ABSTRACT

Title of Dissertation: EFFECTIVENESS OF A BRIEF BEHAVIORAL SMOKING

CESSATION INTERVENTION IN A RESIDENTIAL

SUBSTANCE USE TREATMENT CENTER

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Cigarette smoking is the number one preventable cause of death in the United
States (American Cancer Society, 2008). Despite decades of awareness on the dangers of
cigarette smoking, many smokers have been unable to successfully quit. One population
with little access to smoking cessation treatments is inner city drug abusers in residential
treatment centers. Smoking rates among polydrug users in treatment approach 100%
(Burling & Ziff, 1988), and half of those treated for alcohol or substance abuse will die of
smoking-related illnesses (Hurt, et al., 1996). Nonetheless, a recent survey of residential
substance abuse treatment centers found that only 31% of centers provided smoking

cessation programs (Fuller, et al., 2007). The relative scarcity of smoking cessation programs offered at such centers is alarming. A residential substance-abuse center setting is, theoretically, an ideal location for the implementation of a smoking cessation program, due to the available resources (Bernstein & Stoduto, 1999). Successful completion of a smoking cessation intervention during drug treatment increases illicit drug abstinence rates by 25% at one year (Prochaska, Delucchi, & Hall, 2004). Nonetheless, studies of smoking cessation programs in residential treatment centers have typically showed low rates of success (Friend & Pagano, 2005), although these programs have typically utilized the group modality and not individualized, one-on-one treatment (Currie, Nesbitt, Wood & Lawson, 2003). It is important to measure the effectiveness of smoking cessation programs delivered in a one-on-one modality in residential treatment centers. The smoking cessation intervention employed in the present study was based on prior behavioral interventions. The effectiveness of this intervention on smoking cessation and short-term (one-month) relapse were assessed. Goodness-of-fit analysis revealed significantly greater rates of point-prevalence smoking reduction or cessation in the active treatment condition compared with the placebo condition; however, when smoking cessation rates were examined alone, there was no significant difference in cessation rates across the two conditions. No sex differences were found in smoking cessation or reduction rates across conditions. Hierarchical linear modeling revealed that sex (being male) and nicotine dependence contributed most significantly to CPD following quit day.

EFFECTIVENESS OF A BRIEF BEHAVIORAL SMOKING CESSATION

INTERVENTION IN A RESIDENTIAL SUBSTANCE USE TREATMENT CENTER

by

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Introduction

Causing over 440,000 deaths annually in the Unites States alone and resulting in

nearly $100 billion in direct medical costs per year, cigarette smoking is the number one

cause of preventable death in the United States (Bergen & Caporaso, 1999; Centers for

Disease Control and Prevention [CDC], 2002; Mokdad, Marks, Stroup, & Gerberding,

2004; NIDA, 2006). Although many smokers have attempted to quit smoking, relapse

rates are high. One-year post-treatment follow-ups have typically found high (i.e. 60-

90%) relapse rates (e.g. Krall, Garvey, & Garcia, 2002).

Despite decades of awareness of the dangers of cigarette smoking, many smokers

have been unable to successfully quit. One population with little access to smoking

cessation treatments, and to whom such treatments have seldom been targeted, is low-

income inner city African American drug users. Cigarette smoking is strongly associated

with living below the poverty line (Agrawal, Sartor, Pergadia, Huiznik, & Lynskey,

2008). Smoking rates among polydrug users in treatment approach 100% (Burling & Ziff,

1988) and half of those treated for alcohol or substance abuse will die of smoking-related

illnesses (Hurt, et al., 1996), making tobacco-related illness a greater source of direct

mortality for this population than alcohol- and illicit drug-related illnesses. In addition,

low-income smokers are at higher risk of relapse (Fernandez, et al., 2006), and thus

greater smoking cessation resources should be directed toward them. However, a recent

survey of residential treatment centers found that only 31% of centers provided smoking

cessation programs, and these programs were offered primarily at centers that accepted

large numbers of veterans or pregnant women (Fuller, et al., 2007). Another recent

survey suggested that many treatment center directors may rely on clients' smoking as a

means of managing co-occurring mood and anxiety disorders in this population (Richter, 2006). In light of the high tobacco-related mortality seen in this population, the relative scarcity of smoking cessation programs offered as such centers is alarming. Further, smoking cessation programs in residential treatment centers typically have low rates of success (Friend & Pagano, 2005). This may be due to the fact that group interventions are more commonly used than individual interventions (Currie, Nesbitt, Wood & Lawson, 2003), and because manualized smoking treatments have seldom taken advantage of 12-step concepts such as sobriety, support networks, and low frustration tolerance (LFT) syndrome. This is unfortunate given that smoking cessation interventions implemented during substance abuse treatment predict increased long-term abstinence rates from drug use (Prochaska, Delucchi, & Hall, 2004). The current study tailored a behavioral smoking cessation program specifically toward illicit substance abusers, making use of language and concepts already being practiced in substance abuse treatment.

The implementation of a smoking cessation program within a residential substance-abuse treatment center could potentially be viewed by some substance-abuse clinicians as either a distraction from the more salient goal of sobriety from illicit drugs, or as a countereffective strategy that aims to remove an important crutch from individuals working hard to maintain sobriety from intoxicating substances (cf. Martin, Rohsenow, MacKinnon, Abrams & Monti, 2006). However, smoking is the prototypical addiction, in that it involves drug tolerance, a strong withdrawal syndrome, and persistent use despite heavy financial, social and health costs. Further, a meta-analysis of smoking cessation interventions with clients in residential substance abuse programs found that those clients in substance abuse treatment who undergo smoking cessation during their treatment

actually have a decreased chance of relapse to illicit drug use (Prochaska, et al., 2004). Thus, the experience of successful smoking cessation while in drug treatment is associated with positive drug use outcomes in addition to the positive health effects of smoking cessation.

Most smoking cessation interventions have been developed and studied in outpatient primary care settings or in specialized smoking cessation clinics. However, some smoking cessation interventions have been studied in specialized populations, such as the low income, inner city African Americans commonly seen in residential substance abuse treatment centers. The needs of those within this population may be different than those of middle-income, suburban Caucasian individuals commonly seeking treatment for smoking cessation in hospitals and clinics. Thus, a successful smoking cessation intervention in a residential treatment center whose population comprises primarily lower-income African-American drug abusers from the inner city will need to be based both on the empirical literature on efficacious smoking cessation techniques and on the empirical literature on the effectiveness of interventions within this population with regard to smoking cessation.

Previous research on smoking cessation interventions tailored toward low income inner city African-American populations (e.g., Lipkus, Lyna, & Rimer, 1999) has been fraught with high attrition during the follow-up phase due to the transient nature of this population. A residential substance abuse treatment center is a nearly ideal location for the study of a transient population in the short-term, due to the low attrition rates of those under contract to stay in the center. A long-term one-year follow-up, considered to be the "gold standard" in smoking cessation trials, was determined to be prohibitively difficult

with this residential treatment population, due to future transience upon leaving the center. The difficulty to follow clients upon leaving this center is further compounded by the fact that the Washington, D.C. metro region consists of two states and the District, and thus even within the metro region, a client may move to one of three jurisdictions. This inability to follow clients for a longer period (such as one year) is an unfortunate limitation of the ability of this study to measure treatment success over a time period common in the literature.

The wealth of research on smoking cessation interventions conducted in outpatient, predominantly middle-class settings suggests a number of psychological correlates of smoking cessation failure and relapse. Temptation to smoke, motivation to quit, nicotine dependence, smoking history, and depression, anxiety and stress symptoms have all been found to affect smoking cessation and predict relapse (e.g. Baer & Lichtenstein, 1988; Covey, Glassman, Stetner, & Becker, 1993; McCuller, Sussman, Wapner, Dent & Weiss, 2006; Ockene, et al., 2000).

Temptation to smoke is the near-opposite of self-efficacy, the belief that one will be able to successfully quit, as measured by self-report (Hansen, et al., 2007). Smoking temptation is highly negatively correlated with self-efficacy at $r = -0.60$ (Velicer, DiClemente, Rossi, & Prochaska, 1990). Self-efficacy at baseline is a strong predictor of smoking cessation (Stein, Anderson & Niaura, 2007).

Baseline motivation to quit smoking is also a significant predictor of success at smoking cessation attempts (Herzog & Blagg, 2007). Although motivation to quit is often measured under a three-stage model (precontemplation, contemplation, action), recent analysis suggests that motivation to quit is a continuous measure that cannot be

trichotomized and instead should be measured continuously. As a continuous measure, motivation to quit is a strong predictor of treatment success (Herzog & Blagg, 2007).

A third major variable found to mediate successful smoking cessation is nicotine dependence. Highly nicotine-dependent smokers experience more difficult time maintaining abstinence from cigarettes (Piper, et al., 2008).

Smoking history is also a significant predictor of relapse. In the present study, participants were asked to give the age at which they initiated smoking and the age at which they started smoking regularly. Early progression to daily smoking is a predictor of smoking cessation failure and relapse (Patton, et al., 1998).

Depression, anxiety and stress symptoms also predict smoking cessation failure and relapse, although some data suggest that this relationship is stronger for older adults than for younger adults and adolescents (Piper, et al., 2008).

These above-mentioned psychological variables have all been found to mediate successful smoking cessation in middle-class outpatient populations (Shiffman, 1993). However, it is unclear whether these relationships will be found among a low-income, predominately African American, inpatient drug-abusing population. The current study provided an opportunity to examine whether the correlates of smoking cessation among middle-class, outpatient, predominately White populations generalize to the population at hand.

This study was an effectiveness trial of a brief behavioral smoking cessation intervention (one hour of therapy delivered via four, 15-minute sessions in a 10-day period) with a control group receiving progressive muscle relaxation (PMR), within a primarily low-income inner city African American population in a residential treatment

setting. The study had three major aims. First, the effectiveness of this treatment with respect to smoking cessation was assessed. Second, the effectiveness of this treatment on harm reduction (defined as ≥50% decrease in number of cigarettes smoked per day [CPD]) was assessed. Third, the influence of Treatment, Time, Treatment X Time, and the correlates of note (Temptation to smoke, Motivation to quit, nicotine Dependence, age of Regular smoking, and depression, anxiety and stress symptoms [DASS]) will be assessed using Hierarchical Linear Modeling (HLM), an advanced form of linear regression that allows the assessment of complex relationships between variables across time when unequal variances are observed.

Hypotheses

The following hypotheses were formulated: (1) the brief behavioral treatment for smoking cessation is significantly more effective on cessation rates than placebo; (2) individuals receiving the treatment who do relapse evidence longer time to relapse than relapsers receiving the placebo treatment; (3) the treatment is significantly more effective at producing significant smoking reduction (≥75% decline in cigarettes smoked daily) than placebo (based upon the extant literature, e.g. Niaura, Abrams & Brown, 2003); (4) the baseline correlates measured (temptation to smoke, motivation to quit, nicotine dependence, smoking history, and depression, anxiety and stress symptoms) each account for significant portions of the variance in smoking cessation failure and relapse, as measured between quit day and four weeks' follow-up (based on the extant literature, e.g. Hatsukami, et al., 2004).

Method

Experimental Design Considerations

Typical effect sizes for studies of this type (a behavioral smoking cessation study,

described below) are moderate (Cohen's $d = 0.40$; Sussman, Sun, & Dent, 2006). A

power analysis (Cohen & Cohen, 2001) showed that with an alpha level of $\alpha = .05$, and

with a moderate effect size, it is necessary to have 30 subjects in each cell. With two

cells, a sample size of $N = 60$ was needed to have adequate power ($1-\beta \geq .8$).

