same self-efficacy and abilities (Ryan & Deci, 2000). For example, SDT suggests that by increasing relatedness, competence and autonomy, individuals will progress towards intrinsic or autonomous motivation, which in turn promotes behavior change (Williams, Gagné, Ryan, & Deci, 2002). Thus, as an intervention strategy, the reasons smokers quit were elicited in order to increase autonomous motivation and self-efficacy to guide them towards cessation.

The Health Belief Model (HBM; Becker et al., 1978) is an approach that considers that an individual engaging in an unhealthy behavior will alter his or her readiness to change based on six constructs that encourage health-related behaviors. The model proposes six constructs: perceived susceptibility (beliefs a person has about the likelihood of acquiring an illness), perceived severity (beliefs of how serious are the consequences of developing an illness), perceived benefits (beliefs about the efficacy of the advice to reduce seriousness of impact), perceived barriers (psychological costs of advised action), cues to action (strategies to activate readiness), and self efficacy. Previous studies have suggested that high levels of risk perception are correlated with increased motivation to quit and smoking cessation (Borrelli, Hayes, Dunsiger, & Fava, 2010; Gerrard, Gibbons, & Bushman, 1996; Hay et al., 2007; McCoy et al., 1992; McKee et al., 2005; Schnoll et al., 2004; Tyc et al., 2004). According to various studies, an individual’s negative beliefs about the consequences of cigarette smoking are associated with greater intentions to quit and better cessation outcomes (Woodruff et al., 2002; Lee et al., 2010). Similarly Borrelli et al. (2010) and Gibbons et al. (1997) have suggested that smoking cessation is associated with an individual’s knowledge about the health risks of smoking and risk perceptions. Higher perceived vulnerability and more perceived smoking risks are positively associated with abstinence. Moreover, studies have shown that higher self-efficacy
(DiClemente, 1981; Gwaltney et al., 2009) and greater intention to quit smoking can predict smoking cessation (Hymowitz et al., 1997; Peters et al., 2009; Smit et al., 2011). Additionally, Lee and colleagues (2010) indicated that smokers with fewer positive smoking expectancies reported higher motivation to quit smoking (Velicer et al., 1985; Boudreaux et al., 1998). These results suggest individuals who are highly motivated will have a greater interest in receiving smoking cessation treatment. Lastly, identifying predictors of success in smoking cessation is critical for physicians and health professionals to become more efficient in advising and assisting light smokers to quit smoking (Caponnetto & Polosa, 2008). The HBM was used to educate smokers about the harmful consequences of light smoking and the benefits of quitting, as well as clarifying any misconceptions about light smoking or smoking in general.

1.6 Aims and Hypotheses

The primary purpose of this study was to assess the efficacy of brief individual and group smoking cessation interventions in light and intermittent smokers. Specifically, it was hypothesized the group intervention would be more effective for smoking cessation and reduction rather than the individual intervention. Four additional predictors were assessed: age, smoking status, nicotine dependence, and motivation to quit. Regardless of intervention condition it was also hypothesized that older age, lower smoking status and lower nicotine dependence, and increased motivation to quit would be significant predictors of smoking cessation and reduction.

Secondary aims of this study included the assessment of changes in motivation to quit post-intervention as well as changes in perceived competence based on intervention format. Intervention format, age, smoking status and nicotine dependence at baseline, and motivation to quit at baseline were analyzed as predictors of follow-up increased motivation to quit and
perceived competence. It was hypothesized that increased cessation rates, higher motivation and greater perceived competence to quit smoking would be higher among those receiving the group intervention.
Chapter 2: Method

2.1 Participants

Two hundred eighty six participants between the ages of 18 and 78 years ($M= 33.08$ years, $SD= 15.28$) were recruited primarily through a regional bilingual media campaign including radio, online, and print advertisement. Thirty-four individuals did not meet eligibility criteria, resulting in a final sample of two hundred fifty two daily light ($\leq 10$ cigarettes per day) and intermittent smokers (LITS). Additionally, referrals and in person recruitment were conducted at the University Medical Center (UMC), the Centro San Vicente Family Health Center (CSV), and the UTEP campus which has a majority of $77.4\%$ Hispanic students (CIERP, 2012). CSV is a primary health care clinic that provides services to a predominantly Hispanic population on the U.S./Mexico border in the El Paso region. El Paso County has a population of 649,121 and comprises a metropolitan area of more than one million inhabitants (together with Cd. Juárez, MX; INEGI, 2010). Hispanics represent $81.1\%$ of the total El Paso County population (U.S. Census Bureau, 2013). Centro San Vicente serves an average of 17,583 people per year; providing a variety of services that include preventive, behavioral health, general care, and dental services (CSV Annual report, 2011). UMC is the largest public hospital located directly on the U.S./Mexico border. It’s mission has been to enhance the health and wellness of the El Paso community by making high quality, affordable healthcare services available to all (UMC Annual report, 2012). In essence, our sample was recruited through multiple and varied methods. Since the beginning of recruitment, 11,496 people were approached at UTEP, 10,808 at CSV, and 1,055 at UMC by program staff to assess eligibility. Forty-seven percent of the participants were recruited through the radio media campaign, $37.8\%$ of participants were from UTEP, $13.2\%$ of the participants were from CSV, and $2\%$ were participants from UMC. The
proposed sample size provided approximately 80% power to detect a population effect size (d) of 0.35 when alpha is set at .05 (2 tails) Cohen, J. (1988).

The inclusion criteria included the following: participants had to be at least 18 years of age, having smoked at least one cigarette in the past 30 days, 10 or fewer cigarettes per day (cpd) and currently not enrolled in another cessation program. Fifty-eight percent of the participants were male. The sample was predominantly Hispanic (85%) and self-identified as follows: 31% Mexican National, 46% Mexican American, 8% Other Hispanic (e.g., Chicano, Puerto Rican), 9% non-Hispanic White, 2% African American, and 1% Native American, and 3% self-reported as other ethnicity (e.g., Mexican American-white).

2.2 Measures

Participants at baseline and at one and three month follow-up completed the following paper and pencil measures for the purposes of this study.

**Tobacco Use Behavior and Demographics Survey (TUBDS; see Appendix A)**

The TUBDS is a 50-item survey that included questions regarding history of tobacco use behaviors, socio-demographic information such as age, gender, ethnicity, and previous mental health diagnoses. The TUBDS survey has been used in multiple studies (e.g., Rodríguez-Esquivel et al., 2009). The TUBDS was used to create the following variables:

**Baseline Smoking Status (B.S.S)**

B.S.S. was assessed with a single item: “What is your smoking status?” Response categories included (a) “I smoke daily more than 5 cigarettes but ≤ 10 cpd” (b) “I smoke daily but less than 5 cigarettes per day” (c) “I smoke weekly but not every day” (d) “I smoke monthly but not weekly.” B.S.S. was coded as either intermittent smoking (non-daily) or daily light
smoking (≤10 cpd). Daily light smokers were those who selected the (a) or (b) categories. Intermittent smokers were those who selected the (c) or (d) categories. Additionally, smoking status was assessed as a continuous variable in order to analyze reduction in cigarettes smoked at 3 month follow-up.

**Smoking Reduction**

Smoking reduction was assessed by subtracting the numbers of cigarettes smoked per month at 3 month follow-up from the number of cigarettes smoked per month at baseline. The number of cigarettes per month was computed by multiplying a subject’s response to the following two items: 1) “On the days that you smoked, about how many cigarettes you smoked per day?” 2) “In the last 30 days, how many days have you smoked?”

**Smoking Cessation**

Smoking cessation was assessed at the 3 month follow-up with the use of following the item: “In the last 30 days, how many days have you smoked?” Participants who responded 0 to this item were classified as non-smokers.

**Smoking: Stage of Change (SSC short form, DiClemente et al., 1991; see Appendix B)**

The SCC is a three-question survey scored by using the DiClemente et al. (1991) algorithm. The survey was designed to assess the motivation of the participant to quit smoking. Based on their responses to the SSC, participants were classified into one of the five stages of change (DiClemente et al., 1991; McConnaughy et al., 1983). For example, participants answered the following single item: “Are you seriously thinking of quitting smoking?” Response categories included: 1) “Yes, within the next 30 days” 2) “Yes, within the next 6 months” and “No, not thinking of quitting.” Participants who selected category 1 were placed
into the preparation stage. Participants who selected category 2 were placed into the contemplation stage. Participants who selected category 3 were placed into the precontemplation stage. Precontemplation, contemplation, and preparation stages have been found to predict attempts to quit, as well as cessation success at 1- and 6-month follow-ups (DiClemente et al., 1991).

**Perceived Competence Scale (PCS; see Appendix C)**

The PCS includes a four-item measure using a Likert type scale that reflects participants’ feelings of competence to quit smoking from (1) not at all true to (7) very true. The PCS scores ranged from (4-28) and item responses are averaged, with higher scores indicating higher perceived competence to quit smoking. The PCS has demonstrated acceptable internal consistency (Cronbach’s alpha ≥ .80) (Williams & Deci, 1996; Williams, Freedman, & Deci, 1998; Williams et al., 2002)

**Fagerstrom Test for Nicotine Dependence (FTND; See Appendix D)**

The FTND is a 6-item survey that asks participants about the intensity of physical dependence to nicotine (FTND; Heatherton, Kozlowski, Frecker, & Fagerström, 1991). Respondents completed items 1, 3 and 4 using a scale ranging from 0-3, and the rest of items elicit binary responses (yes/no). For example, participants answered the following items: “How soon after awaking do you smoke the first cigarette?”; “Is it hard not to smoke in public places?”; “Which cigarette is most difficult to give up?”; “How many cigarettes do you smoke a day?”; “Do you smoke more in the morning?” and “Do you smoke when you are ill and have to stay in bed?”. Item responses are averaged, and higher scores indicate higher nicotine dependence. Additionally, an acceptable internal consistency of .70 has been reported overall.
(Heatherton et al., 1991), and a coefficient alpha greater than .70 among relatively lighter smokers (average of 12 cigarettes per day; Etter, Duc, & Perneger, 1999).