Participants

Participants for this study were sixty-six men and women substance abusers

residing in The Salvation Army Harbor Light Treatment Center in Northeast Washington,

DC. All clients at this center are 18 years of age or older. The mean age of the sample

was 44.0 years ($SD = 9.4$); 90.0% were African-American, and 52% were male.

Demographics of the sample population were typical of the center population

demographics on age ($M = 44.2$, $SD = 9.7$) and race/ethnicity (94% African-American).

Clients at this center typically report low household income (56% under $10,000

annually) and low marriage rates (87% single). Only 46% of sample participants reported

income and marital status, and so these data are not presented here. The sample

population had a higher percentage of women (48%) than is typical of the center

population, which was estimated to be approximately 20% women during the data

collection period.

Inclusion criteria were: (1) enrolled in a two-, three-, or six-month program at the

center; (2) have lived at the center for more than one week; (3) report current daily

smoking (≥ 1 CPD) at baseline; (4) report motivation to quit at ≥ 5 or greater on a scale of

0-10, with 10 being the highest motivation to quit; and (5) have no current diagnosis of psychotic or bipolar disorder (as indicated by SCID data; see below for a description of the SCID).

Baseline Measures

   Demographics. The Demographics measure used (Appendix A) asked for the following self-report items: age, sex, and racial and/or ethnic identity.

   Smoking History. The Smoking History questionnaire used (Appendix B) asked participants about their smoking history: the age at which they first tried smoking cigarettes, the age at which they first started smoking regularly, and their age currently (so that number of years smoking could be assessed). Additionally, the questionnaire asked participants for their preferred brand of cigarette, its length (85 mm vs. 100 mm), and menthol or non-menthol content. Although the items on this measure are relatively typical items used, the measure as is was created anew for the current study in light of the recent emphasis on the phenomenon of menthol cigarette use in low-income and African American populations. Because of its novelty, normative data are not yet available.

   Semi-structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I). The SCID-I (First, Spitzer, Gibbon, & Williams, 1997; 2000) is a semi-structured clinical interview for DSM-IV-TR (APA, 2000) Axis I disorders. Specifically, the following disorders were assessed: Major Depressive Disorder, Bipolar I Disorder, Panic Disorder, Specific Phobias, Obsessive-Compulsive Disorder, Post-Traumatic Stress Disorder, Generalized Anxiety Disorder, Social Phobia, Psychotic Disorders, and Alcohol, Cocaine, Opioid, Cannabis, Hallucinogen and Polydrug Dependence. Interviews were conducted by the student investigator (T.J.W.) and trained research assistants.

The SCID was used for two reasons: first, to assess for current symptoms of mania and psychosis. Current mania and psychosis were exclusion criteria for this study, because these acute symptoms require intensive treatment and it was deemed inappropriate to include clients experiencing these symptoms in a behavioral smoking cessation study (e.g. Kadden, Litt, Cooney, Kabela, & Getter, 2001). Second, the SCID was used to diagnose other major Axis I disorders such as depression and PTSD, so that secondary analyses could be conducted by diagnostic subgroups. In fact, insufficient data were available for this, as discussed in the results section. Upon administration of this screener, participants were drug-free and detoxified for a minimum of one week, and thus no manic or psychotic symptoms were attributable to acute drug effects.

Diagnostic Interview for DSM-IV Personality Disorders. The BPD and ASPD modules of the Diagnostic Interview for DSM-IV Personality Disorders (DIPD-IV; Zanarini, Frankenburg, Sickel, & Yong, 1996) were used to diagnose Borderline Personality Disorder and Antisocial Personality Disorder. The DIPD-IV is a semi-structured interview for assessing DSM-IV personality disorders. It evidences good inter-rater reliability (Cohen's k = .68) and test-retest reliability (Cohen's k = .69) based on interviews by independent raters conducted 7–10 days apart (Zanarini et al., 2000). Additionally, the DIPD-IV has been found to correlate with the Axis II module from the previous version of the SCID (Zanarini et al., 2004). However, the DIPD was used because its measures of reliability are superior to the Axis II modules of the SCID: interrater reliability coefficients range from 0.52 to 1.0 for the DIPD and test-retest reliability coefficients range from 0.46 to 0.85 (Zanarini, Frankenburg, Chauncey, & Gunderson, 1987).

Fagerstrom Test of Nicotine Dependence. The Fagerstrom Test of Nicotine

Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991; Appendix C)

is a modification of Fagerstrom's (1978) original Nicotine Tolerance Questionnaire

(Fagerstrom, 1978). The FTND consists of six forced-choice questions regarding

smoking preferences, and has been shown to be a reliable and valid instrument for

assessing level of nicotine dependence and distinguishing heavier smokers from lighter

smokers: the coefficient alpha for the FNTD is 0.61 (Heatherton et al., 1991), and each

item has been biochemically validated as a measure of nicotine dependence (Heatherton,

et al., 1991). FTND scores of 4 or greater reflect high dependence (Rios-Bedoya,

Snedecor, Pomerleau & Pomerleau, 2008) and African American smokers typically

experience greater levels of dependence at lower FTND scores than Whites, meaning that

scores of 4 or greater on the FTND for African American smokers reflect strong

dependence (Luo, et al., 2008).

Motivation to Quit. The Contemplation Ladder (Biener & Abrams, 1991;

Appendix D) is a measure based on the stages-of-change model where individuals move

through a period of four stages in behavioral change: precontemplation, contemplation,

readiness, and action. Participants are asked to circle a number between one and ten,

placed on rungs of a drawing of a ladder. Higher numbers indicate a greater motivation to

quit smoking, and motivation to quit smoking as measured by the contemplation ladder

has shown a modest effect size as a moderator of smoking cessation (Abrams, et al.,

2000). Comparison of ten different assessment measures of motivation to quit using a

sample of current smokers revealed that the contemplation ladder more accurately

predicts the likelihood of smokers quitting than other measures available. That is to say,

those with higher scores on the ladder are more likely to seriously attempt quit smoking in the near future, and those with lower scores are less likely to do so, whereas other extant measures are less accurate at predicting likelihood of impending smoking cessation (Herzog & Blagg, 2007).

Situational Temptation Inventory (Short Form). The Situational Temptation Inventory (DiClemente, 1981, 1986; Short Form: Velicer, et al., 1990; Appendix E) was developed as a 31-item measure of situational cues that serve as temptations for smoking behavior. Scores on this measure are strongly negatively correlated with confidence in smoking cessation ($r = -.60$; Velicer, et al, 1990). Exploratory factor analysis revealed three factors: positive/social, negative/affective, and habitual/addictive. A short form of the inventory was then created, using three items from each factor (Velicer, et al., 1990).

Depression, Anxiety and Stress Scale. The DASS-21 (S.H. Lovibond & P.F. Lovibond, 1995; Appendix F) is an epidemiological measure of depression severity consisting of three, 7-item subscales of depression, anxiety and stress, for a total of 21 questions. The questions ask about mood states in the past week, each of which can be answered with a response between 0 (i.e. "I felt this way none or very little of the time this week") and 3 (i.e. "I felt this way very often, between 5 and 7 days this week") yielding a total range of 0-63 points on the measure. In a sample of undergraduates (S.H. Lovibond & P.F. Lovibond, 1995), excellent internal reliability was shown for each of the subscales ($\alpha = 0.91$, 0.84, and 0.90 for the Depression, Anxiety, and Stress scales, respectively).

Outcome Measures

   Self-Reported Smoking. At all visits (i.e. baseline, the four treatment sessions, and once weekly on the four follow-up Monday visits), participants met with the experimenter to complete a weekly timeline follow-back calendar (cf. Sobell & Sobell, 1978; 1996; Appendix G) for their smoking over the past week. This method has shown to be a useful and accurate tool for measuring smoking behavior (Brown, Burgess, Sales, Whiteley, Evans & Miller, 1998).

   Biochemical Validation. Smoking status at all four therapy sessions and all four weekly follow-ups was biochemically validated using expired-air CO measurements (Belmont Smokerlyzer Micro III™, Belmont, NJ). Expired-air CO measurements allow for an additional measure of smoking status above and beyond self-reported smoking status; as such, both self-reported CPD and measured CO were used as outcome measures. Discrepancies exist between the two sources for a number of reasons; these are addressed in the Discussion section below. The half-life of CO is eight hours; a measurement of 8ppm or less represents the "non-smoking" range; typical smokers have expired-air CO levels of 9-40ppm depending on time of day and how recently the last cigarette was smoked (Kozlowski & Herlig, 1988). Smokers in settings such as this residential center, with limited opportunities to smoke are likely to have lower CO levels, because CO is positively correlated with cigarettes smoked (Heatherton, et al., 1991); the maximum number of cigarettes smoked per day in this sample was 10 (see Results section below), whereas typical smoking cessation study participants average 13-18 CPD (Messer, Trinidad, Al-Delaimy, & Pierce, 2008).

Procedure

Prior to participation, participants were randomly assigned to the experimental condition (i.e. an active treatment comprising four, 15-minute therapy sessions, a manual, and homework) or the control condition (i.e. no therapy sessions, manual, or homework). The computer-aided generation of a randomized list was repeated until a list of $N = 60$ was generated that had an equal number of participants ($n = 30$) assigned to each condition. In the event that participants dropped out prior to completion of the treatment phase, they were randomly replaced by new participants, such that $N = 60$ participants complete the active phase of the study. Demographic data were analyzed to determine whether any key variables differed systematically between drop-outs and treatment completers; eight women and one man dropped out, and all from the control condition. This problem is addressed in the Discussion section below. Additionally, it was decided prior to the collection of data that any participants who elected to drop out of treatment, but were willing to continue to be assessed (i.e. those who wished to cease receiving active therapy but wished to remain in the study) were to have been assessed and treated as a third group (in addition to the control group and the experimental-completers group). However, this situation did not occur where participants elected to drop out of treatment but remain being assessed.

The timeline and procedures for this study are summarized in Table 1. Participation in this study consisted of an informed consent and semi-structured interview session on a Monday evening ("Session 0" for the sake of discussion), followed by eight sessions scheduled during the daytime at the Salvation Army Harbor Lights treatment center. The first four sessions included the behavioral treatment or PMR placebo, and session 3 was the official quit date for all participants. Sessions number 1 and 3 were

conducted on Tuesdays; sessions 2 and 4 were conducted on Fridays. There was no

deviation from the Tuesday/Friday schedule. Follow-up data collections (sessions 5

through 8) were scheduled on Tuesdays or Fridays, roughly evenly divided between the

two. Two follow-up data collections were conducted on a Monday. For participants in the

standard treatment condition, session 1 (one week prior to quit day) typically lasted 30

minutes; sessions 2, 3 and 4 typically lasted 20 minutes. Follow-up visits (sessions 5

through 8) lasted less than 5 minutes each, occurring once weekly following quit day.

Follow-up sessions comprised a CO sample being taken, and completion of the timeline

follow-back calendar. With the exception of the last two weeks of follow-up data

collection for the last cohort of six individuals, which were conducted by an

undergraduate research assistant, all data collection and therapy sessions were conducted

by the student investigator (T.J.W.), using the treatment manual (Appendices J and K;

discussed below).

Table 1. Study timeline and procedures.

Session Number	Description	Weekday	Therapy* *treatment condition only	Measures** **both conditions
0	First Week At Center	Monday	None	Informed consent, SCID-I, DIPD
1	1 week prequit	Tuesday	15 minutes; decisional balance, social support	15 minutes; Demographics, smoking history, smoking temptation, Contemplation Ladder, FTND, DASS, CO, TLFB
2	3 days prequit	Friday	15 minutes; high-risk situations	5 minutes; CO, TLFB
3	Quit Day	Tuesday	15 minutes; abstinence violation effect	5 minutes; CO, TLFB

4	4 days postquit	Friday	15 minutes; reflection on successes and failures	5 minutes; CO, TLFB
5	1-week follow-up	Tuesday or Friday	None	5 minutes; CO, TLFB
6	2-week follow-up	Tuesday or Friday	None	5 minutes; CO, TLFB
7	3-week follow-up	Tuesday or Friday	None	5 minutes; CO, TLFB
8	4-week follow-up	Tuesday or Friday	None	5 minutes; CO, TLFB

Participation for those in the control condition consisted of eight sessions, completing identical measures at identical times, with the only difference being the absence of the four, 15-minute therapy sessions.

Because participants in this study were all undergoing residential treatment, and the therapist had the ability to locate them for sessions, the occurrence of participants missing sessions, a common problem in outpatient studies, was lower than in typical outpatient studies. On average, participants attended 3.2 therapy sessions out of four. Of the 39 missed sessions, most (33) occurred because of typical medical visits (e.g. dental, vision, clinic visit); five occurred due to medical emergencies (e.g. offsite hospitalization), and one missed visit was due to legal reasons (a court date). In the event of a participant missing one of the four therapy sessions, the material from that session was made up at the next session.

Following study completion or withdrawal, participants were thanked for their participation. Payment in the form of a $20 grocery store gift card was deposited into an account at the University of Maryland, and was available to clients upon their leaving the

center via calling a hotline and giving an address to which the card could be sent.

Funding for payment of participants in this study came from NIDA grant R01 DA 019405. This grant was awarded to principal investigator Carl W. Lejuez to examine psychological differences between cocaine and heroin addicts.

Determination of Cessation and Reduction

The outcomes of importance in this study, smoking cessation and smoking reduction, were measured in accordance with the extant literature. Smoking cessation was defined as self-reported 24-hour abstinence as verified by CO levels of <8 ppm, as is typical in the field (e.g. Weinberger, Krishnan-Sarin, Mazure, & McKee, 2008). However, given that this population has restricted access to smoking cigarettes (typically four smoking breaks daily), and as a result, lower CO levels, this CO cutoff for determination of cessation was set at a stricter level. Smoking reduction was measured by self-reported 50% reduction in CPD from baseline average as verified by a 50% decrease in measured CO from baseline average (cf. Bohadana, Nilsson, Westin, N. Martinet & Y. Martinet, 2005; Bolliger, 2000; Bolliger, et al., 2002).

Components of Therapy.

At the start of the first session, participants were given the opportunity to provide informed consent (Appendix H). Following informed consent, the therapist consulted the randomization list to determine each participant's treatment condition. Participants in the standard treatment condition received four, 15-minute therapy sessions, one in each of their first four visits. Therapy was conducted by the student investigator (T.J.W.), a doctoral student enrolled in a scientist-practitioner program in clinical psychology at the University of Maryland.

Therapy was conducted based on a treatment manual (Appendix I), created by the student investigator based on a modification of previously used manuals. This manual utilizes semi-scripted prompts. The manual is broken down into an introduction and four sections, one for each therapy session. The first session (one week prior to quitting) comprised an overview of the study, discussion of past quit attempts, reasons for quitting, developing a "game plan" for staying smoke-free, and establishing social support. The second session (three days prior to quit day) comprised a discussion of triggers for smoking and high-risk situations in which relapse would be most likely to occur, and the development of coping strategies for use in these situations. The third session (on quit day itself) comprised a discussion of quit-day experiences and a critical review of the effectiveness so far of the game plan and coping strategies; the fourth session (four days after quit day) similarly involved reflections on the experience and a utility analysis of coping strategies used, with modifications to the game plan developed for the future.

The student therapist was trained to conduct a very similar version of the therapy used for a previous study. Therapist training began with a psychoeducational component on smoking cessation interventions and the nature of smoking addiction; training in the use of the TLFB calendar and CO measurement; review of the study procedures; and psychoeducation into the background implications of the techniques used (e.g. motivational interviewing; behavior modification). The trainer and trainee ran through the full therapy component on each other twice each (to insure similar implementation of the manualized therapy; this took approximately two and one-half hours).

Adherence to protocol was defined as the therapist delivering the information found in each prompt in the therapists' manual (Appendix J), and not delivering any

prompts from the other treatment (i.e. PMR in the treatment condition; behavioral

techniques in the placebo condition). The ratio

[(# of manual prompts used) – (# of prompts from the other intervention used)]

/

[# of prompts in manual]

was calculated for each of the four therapy sessions per participant; the mean of these

four ratios was used as the adherence ratio for each participant run. Prior to the start of

data collection, it was determined that adherence ratios of .90 for a participant was

considered good adherence to protocol; ratios under .80 was considered unacceptable.

To assess adherence to protocol, audiotapes for all sessions of 10% of the

participants in the study sample were analyzed. These were randomly selected from each

condition. Because the final sample consisted of 30 subjects in the treatment condition

and 20 subjects in the placebo condition, the data for three clients (#X, Y and Z) were

assessed for the treatment condition and the data for two clients (#P and #Q) were

assessed for the placebo condition.

Data Analyses

First, adherence to treatment protocol was assessed (Appendix L). For the three

subjects assessed in the active treatment condition, adherence was measured at 0.82 for

one, 1.00 for the next, and .91 for the third (with an average of 0.91 for all three). Thus,

adherence to protocol was considered acceptable. Adherence for the placebo condition

was 1.00 for both participants assessed. With treatment delivered acceptably, we moved

onto descriptive analysis. Descriptive characteristics were calculated for the entire sample

prior to dropouts (as listed above under "Participants"), for the completed sample, and for

each treatment group (i.e. standard behavioral treatment and PMR control). Significance testing was then conducted to determine any failures of randomization or differential attrition between the two groups. It was determined that randomization failed with regard to sex. Sixty-six clients at The Salvation Army were recruited for this study; more women than men were assigned to the treatment group due to the random assignment and low N. Exacerbating this problem was the fact that more men than women dropped out of the treatment group, and their replacements were not sex-matched. That is to say, most men who dropped out of the treatment group were replaced by women and this led to a significant sex difference across groups (Figure 1, below).

Initially, analysis of treatment effectiveness regarding smoking cessation and reduction were to be conducted via survival analysis, using Cox regression techniques. However, the low n for the placebo group ($n = 1$ for quitters in the placebo condition; $n = 3$ for reducers in the placebo condition) ruled out the use of survival analysis. Next, Generalized Estimation Equations (GEE) were contemplated to replace the survival analysis; however, the spotty nature of participants' cessation attempts and erratic CPD and CO data ruled out the use of GEE. In the end, goodness-of-fit testing was used to measure the significance of cessation and reduction n's across conditions.

Following the goodness-of-fit analysis, we used hierarchical linear modeling (HLM), an advanced form of linear regression, to determine the variance accounted for by the effects of treatment, time, their interaction, and the baseline covariates. HLM is capable of measuring outcome variables at multiple hierarchical levels. Thus, time can be measured within individuals, as an individual difference variable, and so inter- and intra-individual questions of change can be addressed (Singer & Willett, 2003). In the present

study, we were able to examine the effects of Treatment, Time, and Treatment X Time on our outcome variable of CPD. Additionally, HLM provided an advantage over traditional linear regression because, measuring time within individuals, we were able to use the full data set collected. Subjects in this study attended (and missed) different sessions than each other, and attended different numbers of overall treatment and follow-up sessions than each other. This situation is much better handled by HLM than by traditional linear regression (Singer & Willett, 2003).

Results

Sample Characteristics

        Sixty-six men and women were recruited for this study, and sixteen dropped out

after randomization but prior to quit date (session 3). Dropout rates were unequal for sex:

thirteen men and three women dropped out of treatment. As such, the initial ratio of 52%

men recruited dropped to 42% of men completing the study. Also, in order to preserve

random assignment, dropouts were replaced with the next available participant and were

not matched on sex. This procedure led to an unequal number of men across treatment

conditions: only 30% of the treatment group comprised of men compared with 65% in the

control group. Because of this substantial difference in gender between groups despite

random assignment, gender was used as a covariate in the HLM analyses. A concert

diagram of recruitment and retention is presented as Figure 1.

        Figure 1. Participant recruitment and retention.
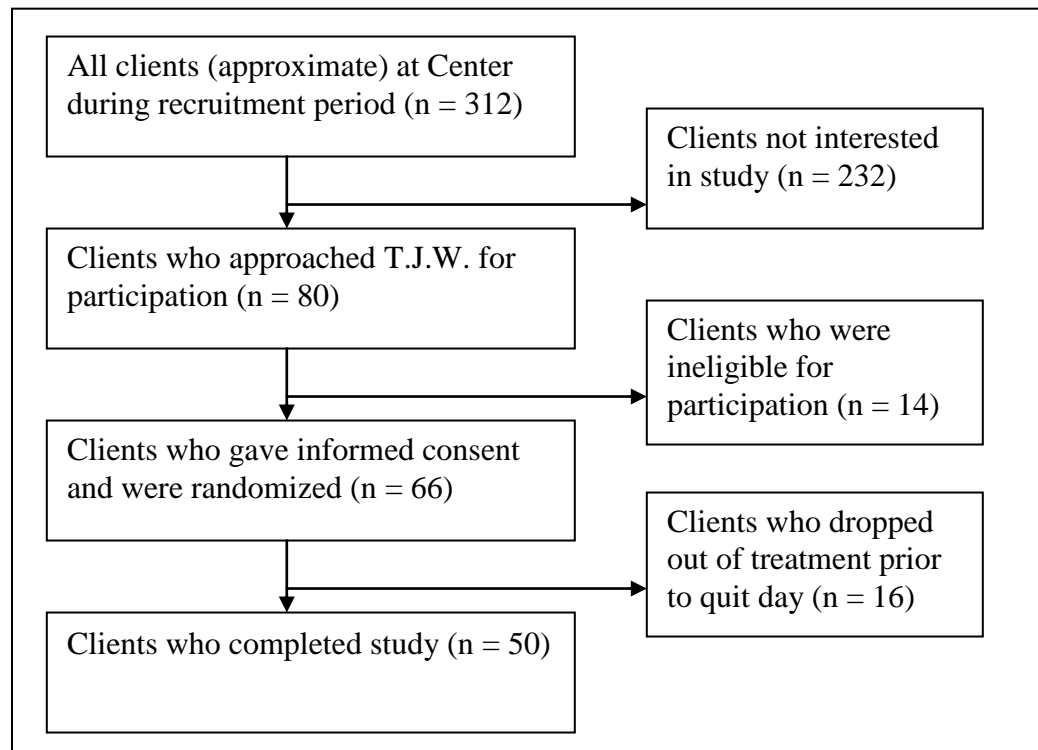
Treatment groups were compared across demographics and covariates (Table 2). The only significant group difference was in gender composition. Subjects in the two groups did not differ significantly in age, race/ethnicity, depression, motivation to quit, nicotine dependence or smoking history.

This sample evidenced high motivation to quit, with an average of 7.9 ($SD = 2.2$) on the motivation ladder, which ranges from 0 ("don't want to quit at all") to 10 ("want to quit immediately"). Depression, anxiety and stress were consistent with depressed clinical samples, with subjects totaling an average of 26.7 ($SD = 17.6$) points across the three subscales (cf. Page, Hooke, & Morrison, 2007). The sample also reported high levels of smoking temptations, averaging 25.0 ($SD = 8.0$) on the Temptation Inventory. No significant group differences were found on depression, anxiety and stress, or on smoking temptation.

Subjects reported a mean onset of smoking behavior at 14.2 years ($SD = 3.8$) with a progression to regular daily smoking at a mean age of 18.3 years ($SD = 5.8$). At a mean age of 44.0 years old ($SD = 9.4$), the mean years smoked regularly was 26.2 ($SD = 10.9$). This sample reported a high prevalence of full-flavor menthol cigarettes (96%) smoked. No group differences were found on these smoking history variables.