2.3 **Screening Procedure**

Prior to beginning data collection, permission was obtained from the Institutional Review Board at the University of Texas at El Paso (UTEP). Participants were recruited into the smoking cessation intervention called (Stoplite) between November 2012 and July 2014. Recruitment was implemented through radio, newspaper advertisement, and in person at CSV, UMC and UTEP. Potential participants responded to the following two questions: 1) “How many cigarettes have you smoked in the past 30 days?” and “How many cigarettes do you smoke per day on average?” Individuals who reported smoking at least one cigarette during the past month but fewer than 10 per day were eligible to participate in the study. The above screening procedure used to identify light smokers was adopted instead of asking “are you a smoker?” since previous studies have suggested many light smokers do not consider themselves smokers. For this reason, we intentionally avoided asking potential participants if they were smokers. If the person was eligible, then he/she completed the informed consent process and was randomly assigned to an individual intervention or to a group intervention by using an online random number generator. Printed randomization logs were used at the three recruitment sites (CSV, UMC and UTEP). Randomization was determined via the log once the participant was screened and eligible to participate in the program. There were 145 participants that were randomized to the individual intervention and 107 participants were randomized to the group intervention. Each participant completed the paper and pencil measures before she/he received the intervention. Participants in the individual intervention (INDI) received a brief smoking cessation intervention, two quit tips, two booster calls (at the second and fourth week), and
completed a one and three month follow-up assessment. Participants in the group intervention (GI) attended three group intervention sessions at UTEP, received two quit tips and completed one and three month follow-up assessments. Participants in both the INDI and GI received a gift card incentive after completing each intervention session and assessments (maximum of $30 in gift cards). A $20 gift card bonus incentive was given to participants who completed all program components (INDI and GI).

Participants were contacted one and three months after they participated in either the individual or group intervention via phone, and given the option of completing their follow-up assessment by telephone, mail, or in person. Research assistants called every participant three times in order to assess the most convenient method for follow-up completion. It should be noted that research assistants completing the follow-up were not blind to intervention assignment. Participants who could not be reached by phone (disconnected/not working) were mailed a reminder of their follow-up assessment and were mailed the follow-up survey as well. If participants completed their follow-up via telephone, or by mail, their $10 gift card was sent by mail to their home address. Staff who conducted telephone and in person follow-ups were not the interventionist or blind to treatment assignment. After participants completed the first group intervention session they were encouraged to make an appointment to receive the other two group intervention sessions. In order to improve retention rates, two strategies were implemented for those participants who completed the study. First, a $20 gift card bonus incentive was provided to participants who completed all the intervention sessions and assessments. Second, five participants from each cycle who completed the study were chosen at random to receive a $100 gift card.
2.4 Intervention

Trained masters’ level clinical psychology students (two female, and one male) recruited smokers in-person or through appointment and delivered the intervention individually and in a group setting to participants. The interventionists were second and third year masters’ level students who were trained and received significant feedback (role plays were performed) by a trained master level clinical psychology student to deliver the intervention. Interventionists followed a semi-formal treatment protocol, and supervision was provided by a clinical psychologist as necessary. The time to complete the brief individual intervention, including the paper and pencil assessment, was approximately one hour, in comparison to the group intervention which consisted of three one hour sessions. The study was also offered in Spanish to participants if this was their preferred language. All assessments and interventions measures were translated by two certified translators. Although in different formats, both the individual and group interventions shared the essential components of motivational enhancement, trigger management, social support, and health education.

2.5 Individual Intervention

Motivational Enhancement (ME)

A motivational enhancement component of the intervention included two steps. First, participants’ motivation to quit was assessed, and second confidence to quit was assessed. Motivation to quit was measured by a single item: “From a scale from 1 to 10, how interested are you in quitting smoking?” Confidence to quit smoking was measured by a single item: “From a scale from 1 to 10, how confident are you in your ability to quit smoking?” Higher scores on both scales indicated greater motivation to quit and greater confidence to quit smoking.
Following the above assessments, participants completed a motivational enhancement worksheet. This worksheet helped participants identify their perceived benefits of quitting and their perceived benefits of continuing smoking. A strategy of verbal and visual representation of “tipping the scales” was used by the interventionist to help the participant identify more motivators to quit smoking (i.e., benefits of quitting, and costs of smoking) as opposed to motivators to smoke (i.e., benefits of smoking, and costs of quitting). If the participant had difficulty identifying motivators to quit, the interventionist would ask questions to help participants identify motivators to quit and as a consequence “tip the scales” towards quitting. Sample question: “What would happen to your health if you quit smoking?” Lastly, the interventionist reviewed the list of motivators to quit smoking that were provided by the participant. Participants were then asked to reflect on the motivators and relate them to their own life and readiness to change. This component required approximately 15 minutes of intervention time.

**Trigger Management**

The trigger management component sought to help participants identify internal and external triggers to smoke. The interventionist explained that internal triggers can be thoughts, feelings (moods), or physical sensations and that external triggers can be places, people, time of the day, and events (e.g., going out with friends or after eating a meal). After this brief introduction, participants were asked to identify their own triggers (internal and external). The interventionist then introduced three ways of managing triggers: escaping, avoiding, and coping with triggers, and elicited from participants examples of each. After the participant listed the coping strategies for the triggers, the interventionist asked him/her how these strategies would be implemented afterwards. This component of the intervention typically lasted for 10 minutes.
Health Education

The interventionist reviewed three handouts with the participant, one listing some common health risks of light smoking, one containing the immediate and long lasting benefits of quitting smoking, and one listing different ways to deal with smoking triggers. At this time, the interventionist answered any questions participant had, and encouraged participants to review in detail these handouts at home. Additionally, the interventionist reassessed participants’ levels of motivation and confidence in quitting smoking, as well as reassessing their readiness to set a quit date. If participants had set a quit date, they were provided with advice to help maintain that goal (e.g., remove ashtrays, tell a significant other of their plan). This portion of the intervention lasted approximately 5 minutes.

Booster Calls

Booster calls were used to help reduce participant attrition in the study. Only participants in the individual intervention received booster calls. These booster calls helped the interventionists maintain presence throughout the three month participation period and contributed to increased reported motivation to quit smoking and actual quit rates. Booster calls consisted of an assessment of current smoking status, a review of triggers, a discussion of the quitting process, and the setting of a quit date. The booster calls also provided the opportunity to address any questions that participants may have as well as verifying that contact information was up to date. Participants received a $5 gift card for completing the first booster call and $10 for completing the second booster call and the one month follow-up assessment. This portion of the intervention lasted approximately 20 minutes.
Quit Tips

Participants in both individual and group interventions received two quit tips at approximately 1 week post baseline assessment and 3 weeks post baseline assessment. These tips served two purposes: 1) They provided a concrete example of quitting smoking, and 2) They reminded the participants of their role in the study and their desire to quit smoking. The first quit tip that was provided to the participants was tailored to the participants’ level of motivation to quit smoking. (Sample quit tip: ready to quit? Change your environment- throw away ashtrays/lighters, don’t keep cigarettes around, and remember why you’re quitting). The second quit tip was based on participant’s comments during the first booster call regarding their difficulties attempting to quit smoking. (Sample quit tip: during difficult cravings have a plan- keep your hands busy, have something to chew on, use your support network).

2.6 Group Intervention

Session One

Both the individual and group interventions shared the essential components of motivational enhancement, trigger management, social support, and health education. During the first session of the group intervention participants introduced themselves and the interventionist offered a brief orientation to the program. At the time of the orientation participants were first informed about the importance of setting up a quit date, and as such they were encouraged to start thinking about a potential quit date. Additionally, participants were taught that quitting smoking is a process, and that having experienced unsuccessful quit attempts is very common for the majority of smokers. Lastly, participants learned briefly about pharmacotherapy for smoking cessation, and were given various reasons of why nicotine
replacement is probably not the most appropriate line of treatment for them because of their low level of smoking. This portion of the intervention lasted approximately 45 minutes.

**Session Two**

During the second session, trigger management was introduced and defined, and the use of a worksheet helped participants identify specific types of triggers. Participants learned that different situations, objects, and cues could trigger thoughts, feelings, and behaviors that leaded them to want to smoke. Specifically, the group focused on triggers to smoking such as stress, the presence of other smokers, the presence of alcohol, and the presence of individuals who may represent some social pressure to smoke (e.g., friends who smoke). Subsequently, participants were encouraged to identify situations and triggers that they encountered between the first and second session which they found the most difficult to avoid smoking. Next, these situations were discussed as well as potential strategies that could be used. After triggers were identified participants learned how to cope with them, and were given a worksheet about behavioral and cognitive smoking responses to cravings. They learned that once they identified their own cues to smoke, they had the option of avoiding those cues, altering the situation, coping with the stress of the cue, or reframing the way in which they think about the cues and smoking. Finally, participants were encouraged to set a quit date prior to session three. This portion of the intervention lasted approximately 45 minutes.

**Session Three**

In the last session, relapse prevention was the main focus in which participants were taught to create strategies and to manage cravings in high risk situations. The group discussed the idea of the types of situations where relapse was possible and how the participants could
utilize their social support system and other strategies to avoid relapse (e.g., avoid such situations, use deep breathing and relaxation). Participants were additionally taught about the abstinence violation effect, which highlighted the fact that a lapse does not have to result in a relapse to previous smoking patterns. More specifically they were taught to plan for situations that could result in slips such as being outside in the presence of other smokers, and identify people they could contact (i.e., call or text-message) as well as things they could have said to themselves to help prevent relapse from happening. Additionally, participants discussed potential refusal skills that were useful in high-risk of relapse situations. Lastly, assertiveness training was discussed to provide participants with information and understanding on the nature of situations where they were tempted to smoke and how they could asserted themselves. This portion of the intervention lasted approximately 45 minutes.

2.7 Approach to Analyses

Descriptive statistics were used to summarize participants’ characteristics, including demographics information, tobacco history, the stages of change and perceived competence. Primary analyses included two regression models that assessed potential predictors of cessation (logistic) and reduction (linear). Independent variables included: intervention condition (individual vs group), age, smoking status, nicotine dependence, and motivation to quit.