Because of the sex difference across conditions, the correlation between baseline CPD and sex was analyzed; baseline rates of smoking did not differ between sexes ($p = .593$). In addition, the baseline rate of smoking (see Table 2) did not differ across treatment conditions ($p = .158$).

Table 2. Descriptive Statistics of the Sample.

Variable	Treatment ($n = 30$)	Placebo ($n = 20$)	Full Sample ($N = 50$)	Test of Significance
	Mean (SD) Range	Mean (SD) Range	Mean (SD) Range	p
Age	43.8 (8.2) 20-57	44.9 (11.8) 21-60	44.0 (9.4) 20-60	.726
Sex (male)	30.0%	65.0%	42.0%	.007*
Race/Ethnicity (% black/African-American)	90.0%	90.0%	90.0%	1.00
Baseline Smoking (CPD)	5.0 (2.1) 2.0-8.0	4.3 (2.0) 0.5-10.0	4.7 (2.1) 0.5-10.0	.158
Depression, Anxiety, Stress Scale (DASS)	27.9 (19.7) 0-63	24.9 (14.1) 0-52	26.7 (17.6) 0-63	.543
Smoking Temptation	25.1 (9.2) 0-36	24.8 (6.2) 17-35	25.0 (8.0) 0-36	.878
Motivation to Quit	8.0 (2.5) 3-10	7.9 (1.8) 4-10	7.9 (2.2) 3-10	.852
Fagerstrom Test of Nicotine Dependence (FTND)	4.1 (2.0) 1-7	4.3 (1.8) 0-7	4.2 (1.9) 0-7	.748
Age of First Smoking	13.7 (3.6) 9-25	15.0 (4.1) 7-26	14.2 (3.8) 7-26	.263
Age of Regular Smoking	18.5 (6.9) 12-46	18.0 (3.6) 14-26	18.3 (5.8) 12-46	.745
Years Smoked Regularly	25.7 (10.7) 0-46	26.9 (11.6) 5-44	26.2 (10.9) 0-46	.707
Type of Cigarette (full-flavor menthol)	93.0%	100.0%	96.0%	.239

Sample scores on the Fagerstrom Test of Nicotine Dependence ($M = 4.2$; $SD = 1.9$) were comparable to other samples of African American smokers (cf. J. S. Brook, Duan, D. W. Brook, & Ning, 2007).

SCID data were incomplete for 27 of the 50 participants in the final sample. Because the SCID data were collected as part of a larger research project, not all clients (particularly those with 45-day treatment contracts) were administered the SCID. As a

result the data were deemed too incomplete to be included as covariates in the primary analyses.

Continuous variable significance testing was conducted using 2-tailed independent samples t-tests and not assuming equal variances for treatment and control groups. Categorical variable significance testing (goodness-of-fit tests) was conducted using 2-sided Pearson's χ^2 tests. Of all baseline variables measured, treatment and control groups only differed significantly on sex (alpha levels were set at .05 prior to the collection and analysis of data).

Smoking Cessation Analysis

Smoking cessation was defined as 24-hour self reported abstinence, as verified by CO analysis (CO < 8ppm; cf, Shiffman, et al., 2006). One participant in the placebo condition quit smoking, compared with eight participants in the active treatment condition (Table 3). Goodness-of-fit testing revealed no significant differences with respect to point-prevalence smoking abstinence rate between the treatment condition and placebo ($\chi^2 = 3.60$; $df = 2$; $p = .166$).

Table 3. Goodness-of-Fit Testing: Smoking Cessation X Treatment Condition.

	Number Quit (%)	Number Not Quit (%)
Placebo ($n = 20$)	1 (5%) 1 woman	19 (95%) 13 men and 6 women
Treatment ($n = 30$)	8 (27%) 2 men and 6 women	22 (73%) 7 men and 15 women
Full Sample ($N = 50$)	9 (18%) 2 men and 7 women	41 (82%) 20 men and 21 women

Following this analysis, a goodness of fit test was conducted for smoking cessation and sex. Across conditions, seven women quit smoking and 21 women did not; 2 men quit smoking and 20 men did not (Table 4). Goodness-of-fit testing revealed no significant differences with respect to point-prevalence smoking abstinence rate between women and men ($\chi^2 = 2.11$; $df = 2$; $p = .348$).

Table 4. Goodness-of-Fit Testing: Smoking Cessation X Sex.

	Number Quit (%)	Number Not Quit (%)
Women ($n = 28$)	7 (25%)	21 (75%)
Men ($n = 22$)	2 (9%)	20 (91%)
Full Sample ($N = 50$)	9 (18%)	41 (82%)

Smoking Reduction Analysis

Smoking reduction was defined as a self-reported 50% reduction in CPD compared with baseline (the mean of the CPD from sessions 1 and 2) accompanied by a 50% reduction in measured CO (cf. Bohadana, et al., 2005; Bolliger, 2000; Bolliger, et al., 2002).This reduction number included those participants analyzed as quitters in the previous analysis. Sixteen participants in the treatment condition reduced or quit smoking, whereas ten did not reduce their CPD and another four reported 50% decreases in CPD but this reduction was not CO verified. Two participants in the placebo condition reduced their smoking by 50%, with sixteen participants not reducing their smoking and another two who reported a 50% decrease in CPD that was not confirmed with CO. Goodness-of-fit testing (Table 5) revealed a significantly greater frequency of smoking reduction in the treatment condition compared with placebo ($\chi^2 = 9.78$; $df = 2$; $p = .008$).

Table 5. Goodness-of-Fit Testing: Smoking Reduction or Cessation by Condition.

	Number Reduced/Quit (%)	Number Not Reduced (%)
Placebo ($n = 20$)	2 (10%) 1 man and 1 woman	18 (90%) 12 men and 6 women
Treatment ($n = 30$)	16 (53%) 4 men and 12 women	14 (47%) 5 men and 9 women
Full Sample ($N = 50$)	18 (36%) 5 men and 13 women	32 (64%) 17 men and 15 women

Again, a goodness of fit test was conducted for smoking reduction/cessation and sex. Across conditions, seven women quit smoking and 21 women did not; 2 men quit smoking and 20 men did not (Table 6). Goodness-of-fit testing revealed no significant differences with respect to the smoking abstinence/cessation rate between women and men ($\chi^2 = 3.004$; $df = 2$; $p = .223$).

Table 6. Goodness-of-Fit Testing: Smoking Reduction or Cessation by Sex.

	Number Quit (%)	Number Not Quit (%)
Women ($n = 28$)	13 (46%)	15 (54%)
Men ($n = 22$)	5 (23%)	17 (77%)
Full Sample ($N = 50$)	18 (36%)	32 (64%)

Hierarchical Linear Modeling

HLM was conducted using the MIXED procedure in SPSS. First, univariate analyses were conducted to determine if any of the baseline variables were significantly correlated with the outcome variable (CPD). Each baseline variable was run individually

with CPD. It was found that Sex, Smoking temptation, Age of regular smoking and FTND each predicted CPD. It should be noted that although CPD was measured at baseline (i.e. the first two sessions, prior to quit day), the outcome measure of CPD was a repeated-measures variable and was only analyzed for the (post-quit) sessions three through eight.

Additionally, the effect of time on CPD was analyzed. The time variable was first centered to simplify interpretation. This allows for the intercept in the regression model to reflect the true value of the predictor variable(s) at each time point (Aiken & West, 1991; Singer & Willett, 2003). The centered time variable was then squared to measure for potential quadratic effects as well as linear. Neither the linear nor quadratic effects of time were significant; accordingly, it was determined that only the linear effect of time was to be entered in the outcome analyses.

As seen in Table 7, sex (being male) was positively associated with CPD: men in this sample, on average, smoked more CPD than did women. Because of the potential confound of having significantly more men in the control group than in the treatment group, this relationship was examined critically at the next level (model) of the analyses. Smoking temptation was also a significant univariate predictor of CPD: those participants who reported higher temptations to smoke at baseline consistently smoked more CPD after quit day. Because sex and temptation were each associated with CPD, their correlation was assessed. Sex (being male) was not significantly correlated with Temptation (Pearson's r = -.07; p = .391).

Additionally, and also not surprisingly, higher scores on the FTND, a measure of nicotine dependence, were correlated with higher CPD levels. Surprising, however, was

the positive relationship between later onset of regular smoking and CPD: a later (older) onset of smoking was associated with higher CPD, post-quit day. Age, DASS, Motivation to quit, and even Treatment (behavioral treatment vs. placebo) were uncorrelated with CPD at the univariate level.

Table 7. Univariate HLM analyses of potential covariates on CPD (run separately).

Covariate	Denominator df	F	P
Sex	46.48	4.48	.040*
Age	45.20	2.30	.136
Temptation	37.95	5.14	.029*
DASS	42.42	.333	.567
FTND	47.19	12.20	.001*
Age of regular smoking	50.01	4.32	.043*
Motivation	46.18	.008	.928
Time	122.27	1.45	.232
$Time^2$	115.85	1.32	.252
Treatment	48.37	2.74	.105

*Statistically significant correlation with CPD ($p < .05$).

Following these individual univariate analyses of the baseline variables on CPD, each baseline variable was run alongside Time, $Time^2$, and Treatment to predict CPD, and identical findings were revealed. Specifically, the four significant covariates – Sex, Temptation, FTND, and Age of regular smoking – remained significantly correlated with the CPD outcome variable, and no other baseline variables showed a significant

correlation when Time, Time^2 or Treatment was added to the model. These analyses can be found in Appendix M.

Next, to assess the effect of Treatment Effect (Treatment X Time), an HLM analysis was conducted with Treatment, Time, and Treatment X Time. In the absence of covariates, Treatment Effect did not have a significant effect on CPD. The results are presented in Table 8.

Table 8. HLM Model With Treatment Effect (Treatment X Time).

Variable	Denominator df	F	p
Treatment	2.687	2.687	.108
Time	33.456	.031	.861
Treatment Effect (Treatment X Time)	28.394	.136	.715

As a result of the preliminary analyses, it was determined that the covariates included in the HLM analyses would be Sex, Temptation, FTND, and Age of regular smoking. The model was then built to include these four fixed-effect covariates, plus Treatment and Time as predictors of CPD. In this model, Sex (being male) and FTND (evidencing higher levels of nicotine dependence) remained significant predictors of CPD (Table 9).

Table 9. Multivariate HLM model.

Variable	Denominator df	F	p
Sex	44.89	5.711	.021*
Temptation	37.09	3.132	.085
FTND	46.848	11.325	.002*

Treatment	45.693	.617	.436
Time	26.199	.480	.495

*Significant predictor of CPD ($p < .05$).

Addition of the Treatment Effect (Treatment X Time) interaction term to the model did not change the outcome: Treatment Effect itself did not account for a significant portion of the variance in CPD, and its inclusion did not change the significance of any of the other covariates (Table 10). Again, the only significant predictors of CPD were Sex (being male) and FTND scores (having higher levels of nicotine dependence). This correlation of FTND scores with the outcome variable, CPD, further validates the FTND as a measure of nicotine dependence.

Table 10. Full Multivariate HLM model including Treatment Effect.

Covariate	Denominator df	F	p
Sex	44.14	5.76	.021*
Temptation	36.07	3.59	.066
FTND	46.71	10.9	.002*
Treatment	44.62	.576	.452
Time	32.65	.000	.993
Treatment Effect (Treatment X Time)	28.09	.278	.602

*Significant predictor of CPD ($p < .05$)

Finally, the role of baseline CPD was analyzed as a potential predictor of treatment. Clients at The Salvation Army Harbor Light Center are allowed four cigarette breaks daily; those who smoke more than four cigarettes per day either smoke more than one cigarette per break, or "sneak" additional non-sanctioned smoking breaks. Therefore,

characteristics of clients smoking more than four cigarettes daily were hypothesized to be distinct from those smoking four or fewer cigarettes per day.