Secondary analyses included the assessments of change in motivation and perceived competence between baseline and three month follow-up. Motivation to change was assessed via the stage of change at baseline and three month follow-up. First, a logistic regression was performed with increase (1= increase vs 0 = decrease or no change) in motivation to quit smoking at three month follow-up as the dependent variable and intervention assignment, age, smoking status, nicotine dependence, and motivation to quit at baseline as independent variables.
Second, a multiple linear regression was performed with the three month follow-up perceived competence score as the dependent variable. The independent variables included: intervention assignment, age, smoking status at baseline, nicotine dependence score at baseline, motivation to quit at baseline, and baseline perceived competence score.
Chapter 3: Results

The mean age of the sample was 33.08 (SD= 15.14); 58% of the sample was male. Of the total sample, 13.6% of the participants reported less than a high school education, 12.5% reported earning a high school diploma, 60.5% reported some college education, 6.9% reported being college graduates, and 6.5% reported some graduate coursework. Participants’ reported their smoking status as the following: 33.7% smoked daily more than 5 cigarettes but less than 10 cigarettes per day ($M= 3.22, SD= 1.07$), 25% smoked daily but less than 5 cigarettes per day, 27% smoked weekly but not every day, and 14.3% smoked monthly but not weekly. The mean FTND score for the whole sample was 1.69 (SD= 1.86). According to the stage of change measure at baseline, 33.3% of the participants were in the preparation stage, 51.4% in the contemplation stage, and 15.2% in the pre-contemplation stage. (See tables 3.1 and 3.2).

At three month follow-up, there were no significant differences in quit rates between individual and group conditions (16.7% and 14.7% respectively; $\chi^2 (1) =1.03, ns$). Additionally, there were no significant differences in reduction rates between individual and group conditions (68.5% and 82.3% respectively; $\chi^2 (1) =3.65, p=.056$).

Table 3.1: Baseline demographics

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>146</td>
<td>57.9</td>
</tr>
<tr>
<td>Female</td>
<td>106</td>
<td>42.1</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>34</td>
<td>13.6</td>
</tr>
<tr>
<td>High school diploma/GED or equivalent</td>
<td>31</td>
<td>12.5</td>
</tr>
<tr>
<td>Some college</td>
<td>150</td>
<td>60.5</td>
</tr>
<tr>
<td>Category</td>
<td>Count</td>
<td>Percentage</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>-------</td>
<td>------------</td>
</tr>
<tr>
<td>College graduate (BA or BS)</td>
<td>17</td>
<td>6.9</td>
</tr>
<tr>
<td>Graduate coursework</td>
<td>16</td>
<td>6.5</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexican National</td>
<td>78</td>
<td>31.1</td>
</tr>
<tr>
<td>Mexican American</td>
<td>116</td>
<td>46.1</td>
</tr>
<tr>
<td>Other Hispanic/Latin ethnic group</td>
<td>20</td>
<td>8.0</td>
</tr>
<tr>
<td>White</td>
<td>22</td>
<td>8.8</td>
</tr>
<tr>
<td>African American</td>
<td>4</td>
<td>1.6</td>
</tr>
<tr>
<td>Asian American</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Native American</td>
<td>2</td>
<td>.8</td>
</tr>
<tr>
<td>Other</td>
<td>9</td>
<td>3.6</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single (never married)</td>
<td>155</td>
<td>61.5</td>
</tr>
<tr>
<td>Married</td>
<td>52</td>
<td>20.6</td>
</tr>
<tr>
<td>Divorced</td>
<td>26</td>
<td>10.3</td>
</tr>
<tr>
<td>Widow/Widower</td>
<td>4</td>
<td>1.6</td>
</tr>
<tr>
<td>Separated</td>
<td>7</td>
<td>2.8</td>
</tr>
<tr>
<td>Living with someone</td>
<td>8</td>
<td>3.2</td>
</tr>
<tr>
<td>Income level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 15000</td>
<td>83</td>
<td>33.3</td>
</tr>
<tr>
<td>Between 15000 and 30000</td>
<td>76</td>
<td>30.5</td>
</tr>
<tr>
<td>Between 30000 and 50000</td>
<td>47</td>
<td>18.9</td>
</tr>
<tr>
<td>More than 50000</td>
<td>43</td>
<td>17.3</td>
</tr>
<tr>
<td>Intervention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual</td>
<td>145</td>
<td>57.5</td>
</tr>
<tr>
<td>Group</td>
<td>107</td>
<td>42.5</td>
</tr>
<tr>
<td>Smoking Status</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3.2: Baseline smoking behaviors

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>252</td>
<td>33.08</td>
<td>15.278</td>
<td>18-78</td>
</tr>
<tr>
<td>Days smoked per month</td>
<td>229</td>
<td>18.04</td>
<td>11.109</td>
<td>1-30</td>
</tr>
<tr>
<td>Cigarettes per month</td>
<td>232</td>
<td>4.42</td>
<td>2.826</td>
<td>1-10</td>
</tr>
<tr>
<td>PCS</td>
<td>247</td>
<td>5.15</td>
<td>1.633</td>
<td>1-7</td>
</tr>
<tr>
<td>FTND</td>
<td>217</td>
<td>1.69</td>
<td>1.864</td>
<td>0-7</td>
</tr>
</tbody>
</table>

A correlation matrix was constructed to determine the relationship between the dependent variables at baseline and at three month follow-up (See table 3.3). Results revealed similar correlations between the dependent variables at both time points. As expected, nicotine dependence was positively correlated with the average cigarettes per month and with the average days smoked in the past month. Additionally, nicotine dependence was negatively correlated...
with motivation to quit. As expected, perceived competence was negatively associated with the average cigarettes per month. As expected, average days smoked in the past month was positively associated with average cigarettes per month. At baseline, nicotine dependence was negatively correlated with perceived competence. As expected, perceived competence was negatively correlated with average days smoked per month. As predicted, the average cigarettes per month were negatively correlated with motivation to quit.

Table 3.3: Correlation matrix of dependent variables at baseline and at 3 month follow-up

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. FTND</td>
<td>-</td>
<td>-.22**</td>
<td>.51**</td>
<td>.49**</td>
<td>-.21*</td>
<td>1.69</td>
<td>1.86</td>
</tr>
<tr>
<td>2. PC</td>
<td>-.14</td>
<td>-</td>
<td>-.34**</td>
<td>-.27**</td>
<td>-.03</td>
<td>5.15</td>
<td>1.63</td>
</tr>
<tr>
<td>3. Avg30Day</td>
<td>.36**</td>
<td>-.52</td>
<td>-</td>
<td>.58**</td>
<td>-.12</td>
<td>18.04</td>
<td>11.11</td>
</tr>
<tr>
<td>4. AvgCig</td>
<td>.27**</td>
<td>-.28**</td>
<td>.48**</td>
<td>-</td>
<td>.17**</td>
<td>4.42</td>
<td>2.83</td>
</tr>
<tr>
<td>5. Motivation to quit</td>
<td>-.21*</td>
<td>-.03</td>
<td>.06</td>
<td>.03</td>
<td>-</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

| M                  | .089  | 5.84  | 8.97  | 2.12  | N/A   |       |        |
| SD                 | 1.31  | 1.46  | 10.63 | 2.34  | N/A   |       |        |

Note: Correlations for baseline smoking behaviors (n=252) are presented above the diagonal and correlations for three month follow-up (n=160) are presented below the diagonal. Means and standard deviations for baseline smoking behaviors are presented in the vertical columns, and means and standard deviations for three month follow-up are presented in the horizontal rows.

FTND= Fagerstrom test for nicotine dependence; PC= perceived competence; Avg30Day= average days smoked in the past month; AvgCig= average cigarettes smoked in the past month. * significant at the p < .05 level; ** significant at the p <.01 level.

Four independent t-tests were conducted to assess smoking behaviors differences at baseline among participants who dropped out of the study (n=92) and participants who remained
in the study (n=160) (See table 3.4 and 3.5). The first independent t-test showed that the
difference between the number of cigarettes smoked per month for participants who dropped out
of the study (M=5.19, SD=3.11) and the number of cigarettes smoked per month for participants
who remained in the study (M=4.01, SD=2.57) was statistically significant, \( t(141) = 2.93, \)
\( p=.001, d=1.18 \). The second independent t-test showed that the difference between the number
of days smoked per month for participants who dropped out of the study (M=19.30, SD=11.28)
and the number of cigarettes smoked per month for participants who remained in the study
(M=17.33, SD=10.98) was not statistically significant, \( t(166) =1.28, p=.843, d=.202 \). The third
independent t-test showed test showed that the difference between the FTND score for
participants who dropped out of the study (M=1.77, SD=2.03) and the FTND score for
participants who remained in the study (M=1.64, SD=1.75) was not statistically significant,
\( t(151) = .484, p=.629, d=.131 \). The fourth independent t-test showed that the difference
between the PCS score for participants who dropped out of the study (M=5.03, SD=1.68) and the
PCS score for participants who remained in the study (M=5.22, SD=1.60) was not statistically
significant, \( t(172) = -4.60, p=.420, d= -.190 \). Overall, the participants who dropped out of
the study reported higher numbers of cigarettes smoked per month, but they did not report
significantly higher number of days smoked per month, higher FTND score and lower perceived
competence than participants who remained in the study.

Table 3.4: Attrition sample smoking behaviors at baseline

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>92</td>
<td>32.16</td>
<td>15.54</td>
<td>18-78</td>
</tr>
<tr>
<td>Days smoked per month</td>
<td>83</td>
<td>19.30</td>
<td>11.28</td>
<td>1-30</td>
</tr>
</tbody>
</table>
Table 3.5: Retest sample smoking behaviors at three month follow-up

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>160</td>
<td>33.60</td>
<td>15.14</td>
<td>18-78</td>
</tr>
<tr>
<td>Days smoked per month</td>
<td>146</td>
<td>17.33</td>
<td>10.98</td>
<td>1-30</td>
</tr>
<tr>
<td>Cigarettes per month</td>
<td>150</td>
<td>4.01</td>
<td>2.57</td>
<td>1-10</td>
</tr>
<tr>
<td>PCS</td>
<td>159</td>
<td>5.22</td>
<td>1.60</td>
<td>1-7</td>
</tr>
<tr>
<td>FTND</td>
<td>135</td>
<td>1.64</td>
<td>1.75</td>
<td>0-7</td>
</tr>
</tbody>
</table>

Four hierarchical regression analyses were performed with participants who remained in the study at three month follow-up (n=160) (See table 3.6). The hierarchical regression models were used to assess if intervention condition predicted smoking behaviors at three month follow-up, while controlling for baseline smoking behaviors. The dependent variables were the smoking behaviors at three month follow-up. In the first step, baseline smoking behaviors were entered, and in the second step the intervention condition was entered. For the first model, nicotine dependence at baseline accounted for 35.7% of the variance in the nicotine dependence score at three month follow-up. The inclusion of the intervention at the second step accounted
for an additional .3% of the variance for nicotine dependence at three month follow-up (F (1,128) =.55, p=.46). The analyses showed that nicotine dependence at baseline significantly predicted nicotine dependence at three month follow-up (β=.497, p=.000); however, intervention condition was not a significant predictor (β=.155, p=.460). For the second model motivation to quit at baseline accounted for 8.4% of the variance in the motivation to quit at three month follow-up. The inclusion of the intervention at the second step accounted for none of the variability (0%) of motivation to quit at three month follow-up (F (1,101) =.012, p=.914). The analyses showed that motivation to quit at baseline significantly predicted motivation to quit at three month follow-up (β=.261, p=.003); however, intervention condition was not a significant predictor (β=.014, p=.914). For the third model, perceived competence at baseline accounted for 15.8% of the variance in perceived competence at three month follow-up. The inclusion of the intervention at the second step accounted for none of the variability (1%) of perceived competence at three month follow-up (F (1,158) =.118, p=.731). The analyses showed that perceived competence at baseline significantly predicted perceived competence at three month follow-up (β=.360, p=.000); however, intervention condition was not a significant predictor (β=.361, p=.731). For the fourth model, average cigarettes per month at baseline accounted for 18.2% of the variance in the average cigarettes per month at three month follow-up. The inclusion of the intervention at the second step accounted for none of the variability (.6%) of the average cigarettes per month at three month follow-up (F (1,143) =1.128, p=.290). The analyses showed that the average cigarettes per month at baseline significantly predicted the average cigarettes per month at three month follow-up (β=.368, p=.000); however, intervention condition was not a significant predictor (β=-.368, p=.290). For the fifth model, average days smoked at baseline accounted for 18.2% of the variance in the average cigarettes at three month follow-up.
The inclusion of the intervention at the second step accounted for none of the variability (20.2%) of the average days smoked at three month follow-up \( (F(1,146) =.033, p=.855) \). The analyses showed that the average days smoked at baseline significantly predicted the average days smoked at three month follow-up \( (\beta=.444, p=.000) \); however, intervention condition was not a significant predictor \( (\beta=.299, p=.855) \).

Table 3.6: Hierarchical regression predicting smoking behaviors at 3 month follow-up

<table>
<thead>
<tr>
<th>Variables</th>
<th>R-square change</th>
<th>Beta</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTND 3 month follow-up</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FTND Baseline</td>
<td>.357</td>
<td>.497</td>
<td>.000</td>
</tr>
<tr>
<td>Intervention</td>
<td>.003</td>
<td>.155</td>
<td>.460</td>
</tr>
<tr>
<td>Motivation to quit 3 month follow-up</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motivation to quit Baseline</td>
<td>.084</td>
<td>.261</td>
<td>.003</td>
</tr>
<tr>
<td>Intervention</td>
<td>.000</td>
<td>.014</td>
<td>.914</td>
</tr>
<tr>
<td>Perceived confidence 3 month follow-up</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived confidence Baseline</td>
<td>.158</td>
<td>.360</td>
<td>.000</td>
</tr>
<tr>
<td>Intervention</td>
<td>.001</td>
<td>.361</td>
<td>.731</td>
</tr>
<tr>
<td>Average cigarettes at 3 month follow-up</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average cigarettes Baseline</td>
<td>.182</td>
<td>.368</td>
<td>.000</td>
</tr>
<tr>
<td>Intervention</td>
<td>.006</td>
<td>-.368</td>
<td>.290</td>
</tr>
<tr>
<td>Average days smoked at 3 month follow-up</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average day smoked Baseline</td>
<td>.202</td>
<td>.444</td>
<td>.000</td>
</tr>
</tbody>
</table>
Four pairwise t-tests were conducted to assess smoking behaviors differences between baseline and three month follow-up among one hundred and sixty individuals participating in either the individual (n=96) or group intervention (n=64) (See table 3.7 and 3.8). The first pairwise t-test showed that the difference between the number of cigarettes smoked per month at baseline (n= 140, M=4.00, SD=2.58) and the number of cigarettes smoked per month at three month follow-up (n=140, M=2.05, SD=2.29) were statistically significant, \( t(139) = -8.66, p=.000, d=-1.95 \). The second pairwise t-test showed that the difference between the number of days smoked per month at baseline (n= 143, M=17.26, SD=2.58) and the number of days smoked per month at three month follow-up (n=143, M=9.05, SD=10.91) were statistically significant, \( t(142) = -8.47, p=.000, d=-8.20 \). The third pairwise t-test showed that the difference between the FTND score at baseline (n= 125, M=1.64, SD=1.71) and the FTND score at three month follow-up (n=125, M=.99, SD=1.37) were statistically significant, \( t(124) = -4.85, p=.000, d=-.648 \). The fourth pairwise t-test showed that the difference between the PCS score at baseline (n= 155, M=5.21, SD=1.61) and the PCS score at three month follow-up (n=155, M=5.83, SD=1.46) were statistically significant, \( t(154) = -4.60, p=.000, d=.623 \).

Table 3.7: Retest sample by intervention condition at baseline

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>160</td>
<td>33.60</td>
<td>15.14</td>
<td>18-78</td>
</tr>
<tr>
<td>Days smoked per month</td>
<td>143</td>
<td>17.26</td>
<td>2.58</td>
<td>1-30</td>
</tr>
<tr>
<td>Cigarettes per month</td>
<td>140</td>
<td>4.00</td>
<td>2.58</td>
<td>1-10</td>
</tr>
<tr>
<td>PCS</td>
<td>155</td>
<td>5.21</td>
<td>1.61</td>
<td>1-7</td>
</tr>
</tbody>
</table>
Table 3.8: Retest sample by intervention condition at 3 month follow-up

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>160</td>
<td>33.60</td>
<td>15.14</td>
<td>18-78</td>
</tr>
<tr>
<td>Days smoked per month</td>
<td>143</td>
<td>9.05</td>
<td>10.98</td>
<td>1-30</td>
</tr>
<tr>
<td>Cigarettes per month</td>
<td>140</td>
<td>2.05</td>
<td>2.57</td>
<td>1-10</td>
</tr>
<tr>
<td>PCS</td>
<td>155</td>
<td>5.83</td>
<td>1.60</td>
<td>1-7</td>
</tr>
<tr>
<td>FTND</td>
<td>125</td>
<td>.99</td>
<td>1.75</td>
<td>0-7</td>
</tr>
</tbody>
</table>

At three month follow-up, there were 25 participants in a one-person group, 16 participants in a two-person group, 11 participants in a three-person group, 8 participants in a four-person group, and 4 participants in a five-person group. The group size was not uniformed throughout the study. The variability in the group size was due to attrition, were subjects failed to return to the remaining group sessions. (See table 3.9).

Table 3.9: Group intervention: number of participants by group size

<table>
<thead>
<tr>
<th>Variables</th>
<th>1 person</th>
<th>2 people</th>
<th>3 people</th>
<th>4 people</th>
<th>5 people</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original sample (n=107)</td>
<td>41</td>
<td>28</td>
<td>21</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>(Data collected at Baseline)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow-up sample (n=64)</td>
<td>25</td>
<td>16</td>
<td>11</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>(Data collected at Baseline)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Three ANCOVAs were conducted to assess whether the number of group sessions attended (total session count) influenced smoking behaviors at three month follow-up among participants in the group intervention (n=64). Baseline smoking behaviors served as the covariates. Only some participants in the group intervention attended all of the three scheduled sessions. By three month follow-up, there were 14 participants who had attended one group session, 10 participants who had attended two group sessions, and 40 participants who attended three group sessions. The first ANCOVA did not reveal a significant effect of total session count on the average number of days smoked per month at three month follow-up after controlling for the average number of days smoked per month at baseline, F (2,56) = .032, p > .05. The second ANCOVA did not reveal a significant effect of total session count on the number of cigarettes smoked per month at three month follow-up after controlling for the number of cigarettes smoked per month at baseline, F (2,55) = .460, p > .05. The third ANCOVA did not reveal a significant effect of total session count on perceived competence at three month follow-up after controlling for perceived competence at baseline, F (2,60) = .820, p > .05.

Four regression analyses were conducted to identify predictors of smoking cessation, reduction, motivation to quit and perceived competence. In model one, a logistic regression was conducted to assess potential predictors of smoking cessation at three month follow-up. In the logistic regression model with smoking cessation (quitter = 0, smoker = 1) as the dependent variable and intervention condition, age, smoking status, nicotine dependence and motivation to quit as the independent variables, the first step of the overall model was not significant ($\chi^2 = 10.45, \text{df} = 6, p > .005, R^2 = .120$). Intervention, age, smoking status at baseline, FTND at
baseline, and motivation to quit at baseline did not significantly predict smoking cessation at three month follow-up (see Table 3.10).

Table 3.10: Logistic regression predicting cessation at 3 month follow-up

<table>
<thead>
<tr>
<th>Variables</th>
<th>OR</th>
<th>p</th>
<th>95% CI Lower</th>
<th>95% CI Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention condition (ref. is individual)</td>
<td>.546</td>
<td>.152</td>
<td>.239</td>
<td>1.250</td>
</tr>
<tr>
<td>Age</td>
<td>.994</td>
<td>.696</td>
<td>.963</td>
<td>1.026</td>
</tr>
<tr>
<td>Cigarettes per month</td>
<td>1.002</td>
<td>.572</td>
<td>.996</td>
<td>1.008</td>
</tr>
<tr>
<td>Nicotine Dependence</td>
<td>1.120</td>
<td>.491</td>
<td>.811</td>
<td>1.546</td>
</tr>
<tr>
<td>Motivation to quit (ref. is precontemplation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation</td>
<td>1.963</td>
<td>.167</td>
<td>.754</td>
<td>5.108</td>
</tr>
<tr>
<td>Contemplation</td>
<td>5.492</td>
<td>.216</td>
<td>1.138</td>
<td>26.494</td>
</tr>
<tr>
<td>Constant</td>
<td>3.411</td>
<td>.030</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

χ² (6) = 10.45, p > .05, R² = .120

In model two, a multiple linear regression was conducted to assess potential predictors of smoking reduction at three month follow-up (See Table 3.11). A multiple linear regression model was performed with smoking reduction (mean number of cigarettes smoked per month at follow-up) as the dependent variable and intervention condition, age, smoking status, nicotine dependence and motivation to quit as the independent variables. The overall model was statistically significant, \( F (5,107) = 9.07, p < .001, R^2 = .337 \). The first step of the overall model was significantly accounting for 33.7% of the variance in smoking reduction at three month follow-up. In the first step, intervention condition and age were not statistically significant. The smoking status at baseline was significantly associated with smoking reduction at three month follow-up. For every one unit increase in cigarettes smoked per month at baseline, there was a -.261 decrease in smoking at follow-up, 95% CI [.120, .401]. Nicotine dependence at baseline and participants who were in the contemplation stage were not statistically significant predictors of smoking reduction. However, participants that were in the preparation stage at baseline
relative to the pre-contemplation stage were more likely to reduce their smoking at follow-up ($\beta = -33.38, p = .029$)