For the analysis of the relationship between baseline cigarette smoking, participants were dichotomized into those smoking 4.0 or fewer CPD at baseline (the average of CPD from sessions 1 and 2; n = 22; n_{PMR} = 11, n_{CBT} = 11) and those smoking 4.5 or more CPD at baseline (n = 26; n_{PMR} = 8, n_{CBT} = 18). For the light smokers, the only univariate predictor that significantly predicted CPD post-quit day was Age of Regular Smoking; when the full model was run in HLM, only FTND significantly predicted CPD. For the heavy smokers, the univariate predictors of Temptation, FTND, and Treatment Condition (being in the active behavioral intervention condition) each predicted CPD post-quit day. When the full HLM model was run with heavy smokers only, Temptation and FTND significantly predicted CPD, Treatment Condition did not predict CPD (p = .054), and Treatment Effect did not predict CPD. The analyses on heavy and light smokers are summarized in Appendix N.

Discussion

Sixty-six inner-city chronic drug users in residential treatment were assigned to receive a brief behavioral intervention targeted at smoking cessation, or to receive a placebo treatment (PMR). When smoking cessation was measured categorically via point-prevalence (24-hour) abstinence, the intervention did not evidence significantly higher rates of smoking cessation compared with placebo. However, when point-prevalence smoking reduction (at levels of 50% or greater) was included with smoking cessation, measured categorically via 24-hour point-prevalence reduction, the brief behavioral intervention evidenced significantly higher rates of smoking reduction/cessation compared with placebo. Hierarchical linear modeling (HLM) showed that, when CPD were measured as a continuous outcome variable, the pre-existing characteristics of Sex and Dependence overwhelmed the effects of Treatment, Time, or Treatment Effect (Treatment X Time). Follow-up analyses did not show a significant relationship between sex and smoking cessation or reduction.

This sample evidenced high motivation to quit, averaging almost at 8 points out of 10, a higher motivation to quit than measured in many smoking cessation studies (e.g. Bernstein, et al., 2008). Depression, anxiety and stress levels were consistent with depressed clinical samples (e.g. Page, Hooke, & Morrison, 2007). Depressive symptoms predict cigarette use across all populations, including inner-city African Americans (Repetto, Caldwell, & Zimmerman, 2005), and as such these elevated levels of depressive symptoms are not surprising. The sample also reported high levels of smoking temptations, which compares to temptation levels reported in outpatient treatment-seeking samples for smoking cessation (e.g. Velicer, et al., 2005).

Subjects reported a mean onset of smoking behavior at 14 years with a progression to regular daily smoking at a mean age of 18 years. At a mean age of 44 years, the mean years smoked regularly was 26. Of note is the high prevalence of full-flavor menthol cigarettes (96%) smoked by the sample. African-American smokers disproportionately prefer to smoke menthol cigarettes over non-menthol cigarettes; the exact opposite is true for White smokers (Robinson & Pertschuck, 1992). In a preferences survey given to 473 adult White and African American smokers, menthol smokers reported a preference for smoking menthol cigarettes due to their taste, the ease of inhaling menthol cigarette smoke, and family/social habits. Among these menthol smokers, African Americans were more likely to report smoking menthols for taste and inhalation reasons than for family or social reasons. It remains unclear why such strong racial preferences occur (Hymowitz, Mouton, & Edkholdt, 1995). What is troubling about this racial prevalence is that Black male smokers, who overwhelmingly smoke menthol cigarettes, have 50% higher rates of lung cancer deaths than White male smokers, who overwhelmingly smoke non-menthol cigarettes (CDC, 2003). African-American smokers report smoking roughly 35% fewer CPD, on average, than White smokers; however, African-American smokers experience levels of most tobacco-related illnesses at higher levels than Whites (USDHHS, 1987). One reason for this health discrepancy may be that full-flavor menthol cigarette smokers more typically smoke longer cigarettes (100mm vs. 85mm) with higher levels of nicotine and tar than non-menthol cigarettes (Okuyemi, Scheibmeir, Butler, & Ahluwalia, 2003; Okuyemi, Ahluwalia, et al., 2002). Other potential reasons for the increased mortality associated with menthol cigarettes include increased addictiveness of cigarettes owing to the

menthol additive, altered patterns of smoke inhalation due to the menthol additive, or alternate branding and marketing strategies that have created more entrenched patterns of addiction among Afican American menthol smokers (Henningfield & Djordjevic, 2004). Perhaps most relevant to the study at hand is that African-American menthol smokers report having a more difficult time quitting than do African-American non-menthol smokers (Okuyemi, Ahluwalia, et al., 2004). For this reason, studies such as the present study, attempting to effect smoking cessation among African American menthol smokers, are especially important from a public health perspective.

This sample reported scores on the Fagerstrom Test of Nicotine Dependence (averaging around 4 points) that appear low given the scale's range of 0-10. However, African American smokers typically evidence nicotine dependence at lower levels of CPD than Whites, and as such, heavily dependent African American smokers typically have lower FTND scores than heavily dependent White smokers (Luo, et al., 2008). This discrepancy may possibly be due to racially discrepant prevalence of gene alleles for the processing of nicotine (which may also be associated with the racial discrepancy in menthol popularity). For example, a novel allele for a cytochrome protein (*CYP2A6*), the protein that processes nicotine, has been found at an allele frequency of 1.7% in African Americans and is not prevalent in Whites. This allele appears to greatly slow the metabolism of nicotine, thus altering smoking behavior by allowing smokers who possess this allele to smoke fewer CPD, yet remain more dependent on nicotine (Fukami, et al., 2007). Further, the FTND scores measured in this sample were considerably higher than those measured in a sample of African American "light smokers," defined as non-drug using non-residential African Americans who smoke 10 or fewer CPD (Okuyemi, et al.,

2007). Our sample reported smoking only 4 CPD on average, yet reported higher FTND scores than "light smokers" despite their low CPD. This sample can thus be considered dependent on nicotine.

The purpose of the present study was to help smoking clients in residential substance abuse treatment to quit smoking. Velicer and colleagues (1992) proposed the differential treatment of different patterns of smoking cessation in treatment studies. They identified four major patterns: *continuous abstinence, prolonged abstinence, point-prevalence abstinence,* and *repeated point-prevalence abstinence.* Continuous abstinence is defined as cessation beginning at the quit date and continuing, with no smoking, through a follow-up measurement. Prolonged abstinence is defined as sustained abstinence between two follow-up measurements, and point-prevalence abstinence is defined as abstinence ($\geq$24 hours) at the time of follow-up that does not continue through subsequent follow-ups. In the circumstance that smoking cessation study participants are not able to maintain abstinence between follow-up visits, but instead temporarily quit anew before each visit, the term *repeated point-prevalence abstinence* is used (Velicer, et al., 1992).

There are many reasons why repeated point-prevalence abstinence is a significant outcome measure of smoking cessation interventions (Hughes, et al., 2003). Many smokers who achieve permanent cessation initially lapse and smoke a few cigarettes in the first few days following a quit attempt. Additionally, "sleeper" effects have been noted in several smoking cessation trials, in which participants do not quit immediately, but do reap the effects of the intervention after a grace period of several days to several weeks after the targeted quit date. As such, point-prevalence abstinence and repeated

point-prevalence abstinence may still reflect success of an intervention, and continuous abstinence is not necessarily the sole indicator of a successful intervention (Hughes, et al., 2003). Participants in the present study who quit smoking are most conservatively described as having achieved repeated point-prevalence abstinence, because CO verification was only conducted twice weekly during treatment and once weekly during follow-up. Whether participants in this study evidenced prolonged abstinence between sessions could not be verified.

Goodness-of-fit testing revealed that the brief behavioral treatment yielded significantly more instances of point-prevalence reduction/cessation than did the PMR placebo. When smoking reduction/cessation was measured dichotomously, the brief behavioral treatment evidenced significantly more instances of smoking reduction/cessation than the placebo treatment. However, with the exception of one participant in the placebo group, participants in this study did not maintain smoking cessation throughout the data collection period. Participants who quit or reduced their smoking in this study appeared to have made multiple brief attempts at smoking cessation or reduction. One interpretation of these results is that this behavioral treatment is effective at smoking cessation but needs to be delivered in much larger doses to yield clinically significant results. Another interpretation is that participants in the active treatment condition realized that they were being given a smoking cessation treatment and attempted to quit, but that the treatment was not helpful in helping them quit and this led to relapse. This second interpretation would suggest that the single-blindness of the placebo condition was compromised and that the differential rates of smoking cessation

attempts were associated with unblinding of the placebo and not with any success of the treatment.

Smoking reduction does not impair one's ability to quit smoking and may indeed increase the likelihood of success at future smoking cessation attempts, via increasing self-efficacy or reduction in nicotine dependence (Hughes & Carpenter, 2006). Thus, the increased rates of smoking reduction/cessation in the treatment group could be viewed as indications of the potential for success in this type of treatment with this population. However, if the higher rate of smoking reduction attempts in the treatment condition was due to an unblinding of the placebo, and not due to the effect of the treatment, then the treatment cannot be considered responsible for an increase in smoking reduction.

HLM revealed that Sex, Temptation, Regular smoking and FTND each predicted CPD, when these correlations were measured individually. When these covariates were all included in an HLM model, only Sex (being male) and FTND accounted for significant portions of the variance in CPD. Treatment, Time, and Treatment Effect (Treatment X Time) did not account for significant portions of the variance in CPD. This further emphasizes that that this treatment either needs to be delivered in much larger doses to yield meaningful results, or is ineffective.

In order to better understand the reasons why treatment failed in this study, the data for heavier- and lighter-smoking participants were analyzed separately. When light smokers (those smoking 4 or fewer CPD) were examined separately, similar results emerged to the original analyses of the full sample. Light smokers who progressed to daily smoking at a later age smoked a greater number of CPD after quit day than did those who progressed to daily smoking at a younger age. When the full HLM model was

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run, only FTND significantly predicted CPD after quit day. For the heavy smokers, the outcome was slightly different. The univariate predictors of Temptation, FTND, and Treatment Condition (being in the active behavioral intervention condition) each predicted CPD after quit day for heavier smokers. This suggests that, among heavier smokers in this study, those who were assigned to the active treatment condition actually smoked more CPD after quit day than did those who were assigned to the PMR placebo. One potential explanation for this relationship is that the heavier smokers, those who were either chain-smoking during the allotted cigarette breaks or who were sneaking extra cigarette breaks, experienced a stronger abstinence violation effect in response to their failed attempts at smoking cessation. However, with data analysis on such a small sample ($n_{PMR} = 8$, $n_{CBT} = 18$), results should be interpreted with caution. Additionally, when the full HLM model was run with heavy smokers only, Temptation and FTND significantly predicted CPD, Treatment was not statistically significant ($p = .054$) and Treatment Effect did not predict CPD. Therefore, although minor differences were found with the subsample of heavy smokers as compared with light smokers or the full sample, it does not appear that baseline smoking significantly affected the effect of this intervention.

Limitations

A significant sex difference existed across conditions. This difference was partially due to randomization failure (i.e. more women were assigned to treatment than placebo due to a low *N*) but was exacerbated by more men dropping out of treatment compared with placebo, and by not accounting for this attrition by matching for treatment-gender substitutions when replacing participants. Although goodness-of-fit

testing did not reveal significant sex differences in smoking cessation or reduction, this sex difference between group still confounds the results of this study because HLM revealed that Sex (being male) predicted CPD post-quit day significantly whereas treatment condition did not, when both covariates were entered into the HLM model.