Table 3.11: Linear regression predicting smoking reduction at 3 month follow-up

<table>
<thead>
<tr>
<th>Variables</th>
<th>B</th>
<th>Beta</th>
<th>$p$</th>
<th>95% CI</th>
<th>OR</th>
<th>$p$</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>11.165</td>
<td>.445</td>
<td>-17.73</td>
<td>40.067</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention condition (ref. individual)</td>
<td>-17.252</td>
<td>-.147</td>
<td>.067</td>
<td>-35.713</td>
<td>1.209</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>.147</td>
<td>.038</td>
<td>.689</td>
<td>-.580</td>
<td>.875</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cigarettes per month</td>
<td>-.261</td>
<td>.390</td>
<td>.000</td>
<td>.120</td>
<td>.401</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nicotine Dependence</td>
<td>-6.963</td>
<td>.196</td>
<td>.059</td>
<td>-.255</td>
<td>14.182</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motivation to Quit (ref. is precontemplation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation</td>
<td>-33.385</td>
<td>-.268</td>
<td>.029</td>
<td>-63.357</td>
<td>-3.413</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contemplation</td>
<td>-1.379</td>
<td>-.012</td>
<td>.918</td>
<td>-27.753</td>
<td>24.995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$F (6,113) = 9.072 p < .001, R^2 = .337$

In model three, a logistic regression model was conducted to assess changes in motivation to quit between baseline and three month follow-up (See table 3.12). Motivation to quit was assessed via the stage of change at baseline and at three month follow-up. First, a logistic regression was performed with increase (1= increase vs 0 = decrease or no change) in motivation to quit smoking at three month follow-up as the dependent variable and intervention assignment, age, smoking status, nicotine dependence, and motivation to quit at baseline as independent variables, the first step of the overall model was statistically significant $\chi^2 (6) = 17.329, p < .05, R^2 = .376$. Intervention condition, age, smoking status and nicotine dependence were not statistically significant. However, participants in the contemplation stage at baseline relative participants in the pre-contemplation stage were more likely to increase their motivation to quit smoking at three month follow-up $OR= 4.556, 95\% \ CI [1.556, 13.337], B= 1.556, p=006.$
In model four, a multiple linear regression was performed to assess changes in perceived competence between baseline and three month follow-up (See table 3.13). The dependent variable was the three month follow-up perceived competence score. The independent variables included: intervention condition, age, smoking status at baseline, nicotine dependence score at baseline, motivation to quit at baseline, and baseline perceived competence score. The overall model was statistically significant, $F(7, 109) = 5.33, p < .01, R^2 = .255$. Intervention condition, age, smoking status at baseline, nicotine dependence at baseline, and motivation to quit at baseline did not significantly predict changes in perceived competence at three month follow-up. However, baseline perceived competence was positively associated with three month follow-up perceived competence; for every unit increase in baseline perceived competence score, there was a .409 unit increase in perceived competence at three month follow-up, 95% CI [.255, .563].

Table 3.13: Logistic regression predicting motivation change at 3 month follow-up

Table 3.12: Logistic regression predicting motivation change at 3 month follow-up

<table>
<thead>
<tr>
<th>Variables</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention condition (ref. individual)</td>
<td>.676</td>
<td>.621</td>
</tr>
<tr>
<td>Age</td>
<td>.982</td>
<td>.550</td>
</tr>
<tr>
<td>Cigarettes per month</td>
<td>-1.009</td>
<td>.085</td>
</tr>
<tr>
<td>Nicotine Dependence</td>
<td>-1.165</td>
<td>.072</td>
</tr>
<tr>
<td>Motivation to quit (ref. precontemplation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation</td>
<td>.988</td>
<td>.593</td>
</tr>
<tr>
<td>Contemplation</td>
<td>4.556</td>
<td>.006</td>
</tr>
<tr>
<td>Constant</td>
<td>.001</td>
<td>.008</td>
</tr>
</tbody>
</table>

$\chi^2 (6) = 17.329, p < .05, R^2 = .376$

Table 3.13: Linear regression predicting perceived competence at three month follow-up

<table>
<thead>
<tr>
<th>Variables</th>
<th>B</th>
<th>Beta</th>
<th>p</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention condition (ref. individual)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cigarettes per month</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nicotine Dependence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motivation to quit (ref. precontemplation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contemplation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

44
<table>
<thead>
<tr>
<th>Variables</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>3.596</td>
<td>.000</td>
</tr>
<tr>
<td>Intervention condition (ref. individual)</td>
<td>.028</td>
<td>.911</td>
</tr>
<tr>
<td>Age</td>
<td>-.002</td>
<td>.843</td>
</tr>
<tr>
<td>Cigarettes per month</td>
<td>.002</td>
<td>.209</td>
</tr>
<tr>
<td>Nicotine Dependence</td>
<td>-.164</td>
<td>.103</td>
</tr>
<tr>
<td>PCS Baseline</td>
<td>.409</td>
<td>.255</td>
</tr>
<tr>
<td>Motivation to Quit (ref. pre-contemplation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation</td>
<td>.715</td>
<td>.088</td>
</tr>
<tr>
<td>Contemplation</td>
<td>-.039</td>
<td>.914</td>
</tr>
</tbody>
</table>

\[ F (7, 116) = 5.328, p < .01, R^2 = .255 \]
Chapter 4: Discussion

Previous studies have revealed that group interventions are more effective than individual interventions for reducing smoking behaviors among heavy smokers. For example, a meta-analysis of 50 studies revealed group interventions resulted in significant decreases in smoking behaviors compared to an individual intervention among smokers motivated to quit smoking (Cohen’s $d=.28$) (Motillo et al., 2009). Even among smokers who were currently not motivated to quit smoking, a meta-analysis of 53 studies demonstrated group interventions were more effective than individual interventions in achieving reductions in smoking prevalence as well as increasing quit attempts (Stead and Lancaster, 2009). However, a limited number of studies have investigated the impact of group and individual smoking cessation interventions among light and intermittent smokers. The current study addressed this gap in knowledge and sought to determine whether a group intervention is more effective than an individual intervention in reducing smoking related behaviors. Overall, there was tentative evidence supporting this hypothesis: participants in the group intervention reported a greater reduction in the number of cigarettes smoked per month, and also reported a greater reduction in nicotine dependence, compared to participants in the individual intervention ($p<.07$). Although this difference is only marginally significant this finding should not be ignored because reducing tobacco use is an important public health goal. The current findings provide tentative evidence that group interventions may be more effective than individual interventions for achieving this public goal. Researchers should take an active role in identifying smoking cessation interventions that might be effective in reducing tobacco related behaviors.

Findings from the current study tentatively suggest that participants who completed either of the interventions (individual or group) benefited from their participation. That is, participants reported a significant reduction in their smoking related behaviors between pre-test and post-test.
However the absence of a control group in this study limits the extent to which I can attribute the reduction in smoking behavior to either interventions. The findings are suggestive but not conclusive. Yet the current findings are consistent with previous studies that assessed if brief smoking cessation interventions were more effective than control ‘interventions’. For example, one study revealed that at three month follow-up participants who received a smoking cessation intervention reported reducing their cigarette consumption by at least 50% in comparison to participants in the control condition, who reported reducing their cigarette consumption by 16.6% (Baker et al., 2006). Similarly, another study found that participants in a smoking cessation intervention reported significantly greater reductions in the mean number of cigarettes smoked at 6-month follow-up compared to participants in the control condition (Canga et al., 2000). However the present study lacked a control group and therefore I cannot conclude that the reported reduction in smoking behaviors was due to participating in either interventions. Several alternative factors could explain why participants who received a smoking cessation intervention reduced their smoking behaviors. One factor that might explain the reduction in smoking is social desirability. For example, participants might have felt obligated to report a reduction in their cigarette consumption because they were participating in a smoking cessation intervention. A second factor that might explain the reduction in smoking involves news reports or community events that may have encouraged smoking reduction. The absence of a control group in the present study makes it impossible to determine if the self-reported reduction in smoking behavior was due to the current interventions or, alternatively, exposure to anti-smoking news reports and anti-smoking community events.

In addition, the efficacy of the current smoking cessation interventions (individual and group) to reduce smoking behavior could have been influenced by participants’ level of
motivation to quit smoking. Participants who remained in the study reported higher levels of motivation to quit smoking at baseline compared to participants who dropped out of the study and were lost to attrition. Thus the potential benefit of the interventions may be restricted to highly motivated participants.

The current study also investigated if a group intervention was more effective than an individual intervention in leading to smoking cessation. This hypothesis was not supported: there were no significant group differences in smoking cessation. It is important to explore potential reasons for the absence of an effect. First, participants in the group intervention often did not experience the intended group dynamic. At baseline, sixty four percent of the participants who were randomized to the group intervention did not have any of the expected group members attend the group sessions. Thus a large proportion of the participants who were assigned to the group intervention did not experience a group dynamic and did not gain the potential benefit of having other people present during the intervention sessions. At three month follow-up there were twenty five groups that failed to meet the minimum requirement of having at least two smokers present per group session. Second, there was a high attrition rate (46.7%) in the group intervention. In the current study it is important to note that the attrition rates in the group intervention were not random because the final sample of the study consisted of participants who at baseline reported smoking fewer cigarettes and also reported lower nicotine dependence, as well as a higher levels of motivation to quit smoking compared to participants who dropped out of the study. Third, the study lacked sufficient statistical power to detect small effects. The study was plagued by higher than anticipated attrition rates. It has been pointed out that retention of fewer than 70% of participants may be a threat to study results (McLellan et al., 1997). In the present study low retention rates were a problem and thus findings and conclusions
can only be generalized to populations who reflect the characteristics of the sample at 3-months follow-up. The current findings suggest the benefits of receiving either interventions was restricted to light smokers and cannot be generalized to all types of smokers. Various factors affected participants’ retention to the program such as changing/disconnecting cell phone numbers, and changing of addresses/incorrect addresses. In order to guard against this possibility, the survey queried about home, cell and/or alternate telephone contact information. However, previous studies have recommended asking for even more alternate phone numbers and addresses (e.g., from a spouse, relative) (Seed, Juarez, & Alnatour, 2009). Although participants were offered multiple methods to complete their follow-up assessment that included in-person, telephone, and postal mail alternatives; lack of transportation, and extended work schedules were reported as difficulties. Improved collaboration of research assistants with participants is warranted to provide more convenient methods for study completion (e.g., convenient call times). In the current study, participants’ whose telephone numbers were not current or were disconnected were mailed a reminder of the three month follow-up along with a survey packet, although, a significant amount were not returned. In order to increase retention rates, the current study implemented a bonus of $20 in gift cards to all participants who completed the program and the opportunity to enter a lottery with a monetary incentive as the prize. Although retention rates increased toward the end of the study, the desired level was not achieved. Multiple and improved contact methods are warranted to achieve higher retention rates.