This study was designed to make use of diagnostic data (SCID-I; DIPD) to measure co-occurring disorders in this sample. However, because the diagnostic interviews were conducted as part of a larger study, and roughly half of the clients who participated in this study were not able to be interviewed, these data were unavailable. Therefore, inferences about the relationship between diagnostic status and treatment outcome could not be made.

Finally, we had wanted to make use of survival analysis to plot the frequency and duration of smoking cessation attempts; however, with a low N ($N = 50$; $n_{PMR} = 20$), not enough participants quit in the placebo group to compare them in a survival analysis with quitters in the treatment group. Additionally, the fleeting nature of the point-prevalence 24-hour smoking cessation attempts would have limited the ability to draw inferences from the data, provided that there were enough quitters in the placebo group to conduct a survival analysis.

Future Directions

All of the above limitations could be better addressed with a higher N and a longer period of data collection. The phenomena of fleeting smoking cessation and reduction attempts and the complicated relationship between 24-hour smoking cessation attempts and prolonged smoking cessation necessitates the collection of prolonged follow-up data to measure the effect of treatment on prolonged abstinence. It is clear that

future studies in this program of research should utilize extended periods of follow-up to measure smoking cessation across a longer time frame. Although outpatient effectiveness trials of smoking cessation therapy typically follow participants up for one year post-intervention, the short length of client contracts at this treatment center precluded such measurement in the present study. However, with the appropriate resources and with fewer time constraints, the following could be enacted: only clients with 6-month contracts at the center could be recruited for the study, and clients would be asked for follow-up information including family members' contact information, so that clients could be followed for up to one year. With certificates of confidentiality, drug use relapse could also be measured and the relationship of drug relapse and smoking relapse could be measured.

This smoking cessation program could potentially have a stronger impact if it were implemented more systematically in a center of this type, with clients being strongly encouraged to quit smoking within a few weeks of admission, and with more time given to the implementation of the behavioral treatment. Increasing the number of treatment sessions would also be likely to strengthen the effect of this treatment. Additionally, the imprimatur of the center itself would be helpful, giving gravitas to the program that was viewed (accurately) as an experimental endeavor of the University of Maryland. The goal of this center is "to release healthy individuals into the community" (Browning, 2008) and a smoking cessation program at The Salvation Army Harbor Light Center would work towards that end. However, given that this treatment showed minimal effects, perhaps the most helpful change in the treatment would be to bolster its effects with the

addition of nicotine replacement therapy, such as the nicotine patch (Hughes &

Carpenter, 2005).

Conclusions

This study showed that a brief behavioral smoking cessation intervention targeted

at clients in a residential substance abuse treatment center led to higher point-prevalence

instances of smoking reduction/cessation (cessation or a ≥50% decrease in CPD) attempts

than did treatment with a placebo intervention. However, when CPD was measured as a

continuous outcome variable, the baseline characteristics of Sex and Dependence

overwhelmed the effects of Treatment, Time, and Treatment X Time. The potential for

this treatment, as seen through the goodness-of-fit testing of point-prevalence smoking

cessation and smoking reduction, is unclear given these weak results. This treatment

would likely benefit from the addition of nicotine replacement therapy in an attempt to

yield clinically significant results with this population.

Appendices

Appendix A: Demographics

The following are optional questions. You don't have to answer them.

1. What is your age? _____

2. What is your racial or ethnic identity? _____

3. What is the highest level of school you completed? _____

4. What is your sex/gender? _____

Appendix B: Smoking History

How old were you when you first smoked a cigarette? _____

How old were you when you first started smoking regularly? _____

How old are you now? _____

What is your preferred brand of cigarettes? _____

    Are those: MENTHOL   NON-MENTHOL

    Are they: REGULAR LENGTH   100's

    Are they: FULL-FLAVOR   MEDIUM LIGHT ULTRA-LIGHT

Appendix C: Fagerstrom Test of Nicotine Dependence (FTND)

1. How soon after you wake up do you prefer to smoke your first cigarette?

____Within 5 minutes

____Between 6 and 30 minutes

____31-60 minutes

____After 60 minutes

2. Do you find it difficult to refrain from smoking in places where it is forbidden?

____No

____Yes

3. Which cigarette would you hate most to give up?

____The first one in the morning

____Any other cigarette

4a. How many cigarettes per day do you smoke right now? _____

4b. How many cigarettes per day would you prefer to smoke?

____10 or less

____11 to 20

____21-30

____31 or more

5. Do you smoke more frequently during the first hours after awakening than during the rest of the day?

____No

____Yes

6. Do you smoke even if you are sick in bed?

____No

____Yes

Appendix D: Motivation to Quit

Each number on the ladder represents how much you want to quit. Please circle the number that represents how you feel RIGHT NOW. 10 is the highest; 0 the lowest.

```
||   10   ||
  ======
||   9   ||
  ======
||   8   ||
  ======
||   7   ||
  ======
||   6   ||
  ======
||   5   ||
  ======
||   4   ||
  ======
||   3   ||
  ======
||   2   ||
  ======
||   1   ||
  ======
||   0   ||
```

Appendix E: Smoking Temptation Inventory

Listed below are situations that lead some people to smoke. We would like to know HOW TEMPTED you may be to smoke in each situation. Please answer the following questions using the following five point scale.

0= Not at all tempted
1 = Not very tempted
2 = Moderately tempted
3 = Very tempted
4 = Extremely tempted

1. With friends at a party.   ____

2. When I first get up in the morning.   ____

3. When I am very anxious and stressed.   ____

4. Over coffee while talking and relaxing.   ____

5. When I feel I need a lift.   ____

6. When I am very angry about something or someone.   ____

7. With my spouse or close friend who is smoking.   ____

8. When I realize I haven't smoked for a while.   ____

9. When things are not going my way and I am frustrated.   ____

Appendix F: Depression, Anxiety and Stress Scales (DASS)

INSTRUCTIONS: Please read each statement and choose the number which indicated how much the statement applied to you over the <u>past week</u>. There are no right or wrong answers. Do not spend too much time on any statement. The rating scale is as follows:

0= Did not apply to me at all
1 = Applied to me to some degree, or some of the time
2 = Applied to me to a considerable degree, or a good part of the time
3 = Applied to me very much, or most of the time

_____1. I found it very hard to wind down.

_____2. I was aware of dryness in my mouth.

_____3. I couldn't seem to experience any positive feeling at all.

_____4. I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion).

_____5. I found it difficult to work up the initiative to do things.

_____6. I tended to over-react to situations.

_____7. I experienced trembling (e.g. in the hands).

_____8. I felt that I was using a lot of nervous energy.

_____9. I was worried about situations in which I might panic and make a fool of myself.

_____10. I felt that I had nothing to look forward to.

_____11. I found myself getting agitated.

_____12. I found it difficult to relax.

_____13. I felt down-hearted and blue.

_____14. I was intolerant of anything that kept me from getting on with what I was doing.

_____15. I felt I was close to panic.

_____16. I was unable to become enthusiastic about anything.

_____17. I felt I wasn't worth much as a person.

_____18. I felt that I was rather touchy.

_____19. I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat).

_____20. I felt scared without any good reason.

_____21. I felt that life was meaningless.

Appendix G: Timeline Follow-Back Calendar

For each of the last seven days, fill in how many cigarettes you smoked.

If you did not smoke at all that day, put "0".

<u>Sun</u>	Mon	Tues	Weds	Thurs	Fri	Sat
Date:	Date:	Date:	Date:	Date:	Date:	Date:
# cigs:	# cigs:	# cigs:	# cigs:	# cigs:	# cigs:	# cigs:
Sun	Mon	Tues	Weds	Thurs	Fri	Sat
Date:	Date:	Date:	Date:	Date:	Date:	Date:
# cigs:	# cigs:	# cigs:	# cigs:	# cigs:	# cigs:	# cigs:

Appendix H: Informed Consent

Project Title	Effectiveness of a Smoking Cessation Intervention In a Residential Substance Abuse Treatment Center
Why is this research being done?	*This is a research project being conducted by Barry D. Smith, Ph.D., at the University of Maryland, College Park. We are inviting you to participate in this research project because you are a daily smoker who wishes to quit smoking, and your treatment contract at Harbor Lights lasts for six more weeks, which is how long we want to follow-up with you on your smoking. The purpose of this research project is to determine whether one of two types of treatment is more effective than the other in helping you quit smoking.*
What will I be asked to do?	*The procedures involve receiving treatment to quit smoking (talking to a student counselor from the University of Maryland). This treatment will be conducted here at Harbor Lights, and will involve an interview that will ask personal questions about mental health and emotional stability, and four, 20-minute sessions across a two-week period. These sessions will consist of one of two types of treatment: you will either be learning new muscle relaxation techniques to relieve stress, or you will be learning ways to cope with smoking triggers, to better avoid smoking. You will be asked to consent to these four sessions being audiotaped, so that we can determine that the therapists did their job correctly. You will then be asked to attend one short (5-minute) follow-up visit for each of the next four weeks, to see if you have managed to quit smoking or not, and if not, to determine how much you are smoking. At each visit you will be asked to blow into a machine that determines how much carbon monoxide (smoke) is in your lungs. This test will NOT measure any other drugs; only smoke. You will also be asked to fill out a few questionnaires, that ask questions such as "How many years have you been smoking cigarettes?" and "In the last week, did you find it difficult to relax?" Participating in this study is not the only way to quit smoking; you could try to quit on your own, or consult a medical professional.*

What about confidentiality?	*We will do our best to keep your personal information confidential. To help protect your confidentiality, your name will not be included on the questionnaires and other collected data. Instead, you will be assigned a code and this code will be placed on the questionnaires and other data. Your information can only be traced to you through the identification key, and only the student researcher (Thom White) will have access to the identification key. Your sessions will be audiotaped to ensure quality control over the treatment protocol; these tapes will be destroyed at the end of the research project. If we write a report or article about this research project, your identity will be protected to the maximum extent possible. Your information may be shared with representatives of the University of Maryland, College Park or governmental authorities if you or someone else is in danger or if we are required to do so by law. In accordance with legal requirements and/or professional standards, we will disclose to the appropriate individuals and/or authorities information that comes to our attention concerning child abuse or neglect or potential harm to you or others.*

Project Title	Effectiveness of a Smoking Cessation Intervention In a Residential Substance Abuse Treatment Center
What are the risks of this research?	*There may be some risks from participating in this research study: quitting smoking often creates strong, negative emotions that may last for 7-10 days. These negative emotions include feeling*
What are the benefits of this research?	*If you are able to quit smoking, the benefits of this study to you include the health benefits associated with quitting smoking: less risk of heart attack, lung cancer, stroke, high blood pressure, emphysema, and fewer common colds. This research may potentially benefit society if we can figure out how to help people in substance abuse treatment centers quit smoking, because cigarette smoking is the #1 preventable cause of death for Americans with alcohol and drug addictions.*
Do I have to be in this research? May I stop participating at any time?	*Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify.*
Is any medical treatment available if I am injured?	*The University of Maryland does not provide any medical, hospitalization or other insurance for participants in this research study, nor will the University of Maryland provide any medical treatment or compensation for any injury sustained as a result of participation in this research study, except as required by law.*
What if I have questions?	*This research is being conducted by Barry D. Smith, Ph.D., at the University of Maryland, College Park. If you have any questions about the research study itself, please contact:* Dr. Barry Smith, Dept. of Psychology (1147 BPS), University of Maryland, College Park, Maryland, 20742; (telephone) 301-405-5860; (e-mail) bdsmith@psyc.umd.edu. *If you have questions about your rights as a research subject or wish to report a research-related injury, please contact:* Institutional Review Board Office, University of Maryland, College Park, Maryland, 20742; (e-mail) irb@deans.umd.edu; (telephone) 301-405-0678. *This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.*

Project Title	Effectiveness of a Smoking Cessation Intervention In a Residential Substance Abuse Treatment Center	
Statement of Age of Subject and Consent	*Your signature indicates that:* *you are at least 18 years of age;,* *the research has been explained to you;* *your questions have been fully answered; and* *you freely and voluntarily choose to participate in this research project.*	
Signature and Date	**NAME OF SUBJECT**	
	SIGNATURE OF SUBJECT	
	DATE	
Audiotaping Consent	*Your signature indicates that you freely and voluntarily consent to be audiotaped for this research project.*	
Audiotaping Consent Signature and Date	**NAME OF SUBJECT**	
	SIGNATURE OF SUBJECT	
	DATE	

SESSION ONE (MONDAY: ONE WEEK PRE-QUIT)

1) **Program Overview**
2) Welcome participant to the program and thank him/her for participating. "Congratulations for taking this first big step toward quitting smoking."
3) Introduce yourself if you have not already worked with the client.
4) Provide overview of treatment program: This smoking cessation treatment research examines whether smoking cessation interventions work in Harbor Lights and/or treatment centers in general. In this treatment, you will be taught a variety of skills that focus on coping with your situations and emotions as you proceed with quitting smoking and staying quit. Learning and applying the specific skills contained in the treatment program are critical to successfully quitting smoking. They are also good techniques for sobriety in general. Readings, handouts, and practice exercises are important parts of this program. You will receive a treatment manual – please bring the manual to every session. There is no substitute for your own motivation and commitment to quit smoking. Quitting smoking is hard work and you need to be committed to putting in the effort to succeed. Let me remind you that any information you disclose is confidential, except in the case where you tell me that you are likely to seriously hurt yourself or someone else, or if you disclose information about child abuse or neglect.
5) Review structural details of program (page 4 of manual): first session today; second session this Thursday; NEXT Monday is quit day (give away/sell/run out of cigarettes on Sunday night); third counseling session on Monday; fourth session on Thursday. Follow-ups on each of the next four Mondays. $20 Safeway card deposited to account as payment for participation. (For those in the no-treatment control, there will be no counseling at the four sessions)
6) Reminder of Questionnaire & Manual Completion: As part of the research program, I will ask you to fill out questionnaires each week. You have been assigned a research participant number and should complete forms with that number on them. Your participation in this research is what allows us to offer this treatment to you at no cost. If fact, you will be reimbursed for completing questionnaires.
7) Provide a theoretical model of smoking: Why do you smoke? What keeps you smoking? Learned habit – behavior pattern over-learned through years of repetition. Must learn about pattern, identify events, situations and behavior where or when you smoke, and learn ways to cope without smoking.
8) Physical addiction – in cigarettes, the addictive substance is the drug nicotine. Your body becomes dependent on nicotine; when quitting, withdrawal symptoms occur. Typically, withdrawal symptoms may last one to two weeks. Thus, treatment should help you understand the learned habit aspect of your smoking so you can anticipate and develop nonsmoking habits in former smoking situations.
9) **Past Quit Experiences**
10) Have you ever tried quitting before? Discussion of past quitting experiences. Questions from the therapist should include the following:
    a) What are the environmental and emotional triggers for relapse?

b) What was the experience of smoking cessation like for you?
c) The hardest thing about quitting smoking?
d) When you did stay abstinent, what strategies did you use?

11) **Reasons for Quitting.** Behavior changes may be easier to accomplish when we find that there are more reasons to change (pros) then not to change (cons). It is not unusual to have mixed feelings about quitting – even when you are enrolled in a program to quit.

12) **Establishing a Non-smoking Game Plan.** Lifestyle change: Quitting smoking is more then just "putting down" cigarettes. There are very important lifestyle change you can make that can help you remain a nonsmoker. Go over the plan. Elicit responses from client.

13) **Enlisting Social Support.** Positive social support is helpful to quitting and negative social support is not helpful. Encourage client to identify examples of positive and negative support they get from others and to speak with people they know to try to ask for more of the positive support and less of the negative support from others. Discuss who the people in pt's life may be that could provide positive (and negative) social support. Discuss whether you can talk to the ones that provide the negative social support.

14) **Set a quit day.** Can you set a quit day for next Monday? How do you think that you would begin to do this? Total abstinence: advise client that even a single puff can lead to relapse. Explain the difference between a 'lapse' and 'relapse' (i.e., the difference between a slip and a slide.) Draw a chart if necessary. They should be aware of this from their classes at the center.

SESSION TWO (FRIDAY: THREE DAYS PRE-QUIT)

1) **Identify High-Risk Situations and Triggers.** Define 'trigger' – a situation or behavior (may include though and feelings) that is commonly associated with smoking a cigarette, so that being in such might bring on the urge to smoke. Ask pt to identify trigger situations as well as what he/she is thinking and feeling, on "Triggers for Smoking" form. Solicit some examples of pt experience. Discuss that upon quitting, triggers may become high-risk situations for relapse. They should also be aware of this from their classes at the center.

2) **Coping with high-risk situations**
   a) Intro to managing your triggers: key techniques
   b) It is important to focus on specific details about the trigger.   After,
      i) Avoid trigger situations – examples: skip coffee, avoid social situations with alcohol (at least temporarily), and avoid former smoking "hang-outs", leave table after dinner instead of lingering over dessert.
      ii) Alter trigger situation – examples: changing behavior – drink juice in morning instead of coffee, go for walk or jog instead of watching TV. Changing thoughts – tell yourself "A cigarette won't change this difficult situation" or "I don't need a cigarette" rather than "I need a cigarette to cope with this situation."
      iii) Use a substitute or an alternative in place of the cigarette. Examples: Changing behavior – use of relaxation technique rather than a cigarette in

stressful situation, use of gum, sugarless candy, fruit, vegetable rather than cigarette, call a friend, do needlework or something to keep hands busy.

c) Changing thoughts – "I'm doing great – I can do without this cigarette", "One cigarette can hurt", or "This feeling is a signal – I need to use a coping technique now".

d) If you were to slip and smoke a cigarette after quit date, in what situation would it be?
   i) Most common high-risk situations: 1. negative mood, 2. positive mood, especially with others and alcohol. 3. Being with others who are smoking.

e) Feeling badly if you slip: This reaction has been termed the Abstinence Violation Effect (or AVE).
   i) We expect people to be successful and to avoid smoking, but we know that sometimes, people have difficulty and do smoke. We refer to an instance or even several instances of smoking as a "slip" as opposed to a "relapse". We define relapse as a return to your usual pattern of smoking. So, how do you prevent a slip from becoming a relapse?
   ii) Should you smoke, you are:
       (1) Likely to feel quite badly, guilty, even somewhat depressed.
       (2) Likely to think of self as weak persona or as a failure.
       (3) Likely to think that this slip makes you a smoker again.
   iii) Be aware that these are natural reactions to a slip. What is needed is to fight off this negative reaction. Here are some suggested ways to do this:
       (1) Think of the slip as a "mistake" rather than as evidenced that you are weak or are a failure. Respond to it as you would respond to other mistakes – that is, figure out what you did wrong and how to correct it or avoid doing it next time. Retrace your steps – use it a as learning experience.
       (2) Realize that one cigar4ette does not mean that you are a smoker unless you allow it to.
       (3) Redouble your coping efforts – behaviors and thoughts. Review reasons for quitting – remind yourself of all the successful, hard work you have put in to date.
       (4) Most of all – don't smoke the next cigarette. Realize that if you don't smoke the next one, the depressed, guilty, angry feelings will decrease with each passing hour/day.

3) **Preparation:**
   a) How do you think you would prepare for quit day? For some, a trigger is the presence of cigarettes. So, one thing you can do is limit the availability of cigarettes around you. Go over triggers and how you can prepare for them.
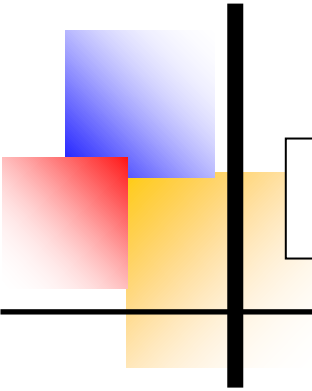
SESSION THREE (MONDAY: QUIT DAY)

1) **Discussion of Quit Day experiences**
   a) Engage client in a discussion of how the day has gone. Reinforce success. Ask about possible withdrawal symptoms. Remind pt that most of the withdrawal is in the first week or two at most when people quit cold turkey.

b) If client has smoked in the morning, remind them of the distinction between slip and relapse, and of the discussion of what they must do to avoid a slip becoming a relapse (AVE)

c) Engage client in the discussion of his/her quitting experience: What kind of plans did they make prior to quit day? What are their expectations for the next several days? Discuss topics:

    (1) coping with urges (they are time-limited, from 20 min – 1 hr)

    (2) anxiety and panic about quitting forever (think about quitting "one day at a time" as a way of coping)

    (3) perceived benefits of quitting (go over decisional balance scale)

d) Anticipate high-risk situations. "Now, that you know through experience what the experience of a trigger is (if they do, that is), let's talk about your experience and what you have learned from it." Discuss potential challenges.

SESSION FOUR (FRIDAY: FOUR DAYS POST-QUIT)

1) **Discussion of post-Quit week experiences.** Engage client in a discussion of how the day has gone. Reinforce success. Ask about possible withdrawal symptoms. Remind pt that most of the withdrawal is in the first week or two at most when people quit cold turkey. If client has smoked, remind him/her of the distinction between slip and relapse, and of the discussion of what they must do to avoid a slip becoming a relapse (AVE)

2) Engage client in the discussion of his/her quitting experience: What kind of barriers to quitting did they encounter? What are their expectations for the next several days?

3) Discuss topics:

    (1) Urges and triggers

    (2) Coping mechanisms – what have they been doing to cope?

    (3) What do they do day to day, to get through without a cigarette?

    (4) If they lapsed, what has worked while it was working? What strategies were successful, and what have failed? What was the trigger? Situation? What has the client learned?

4) Anticipate high-risk situations. "Let's attempt to predict the type of challenges you will encounter in the next week. How will you cope with those challenges?"

Sobriety From Nicotine

A doctoral dissertation study by Thomas White

University of Maryland

Conducted at the Salvation Army Harbor Lights Treatment Center

Washington, D.C.

Introduction

Welcome, and congratulations on your choice to quit smoking!

Quitting smoking is not easy.

This booklet will help you move from thinking about stopping to doing it.

Together with your "quit smoking" counseling sessions, it gives helpful advice on fighting temptation.

By telling you what to expect, the counseling sessions plus the manual can help you through the process of becoming a nonsmoker.

Take the time to look at each suggestion carefully and think about how it can help you in your quit attempt. Pick the hints that will work FOR YOU, and decide today that you're going to use them to quit.

It may take a while to find the tricks that's right FOR YOU, but you CAN quit for good, even if you've tried to quit before and it didn't work then.

Smoking is not just a physical addiction; it involves many aspects of your life: social, emotional, and behavioral.

For most individuals, smoking is a way life. The more attention you pay to HOW smoking has been a part of your life, the more likely you are to succeed in your cessation attempt.

That's why we are going to focus on helping YOU figure out HOW smoking has been a part of your life, and what tricks will work best FOR YOU to quit.

Why Quit Smoking?

You probably already know why it's good for you to quit smoking. But here's a reminder to help motivate you:

- **Money**
  - Smoking 10 cigarettes a day costs over $1000 per year!

- **Health**
  - You can avoid or even reverse the damage from cigarette smoking.
    - **Short-term risks:** Shortness of breath, worse asthma, sexual dysfunction, etc.
    - **Long term risks:** Heart attack, Stroke, Emphysema, Cancers (lung, cervix, bladder, mouth, throat, pancreas, colon).