Fourth, random assignment was ineffective in that greater numbers of daily smokers (vs intermittent smokers) were randomly assigned to the individual intervention. Studies have showed that intermittent smokers are less nicotine dependent than daily smokers (Okuyemi,
Pulvers, et al., 2007), report more quit attempts (Levy, Biener, & Rigotti, 2009) and are more likely to quit within the next 6 months compared to daily light smokers (Tong et al., 2006). For example, Cooper et al. (2010) assessed differences between intermittent and daily light smokers in a young adult military sample. At the one-year follow-up, 45% of intermittent and 23% of daily light smokers reported a seven day abstinence from smoking; 41% of intermittent and 22% of daily light smokers reported continuous abstinence. Consequently, the failure of randomization in the present study concerning smoking status may have influenced the lack of intervention difference results.

Fifth, it is unclear whether the combination of intervention strategies used in the study were the most appropriate for light and intermittent smokers. Although the efficacy of motivational interviewing (MI) addressing change in health behavior across different behavioral domains has been suggested, there has been insufficient support in the efficacy for smoking cessation. A meta-analysis of 30 controlled trials, focused on the efficacy of MI for various health behaviors found a non-significant effect size (Cohen’s $d = .11$, $ns$) for smoking cessation; however only two studies were included in this review (Burke, Arkowitz, & Menchola, 2003). Okuyemi et al. (2007) compared MI plus nicotine gum to a control condition among low income participants. A six-month follow-up indicated low cessation rates and no significant differences between conditions (MI 7.6% vs control 9.3%). Similarly, the current study revealed low cessation rates at post-test and no significant differences between treatment conditions. On the contrary, previous studies have observed higher quit rates using health education interventions (e.g., Ahluwalia et al., 2006). The present intervention may benefit from strengthening its health education component to clarify misconceptions about the health risks of light and intermittent smoking. Additionally, greater advice and more tools to enhance self-efficacy and coping skills
could be provided. Future studies should assess the efficacy of ME and HE interventions and add other empirically validated cessation strategies or components.

Sixth, the Clinical Practice guideline recommends a greater use of targeted and tailored interventions for smoking populations (Fiore et al., 2008), particularly for those who have been underserved in the smoking cessation literature. This study focused on light and intermittent smokers, 85% of whom reported being Hispanic. Although efforts were made to target both light and Hispanic smokers, it is possible that the intervention was not targeted enough, which may have explained low cessation rates. Future efforts should continue to consider the unique characteristics of the smoking populations of interest.

Finally, the group intervention in this study was brief in nature, including only three group sessions (45 minutes each) that may have not been intensive enough to promote cessation. Mohamed (2011) reported most counseling groups use between six and eight sessions, with the first few sessions devoted to the discussion of motivation to quit, health benefits, and strategies for planning a quit attempt. Furthermore, the Clinical Practice Guideline for treating tobacco addiction provides a description of key components of an intensive tobacco dependence intervention (Fiore et al., 2008); one of the components is program intensity, assessed by the number of sessions and session length. Based on the Clinical Practice Guideline, the session length of an intervention should be more than 10 minutes and the number of sessions should be 4 or more. Thus, program intensity and adherence to treatment is crucial, as already demonstrated by previous studies that found a dose-response relationship between the number of visits and a successful outcome (Fiore et al., 2004). Lastly, studying why participants drop out of sessions could be useful in trying to prevent such losses and in learning to appropriately choose candidates for interventions (Ramos et al., 2010).
Based on the findings of the current study, participants that remained in the study at three month follow-up were older, had a lower smoking status, lower nicotine dependence and increased motivation to quit smoking and higher perceived competence than participants who dropped out of the study. Hence, the potential efficacy of group and individual interventions is restricted to participants who reported reducing their smoking behaviors. At follow-up, those receiving the group intervention on average reduced .261 cigarettes per month than those in the individual intervention. The latter finding did not meet the conventional significant criteria (p<.05), instead the difference in smoking reduction between group and individual condition was marginally significant (p=.067). Future research should be conducted to determine if the marginal findings hold up under extreme scrutiny. Overall, these findings suggest smoking reduction may be clinically significant. Previous studies have suggested smoking reduction increases the probability of future cessation (Hughes & Carpenter, 2006). Smoking reduction can be seen as a step towards cessation, which in turn may increase the individual’s motivation to quit smoking (Hughes & Carpenter, 2006). These findings are consistent with previous studies, indicating greater intention to quit is associated with lower levels of smoking (Boulos et al., 2009; Levy et al., 2009). In a longitudinal study, it was reported that those who reduced their smoking by more than 25% had greater chances of quitting in the future (Broms, Korhonen, Kaprio, 2008). Additionally, the likelihood of quitting smoking increased with greater reduction (OR = 1.94). Similarly, a study indicated that moderate (25-50%) to large reductions (> 50%) in smoking quantity increased the likelihood of cessation (OR = 1.61 and OR = 2.96 respectively) and those who reduced and quit were less likely to relapse than those who quit without reducing (OR = .43) (Falba, Jofre-Bonet, Busch, Duchovny, & Sindelar, 2004). Further, at least two reviews, one that included 9 studies and a second that included 16 studies suggested that
smoking reduction was associated with future cessation (Fagerstrom, 2004; Hugues & Carpenter, 2006). These findings are important to note since studies have indicated a significant association between reduction, past year quit attempts (Sacks, Coady, Mbamalu, Johns, & Kansagra, 2012; Schauer et al., 2014), and nondaily smoking. Specifically, a subgroup of LITS, those who recently reduced from daily to nondaily smoking, may have an increased likelihood of cessation (e.g., compared to nondaily smokers who have never smoked daily; Schauer et al., 2014). As such, providing interventions to individuals while engaged in low-level smoking patterns may assist in preventing or delaying their transition into heavier smoking. Future efforts should include intervention components that heighten reduction and capitalize on observed reduction toward cessation.

As expected, participants who were highly motivated were more likely to reduce smoking. Despite not detecting a statistical difference between intervention conditions and motivation to quit, three considerations are noteworthy. First, increases in motivation to quit heighten the likelihood of future quit attempts (Zhou et al., 2009). Previous studies have established the relationship between motivation and potential quit attempts (Manfredi, Cho, Crittenden, & Dolocek, 2007; Pai & Edington, 2008). There is evidence supporting the motivational and volitional processes, where individuals form a plan stating when, where and how they will achieve their intention and how it is associated with promoting cessation (Armitage & Arden, 2008). Hence, an addition of a volitional component to light and intermittent smoking cessation interventions may capitalize on increases in motivation to change, which will promote cessation. Second, smoking cessation researchers have begun to postulate a phase based cessation model with phases that include motivation (increases in readiness to quit), pre-cessation (quit attempts), peri-cessation (short term abstinence), and maintenance (long term
abstinence) (Baker, 2010). Thus, given the challenges with smoking abstinence and its maintenance, increases in motivation are important to the cessation process. Future efforts should examine the multiple phases within the process of motivation to quit. Third, light smoking has been identified by some studies as an unstable pattern of smoking in which quit attempts and relapse may be common (White, Bray, Fleming, & Catalano, 2009), and intention to quit has been observed to change over short periods of time (Hughes, Keely, Fagerstrom, & Callas, 2005). As a result, longer and more follow-ups may serve as more accurate indicators of future quit attempts and smoking cessation. Future light and intermittent smoking studies should consider including volitional elements, consider measuring multiple phases of motivation, and use longer and more frequent follow-up periods to capture the entire cessation process.

The present intervention may be improved by a deeper assessment of theoretical underpinnings. For example, the positive change in motivation to quit smoking from baseline to follow-up suggests that the use of the Transtheoretical Model as a guide for motivation change was efficacious and is promising. The lack of association between intervention and follow-up perceived competence may suggest focusing more on the MI style and tone (Ryan, Tobin, & Rollnick, 2005). Indeed, Markland and colleagues (2005) suggest that the MI process can be implemented to affect the three main SDT constructs. Competence can be bolstered by helping the client to develop clear goals and by supporting self-efficacy; rolling with resistance can increase autonomy and avoiding coercion; expressing empathy and avoiding judgment on part of the client can increase relatedness. Thus continued refinements attending to theory are likely to enhance future light and intermittent cessation efforts.
4.1 Limitations

Several limitations are noteworthy. First, participants in the group intervention often did not experience the groups’ dynamics. Even though participants were randomized to receive the group intervention, the majority were by themselves. Second, the high attrition rates were observed among the individual intervention, reducing statistical power to detect potential between group differences. Third, the focus on a predominantly community Hispanic sample potentially limits the generalizability of the results from this study to other ethno cultural groups. Lastly, this study assessed smoking status at follow-up by self-report rather than using a biochemical method. Although biochemical verification of smoking status is often preferred, self-report is well known and noted as valid. Such that, in a sample that presents multiple challenges to follow-up survey completion, biochemical verification was not feasible.

4.2 Strengths

Multiple strengths of the current study are also noteworthy. First, this study represents one of the few interventions assessing smoking differences between group and individual conditions with a focus on LITS particularly within a minority population (i.e., Hispanic) along the U.S./México border. Additionally, the use of both types of intervention formats (individual & group) is consistent with recommendations of the Clinical Guidelines (e.g., Fiore et al., 2008) to deliver cessation services to a larger number of smokers. Second, all study materials were translated to promote evenness of study materials in both English and Spanish. Third, the intervention was guided both by theory and empirical evidence.
4.3 Future Directions

The present findings suggest that future research should explore the factors that increase attendance and retention among smokers who participate in group interventions. In addition, more studies should be conducted investigating the efficacy of group versus individual interventions. Most importantly, the latter research should explore the efficacy of these interventions among Hispanics who are light and intermittent smokers. In addition, future research should identify strategies for communicating the health consequences of ‘light’ smoking and incorporate the latter information in smoking cessation interventions. Additional research should explore the benefit of increasing the number of group sessions attended by participants. Longer follow-up periods would also be beneficial, permitting more time to assess the long term effects of each type of smoking cessation intervention.
References


Medical Care, 15, 5, 27–46.


Home health care nurses as a new channel for smoking cessation treatment: Outcomes from Project CARES (Community-nurse Assisted Research and Education on Smoking). *Preventive Medicine, 41*, 815-821. doi: 10.1016/j.ypmed.2005.08.004


doi: 10.1016/j.rmed.2008.02.017


doi: 10.1037/a0029039


doi: 10.1037/a0029039


http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6044a2.htm


Curry, S. J. (2003). Youth tobacco cessation: filling the gap between what we do and what


smoking treatment programs for lighter smokers with and without a history of heavier smoking. *Journal of Substance Abuse Treatment, 37*, 247–255.
doi:10.1016/j.jsat.2009.01.006


Doi:10.106/j.addbeh.2004.08.11


doi:10.1161/CIRCULATIONAHA.109.904235


General Practice, 56, 768-774.


doi:10.2105/AJPH.2011.300186


Intermittent and light daily smoking across racial/ethnic groups in the United States.


_Addictive Behaviors_, 29, 1143 – 1147. doi:10.1016/j.addbeh.2004.03.007


http://www.ncbi.nlm.nih.gov/books/NBK99242/


Appendix
Appendix A

Tobacco Use Behavior and Attitude Survey

Today’s Date: _________________________

How old are you? __________

Gender: _____ Male _____ Female

What is your level of education?

_____ Less than high school
_____ High school diploma/GED or equivalent
_____ Some college
_____ College graduate (e.g., B.A., B.S.)
_____ Graduate coursework

I am: _____ Single (never married)

_____ Married
_____ Divorced
_____ Widow/Widower
_____ Separated
_____ Living with someone

Please indicate the ethnic group(s) to which you belong:

_____ Mexican National _____ Mexican American

_____ Other Hispanic/Latin ethnic group (please specify) _______________________

_____ White _____ African American

_____ Asian American _____ Native American

_____ Other (please specify) __________________________
What is your total annual household/family income from all sources? (Check one)

_____ Less than $15,000
_____ Between $15,000 and $30,000
_____ Between $30,000 and $50,000
_____ More than $50,000

What is the size of your household, including yourself? ________ Members

Have you ever received Mental Health Services? _____ Yes _____ No

If yes, what conditions were you treated for?

_____ Depression
_____ Anxiety
_____ Post Traumatic Stress Disorder
_____ Schizophrenia
_____ Other (please describe) _______________________

What is your smoking status?

_____ I smoke daily and 11 or more cigarettes per day
_____ I smoke daily and between 5 and 10 cigarettes per day
_____ I smoke daily but less than 5 cigarettes per day
_____ I smoke weekly but not every day
_____ I smoke monthly but not weekly
_____ I no longer smoke at all, but in the past smoked at least 1 cigarette per day;

**If so, how many cigarettes per day? _____**

_____ I no longer smoke at all, but in the past I smoked weekly but not daily
_____ I have smoked a cigarette or a few, just to try it
_____ I have never smoked before, not even a puff

How many cigarettes do you smoke per day on average?

_______ Number of cigarettes per day (20 cigarettes in a pack)
In the last 30 days, how many **days** have you smoked?  
_______ Number of days (please write your best estimate)

On the days that you smoked, about how many cigarettes you smoked per **day**?  
_______ Number of cigarettes per day (please state your best estimate)

Do you smoke cigars?  
_____ Yes  If so, how many per week? _____  
_____ No

Do you use dip?  
_____ Yes  If so, how much per week? _____  
_____ No

Do you use chew?  
_____ Yes  If so, how much per week? _____  
_____ No

Do you use hookah?  
_____ Yes  If so, how much per week? _____  
_____ No

Do you use e-cigarettes?  
_____ Yes  
_____ No

If so, how many cartridges/disposable e-cigarettes per week? _____

Do you use smokeless tobacco alternatives (e.g., dissolvable tobacco, snus, etc.)?  
_____ Yes  If so, how much per week? _____  
_____ No

At what age did you first smoke? ______

For how many years have you smoked at least one cigarette per day? ______

What type of cigarettes do you usually smoke?  
_____ Regular  
_____ Lights  
_____ Ultralights
Have you ever changed this type of cigarette? _____ Yes _____ No

If so, for how long have you smoked your present brand?

How many times have you intentionally stopped smoking cigarettes for at least one day?

When is the last time you tried to quit smoking?

Think of the longest time you quit smoking. For how long did you stop?

During your longest quit attempt, did you gain weight? _____ Yes _____ No

If yes, how much weight did you gain? _____ pounds

In attempts to quit tobacco, have you ever used:

Nicotine patch __yes __no Nicotine gum __yes __no
Nicotine inhaler __yes __no Nicotine nasal spray __yes __no
Cold turkey __yes __no

Zyban (Bupropion, Wellbutrin) __yes __no

How interested are you in stopping smoking?

____ Not at all
____ A little
____ Some
____ A lot
____ Very much so

If you decide to quit tobacco, why would you consider quitting?

_____ Personal choice
_____ Health
_____ Person close to me wants me to (wife, child, friend, etc.)
_____ Tobacco is expensive
_____ My faith
_____ Other ________________________________

Are you in general concerned about your weight?  _____ Yes  _____ No

Would you start smoking again if you gained:

20 pounds or more (9 kilograms +)  _____ Yes  _____ No
18 – 20 pounds (8-9 kilograms)  _____ Yes  _____ No
16 – 18 pounds (7-8 kilograms)  _____ Yes  _____ No
14 – 16 pounds (6-7 kilograms)  _____ Yes  _____ No
12 – 14 pounds (5-6 kilograms)  _____ Yes  _____ No
10 – 12 pounds (4.5-5 kilograms)  _____ Yes  _____ No
8 – 10 pounds (4-4.5 kilograms)  _____ Yes  _____ No
6 – 8 pounds (3-4 kilograms)  _____ Yes  _____ No
4 – 6 pounds (2-3 kilograms)  _____ Yes  _____ No
2 – 4 pounds (1-2 kilograms)  _____ Yes  _____ No
0 – 2 pounds (0-1 kilogram)  _____ Yes  _____ No
How many pounds (or kilograms) gained do you think would prompt you to smoke again?

_____ Pounds (____ Kilograms

How many times have you intentionally quit smoking for at least 24 hours since participating in StopLite? _________

In the past 7 days how many cigarettes have you smoked?

__________ (If you have not smoked in the past 7 days, please indicate zero)

In the past 30 days how many cigarettes have you smoked?

__________ (If you have not smoked in the past 30 days, please indicate zero)

Have you used any of the following to assist you in quitting smoking?

_____ quitline/telephone service
_____ online service
_____ other smoking cessation service

How confident are you that you can quit smoking (stay quit)?

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

How interested are you in quitting smoking (or staying quit)?

1 2 3 4 5 6 7 8 9 10
Not at all interested Very interested
If you chose to quit using tobacco, how likely would it be that you would:

**Attend 4 group sessions**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at</td>
<td>Very likely</td>
<td>All likely</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Participate in a program where you receive multiple telephone contacts to quit**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at</td>
<td>Very likely</td>
<td>All likely</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Use a program on the internet designed to help you quit**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at</td>
<td>Very likely</td>
<td>All likely</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Participate in one on one counseling at the Health Center to help you quit**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at</td>
<td>Very likely</td>
<td>All likely</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Participate in one on one counseling at a smoking cessation clinic to help you quit**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at</td>
<td>Very likely</td>
<td>All likely</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Use self help materials**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at</td>
<td>Very likely</td>
<td>All likely</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you chose to quit using tobacco, how likely would it be that you would:
use nicotine gum

1  2  3  4  5  6
Not at
All likely
Very likely

use a nicotine patch

1  2  3  4  5  6
Not at
All likely
Very likely

use Zyban (Bupropion, Wellbutrin)

1  2  3  4  5  6
Not at
All likely
Very likely

use nicotine nasal spray

1  2  3  4  5  6
Not at
All likely
Very likely

use a nicotine inhaler

1  2  3  4  5  6
Not at
All likely
Very likely
Appendix B
Smoking: Stage of Change (Short Form)

Do you smoke (even once in a while)?

_____Yes, I currently smoke.
_____No, I quit within the last 6 months
_____No, I quit more than 6 months ago
_____No, I have never smoked

In the last year, how many times have you quit smoking for at least 24 hours?

_________________________ times

**If you smoke even once in a while**, are you seriously thinking of quitting smoking?
(If you are not currently smoking, please skip this question.)

_____Yes, within the next 30 days
_____Yes, within the next 6 months
_____Yes
_____No, not thinking of quitting
Appendix C

Perceived Competence (Not Smoking)

Please indicate the extent to which each statement is true for you, assuming that you were intending either to permanently quit smoking now or to remain permanently abstinent from smoking. Use the following scale:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>not at all</td>
<td>somewhat</td>
<td>very</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>true</td>
<td>true</td>
<td>true</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. I feel confident in my ability to not smoke.

2. I now feel capable of not smoking.

3. I am able to not smoke anymore.

4. I am able to meet the challenge of not smoking.
### Appendix D

**FTND**

1. How soon after you wake up do you smoke your first cigarette?
   - 5 minutes or less
   - 6 to 30 minutes
   - 31 to 60 minutes
   - Over 60 minutes

2. Is it hard for you to not smoke in places where it is not allowed like in church, at the library, or at the movies?
   - Yes
   - No

3. Which cigarette would you hate to give up the most?
   - The first one of the day
   - Other: __________________

4. How many cigarettes per day do you smoke?
   - 10 or less
   - 11 to 20
   - 21 to 30
   - 31 or more

5. Do you smoke more when you first wake up than during the rest of the day?
   - Yes
   - No
6. Do you smoke even when you are so sick that you are in bed most of the day?

Yes

No
Appendix E

Stoplite Intervention

From 1 to 10, how interested are you in quitting smoking? ______________

From 1 to 10, how confident are you in your ability to quit smoking? ______

*If the participant responds with a low number, you might ask open ended questions designed to get the participant to open up.*

What do you think keeps you from being a 10 in your interest to quit?

What do you think keeps you from being a 10 in your confidence to quit?

What would have to happen to raise your interest to a 10?

What might raise your confidence to a 10?

One thing that often helps people raise their desire to quit smoking is to review the good and bad things about smoking and quitting smoking. Let’s see if we can create your list.

*Use Worksheet. Begin to fill out with participant.*

*Boosting the Benefits: These questions may help increase the number of good things relative to bad things about quitting smoking.*

What would happen to your health if you quit smoking?

What would happen to the way you feel about yourself if you quit smoking?

What would happen to your relationships if you quit smoking?

What would happen to the quality of your life if you quit smoking?

*Make a copy of the Worksheet and provide it to the participant.*

When thinking about quitting, it sometimes helps to think of situations and feelings that lead you to smoke. It is also helpful to come up with a plan for dealing with these situations and feelings. Let’s identify your triggers to smoke and ways to cope with them.
Complete the Triggers to Smoke Worksheet with the participant, make a copy of it, and provide it to the participant.

<table>
<thead>
<tr>
<th>Pros and Cons Worksheet</th>
<th>Things that make me want to Quit Smoking</th>
<th>Things that make me want to Smoke</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Benefits of Quitting Smoking</td>
<td>Benefits of Smoking</td>
</tr>
<tr>
<td></td>
<td>(Good Things)</td>
<td>(Good Things)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Costs of Smoking</td>
<td>Costs of Quitting Smoking</td>
</tr>
<tr>
<td></td>
<td>(Bad Things)</td>
<td>(Bad Things)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Triggers to Smoke

Smoking triggers are things that make you want to smoke. Triggers also can remind you about smoking, so that you want to smoke. Use this worksheet to help identify triggers that remind you of smoking and ways you can manage the triggers.

What are three things that make you want to smoke?

External triggers are environmental triggers such as specific times, places, things and events.

1. _____________________________________________________
2. _____________________________________________________
3. _____________________________________________________

What are three feelings or thoughts that make you want to smoke?

Internal triggers are triggers such as emotions, thoughts, and physical feelings.

1. _____________________________________________________
2. _____________________________________________________
3. _____________________________________________________

What are three ways to deal with smoking triggers?

Avoiding: Make an effort to stay away from the triggers. This can help with external triggers.

Escaping: Getting out of the place/area with the smoking triggers. This is best for triggers that you don’t expect in the outside world.

Coping: Using skills you have to deal with the trigger while it is with you. This is good for both kinds of triggers.

Avoiding Smoking Triggers

What are two ways you can stay away from the smoking trigger?

1. _____________________________________________________
2. _____________________________________________________

Escaping Smoking Triggers

How can you escape (get away from) the smoking trigger?

1. _____________________________________________________
Coping with Smoking Triggers

What are some skills you can use to cope with smoking triggers?

1. _________________________________________________
2. _________________________________________________
3. _________________________________________________
4. _________________________________________________
5. _________________________________________________
6. _________________________________________________
Social Support
Social Support for the New Smoke-Free You!

Getting support and encouragement from others can help you to stay smoke-free! Use this worksheet to help you identify the people you will rely on for support and the things they can do to help.

My Support Network

Who are three people that really want to see you succeed?

1. __________________________________________
2. __________________________________________
3. __________________________________________

__ Supportive Behaviors
What things could other people do to help you stay smoke-free?

1. __________________________________________
2. __________________________________________
3. __________________________________________

__ Unsupportive Behaviors
Are there things that other people might do that would make it harder for you to stay smoke-free?

1. __________________________________________
2. __________________________________________
3. __________________________________________

__ Requesting Behaviors from Others
I will ask others to do more of these things:

1. __________________________________________
2. __________________________________________
3. __________________________________________
I will ask others to do less of these things:

1. __________________________________________

2. __________________________________________

3. __________________________________________
Common Health Costs of Tobacco

- Tobacco is the only product you can legally buy in the United States that can cause cancer if you use it.
- Stopping smoking is one of the best ways to prevent diseases and death.
- One out of five individuals who die each year, do so from smoking. One out of four individuals who are 35 to 64 years of age dies because of smoking.
- People who smoke miss about 7 more days of work per year than people who don’t smoke.
- People who smoke go to the doctor about 6 more times a year than people who don’t smoke.
- People who live with smokers go to the doctor about 4 more times a year than people who live with nonsmokers.
- About 53,000 people die each year from exposure to secondhand smoke. That is a packed Sun Bowl Stadium!!
- People who live with smokers die more often than people who do not.
- People who smoke between 1 and 4 cigarettes per day are 3 times more likely to die from lung cancer and heart disease.
- People who smoke occasionally have 60% higher heart disease death rates than nonsmokers.
- Smoking just one or two cigarettes per day increases your risk of heart attack.
- Light smokers have a 50% higher death rate in comparison to nonsmokers.
- Smoking 3 to 6 cigarettes per day (and not inhaling) increases your risk for heart attack by 60%.
- Cigarette smoking increases the risk of cardiovascular or heart disease.
- Nonsmokers living with smokers have a 30% increase in the risk of death from heart disease.
- Smokeless tobacco (e.g. chew, dip) users often have higher blood pressure.
- Using smokeless tobacco increases your heart rate.
- Smoking reduces the quality of life. For example, it causes lower energy, more shortness of breath, and more frequent colds.
The Benefits of Quitting Smoking

WITHIN:

20 minutes
Blood pressure, heart rate and the temperature of your hands and feet return to normal. You’ll feel less tired when you’re exercising.

Oxygen level in your blood increases to normal and carbon monoxide level drops to normal. With more oxygen in your blood, you’ll feel more awake and you won’t need as much coffee during the day.

8 hours
The risk of a heart attack begins to decrease.

24 hours
Nerve endings start to re-grow and your ability to smell and taste things increases. Now you’ll really be able to taste your home cooking!

2 days
Your body is free of nicotine. Bronchial tubes relax, making it easier to breathe. Your lung capacity increases.

3 days
Coughing, sinus congestion, fatigue, and shortness of breath decrease. Cilia or tiny hairs reactivate in the lungs, increasing your ability to handle mucus, clean the lungs, and reduce infection, like coughs or colds.

1 to 9 months
The risk of heart disease from smoking is reduced by 50%.

1 year
Lung cancer death rate for the average smoker (one pack a day) decreases from 137 per 100,000 to 72 per 100,000.

5 years
Risk of stroke for ex-smokers return to that for non-smokers.

5 to 10 years
Risk of Lung cancer drops to as much as half of that of current smokers. Lung cancer death rate for the average smoker drops to 12 deaths per 100,000 or almost the rate of non-smokers. Pre-cancerous cells are replaced. Other cancers, such as those of the mouth, larynx, esophagus, bladder, kidney and pancreas decrease.

10 years
Health risks are similar to non-smokers.

15 years
How to deal with triggers

Avoid

- Avoiding frequent contact with places where you smoke and with people who smoke
- Get rid of things that remind you of smoking like cigarettes, ashtrays, and lighters

Escape

- Leaving a situation or place that made you want to smoke

Cope

Substitution

- Eat or chew something like gum, or crisp vegetables such as carrots or celery
- Keep your hands busy: knit, fix something, garden, or write a letter
- Drink a glass of water or juice

Distraction

- Turn your attention to something else
- Read a book, newspaper, magazine, or watch television
- Do a crossword puzzle
- Find a hobby that requires using your hands

Social Support

- Seek the company of non-smokers
- Talk to a supportive ex-smoker
- Talk to a friend on the phone
- Tell your friends and family you quit

Healthy Alternatives

- Go to places where smoking is not allowed rather than places where smoking is allowed
- Drink less alcohol and caffeinated beverages for the first few weeks
- Use relaxation/deep breathing
- Clean your teeth and use a mouthwash after each meal
• Join the gym or attend exercise or dance classes
• Go for a walk around the block

Self-Reward
• Enjoy a special treat on weekends with the money you’ve saved
• Keep a money jar and fill it with the amount that you would normally spend on cigarettes
• Have a relaxing bath

Positive Self-Talk
• When the urge to smoke comes, say: “Take it easy now, calm down”
• Take a few deep breaths and remember your determination to be smoke free
• Think of your most important reason for quitting, and say it out loud
• Think of quitting as an act of love for those you care about and for yourself
• Think about the effort you’ve put into quitting
• Think about the negative effects of smoking
• Mark off each smoke-free day on your calendar to boost your confidence

Fact: Craving lasts only a few minutes at the most whether you smoke or not!!
Screening and Consent to Randomize

**Group (1-5 participants)**

- Session 1 (One hr) Tipping of the Scales (MI)
  - Quit Tip
  
  - Session 2 (One hr) Trigger Management, Social Support
    - Quit Tip
  
  - Session 3 (One hr) Relapse Prevention and 1 month post test
    - 3-month follow-up

**Individual (1 participant)**

- Intervention (45-60 min) Tipping of the scales (MI), Trigger Management, Social Support, Health Education
  - Start Tip
  
  - Booster Call 1 (5-10 min)
    - Quit Tip

  - Booster Call 2 and 1-month post test (30 min)
    - 3-month follow-up

**Weeks**

- Week 1
- Week 1.5
- Week 2
- Week 3
- Week 4
- Week 12
Participant Flow Diagram

Enrollment

Assessed for eligibility (n=32,072)

Excluded (n= 31,442)
- Not meeting inclusion criteria (n=432)
- Declined to participate (n=1,123)
- Non-smokers (n= 29,887)

Randomized (n=630)

Did not participate (n=344)

Total baseline sample size (n=286)

Heavy smokers (n=34)

Baseline Assessment (n=252)

Allocated to Individual intervention (n=145) Allocated to Group intervention (n=107)

Attrition

Lost to follow-up (n= 49) Lost to follow-up (n= 43)

3 month follow up

Analyzed (n=95) Analyzed (n=64)
Curriculum Vitae

Beatriz Suro Maldonado was born in Santurce, PR. She graduated from Rosa-Bell High School in Guaynabo, PR in 2007; she then entered the University of Puerto Rico at Rio Piedras. She earned a bachelor of arts in psychology in 2012 and joined two psychological research laboratories. Then, she attended the Master in Clinical Psychology program at the University of Texas at El Paso where she worked with Dr. Theodore V. Cooper in the Prevention and Treatment in Clinical Health Lab conducting research in light smoking cessation. In 2016 she will attend the counseling psychology doctoral program at Lehigh University.

Contact Information: bmsuromaldonado@miners.utep.edu

This thesis was typed by: Beatriz Suro Maldonado