  - Your body starts getting better **immediately** when you quit, no matter how old you are.
    - **20 minutes:**   Drop in Blood Pressure and Heart Rate Increase in Body Temperature
    - **8 hours:**   CO normal; increase in blood oxygen
    - **24 hours:**   Chances of heart attack drop
    - **48 hours:**   Regain sharpness of taste and smell
    - **2-3 weeks:**   Circulation improves
    - **1-9 months:**   Breath easier, increased energy
    - **1 year:**   Risk of coronary heart disease cut in half
    - **5-15 years + :**   Risk of stroke and cancer reduced significantly

  - Your chance for a longer life is significantly improved.

  - Family, friends, pets, and people in your environment are spared of the effects of second-hand smoke.

- **Hygiene**
  - Stop smelling like cigarettes anymore; whiter teeth
  - You no longer have to deal with burning clothes and furniture.
  - You can enjoy the good feeling of having rid yourself of a bad habit & feel less guilty.

Study Overview

Today (Monday) you will have your first counseling session. You'll also complete a few questionnaires.

This Thursday, you will have your second counseling session.

NEXT MONDAY IS YOUR QUIT DAY. That means that this Sunday night, you will get rid of your cigarettes at the end of the night, and starting Monday morning you will be a non-smoker. On Monday, you will also have your third counseling session.

Next week Thursday (10 days from now), you will have your fourth counseling session.

Then, on each of the next four Mondays, we will check in with you for about two minutes, to measure your carbon monoxide level and have you complete a weekly smoking calendar.

For participation in this study, you will receive a $20 Safeway card deposited in your account when you leave the center.

On the next page is a calendar to keep track of your sessions.
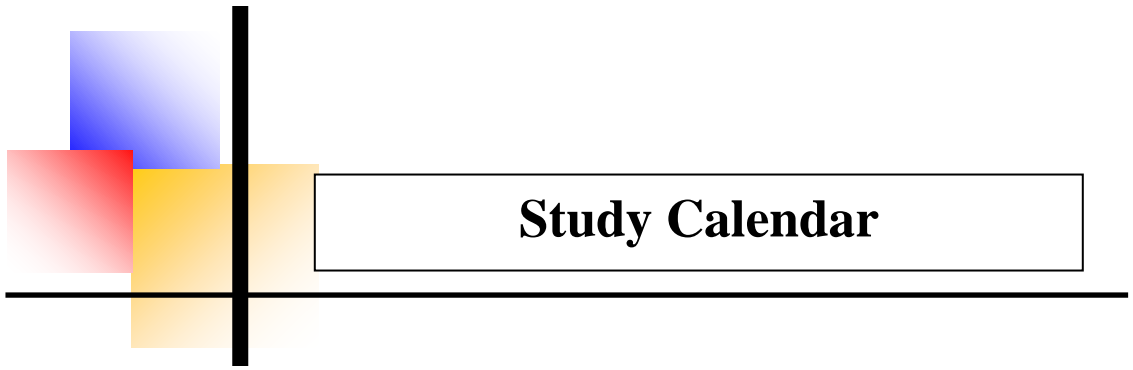
Study Calendar

If you have any questions, ask your study counselor.

Your Name:_____

TYPE	DATE
Counseling session 1 (6 days pre-quit)	**Tuesday, _____ _____**
Counseling session 2 (3 days pre-quit)	**Friday, _____ _____**
Counseling session 3 (quit day!)	**Tuesday, _____ _____**
Counseling session 4 (3 days post-quit)	**Friday, _____ _____**
Follow-up 1, one week post-quit	**Tuesday, _____ _____**
Follow-up 2, two weeks post-quit	**Friday, _____ _____**
Follow-up 3, three weeks post-quit	**Tuesday, _____ _____**
Follow-up 4, four weeks post-quit	**Friday, _____ _____**
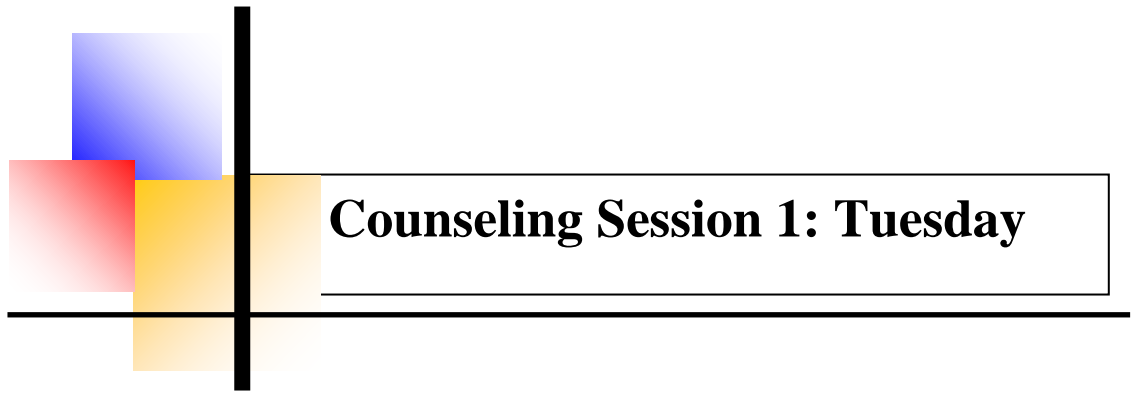
Counseling Session 1: Tuesday

❖ **Study Overview**

❖ **Reasons why you smoke; reasons why you want to quit**

  ➢ **Complete: Decisional Balance Scale – Why Quit? Why Smoke?**
    • **FORM 1-1**

❖ **Establishing a Nonsmoking Game Plan**

  ➢ **Complete: Nonsmoking Game Plan: Lifestyle Change**
    • **FORM 1-2**

❖ **How can you use your network to stay quit?**

  ➢ **Complete: Using Your Network!**
    • **FORM 1-3**

Why Quit? / Why Smoke?

If you want to change your behavior, it helps to think about your reasons for making this change.

For this exercise, consider your reasons to quit smoking, and any reasons to continue smoking you might have.

List your reasons below. Try to be as specific and personal as possible.

Reasons to Keep Smoking	**Reasons to Quit**
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
5. _____	5. _____
6. _____	6. _____
7. _____	7. _____
8. _____	8. _____
9. _____	9. _____
10. _____	10. _____

Non-Smoking Game Plan: **1-2**
Lifestyle Change

As part of your Non-Smoking Game Plan, you can plan to make changes in your daily behaviors that can help you remain a non-smoker. Below, list specific answers to some general lifestyle questions important to quitting smoking and remaining a non-smoker.

1. **How will you keep cigarettes away from you?**
   a. _____
   b. _____
   c. _____

2. **How can you spend more time spent in non-smoking places, or doing non-smoking things**?
   a. _____
   b. _____
   c. _____

3. **How can you use your network to get other people to help support you in quitting and staying quit**?
   a. _____
   b. _____
   c. _____

4. **What will you do to manage stress successfully?**
   a. _____
   b. _____
   c. _____

5. **What will you do to keep from gaining weight?**
   a. _____
   b. _____
   c. _____

6. **What will you do to become more physically active?**
   a. _____
   b. _____
   c. _____

Using Your Network! 1-3

Getting support and encouragement from others while you quit
and work at being a nonsmoker can be very helpful.

Complete this handout to help you determine what other people
do
that is helpful or not helpful to you, and what you can do
to ask them to be more helpful!

What could other people do that would GET IN THE WAY of you quitting
and staying quit?
1.
2.
3.
4.

Make these into requests: how will you ask other people to not interfere with
your quitting?
1.
2.
3.
4.

What could other people could do that would HELP you quit and stay quit?
5.
6.
7.
8.

Make these into requests: how will you ask other people to help you?
4.
5.
6.
7.

Counseling Session 2: Friday

❖ **Discussion of Upcoming Quit Day (Monday)**

❖ **Go over last Tuesday's Worksheets**

❖ **Game Plan For High-Risk Situations**

➢ **Read: Nonsmoking Game Plan: Coping with High-Risk Situations**
  • **FORM 2-1**

❖ **Discussion of your high-risk situations and your personal game plan**

➢ **Complete: Coping with High-Risk Situations Worksheet**
  • **FORM 2-2**

❖ **How to Identify and Cope with High-Risk Situations**

❖ **Prepare to Quit**

Nonsmoking Game Plan:
Coping with High-Risk Situations

As part of your Nonsmoking Game Plan, think about what you can do to prepare for high-risk situations that may bring on an urge to smoke. Common high-risk situations include:

- Feeling down in a situation – or being in a bad mood

- Being around other people who are smoking

- Having a stressful conversation with someone

Being prepared with a plan for identifying high-risk situations and knowing how you will successfully cope with them can help prevent slips or relapse to smoking.

Over the next week, think about daily events and upcoming special events. Consider what *your* high risk situations for smoking may be.

2-2

Coping with High-Risk Situations Worksheet

Think about the different times or situations or circumstances in which you usually smoke. These situations or circumstances may trigger smoking in different ways.

For example, these situations may involve a thought like "I need a cigarette to focus," or they can involve a mood like being down or being angry after an argument.

We call these behaviors, thoughts, and moods **"High-Risk Situations for Smoking"**

Make a list of as many of your own high-risk situations as possible. Then, list your GAME PLAN to deal with these situations so that you don't smoke.

Situation	Game Plan
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____

Counseling Session 3: Monday
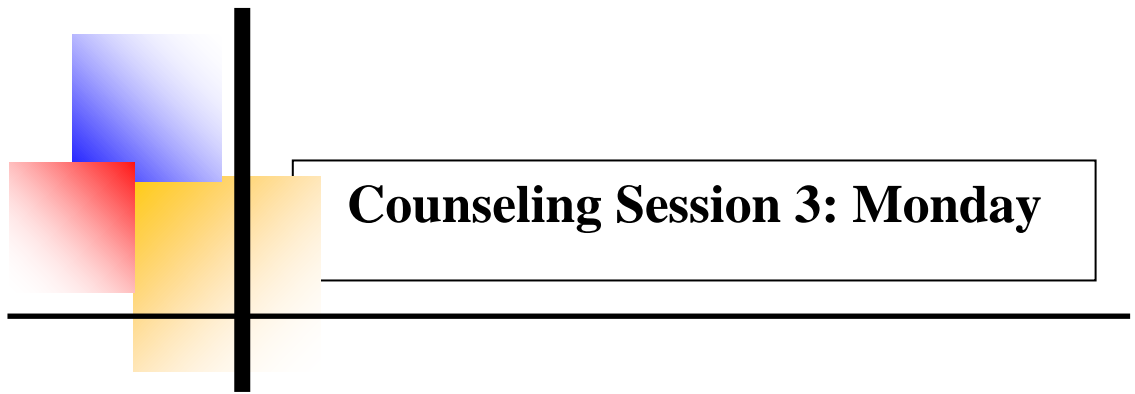
❖ **Discussion of Quit Day (today!)**

❖ **Discussion of High-Risk Situations and last Friday's worksheets**

❖ **Three ways to manage a high-risk situation (avoid, alter, substitute)**

  ➢ **Read: Managing High-Risk Situations for Smoking**
    • **FORM 3-1**

❖ **Discussion of Quit Plan for the Future/Relapse Prevention**

❖ **Discussion of Slips and how to not let a mistake become a relapse**

  ➢ **Read: Nonsmoking Game Plan: Feeling Badly if you slip**
    • **FORM 3-2**

Managing High-Risk Situations for Smoking

Smoking is a behavior you have learned. And, you are in the habit of smoking in many situations. By filling in the "High-Risk Situations for Smoking" form, you have started to notice and identify events and times on your daily life when you smoke. These events and times have become **high-risk situations** for you to smoke, producing **urges** for a cigarette. **You can manage your high-risk situations for smoking by breaking the connections between "high-risk situations" and "urges" to smoke.**

Three strategies that can help you **not** smoke in high-risk situations:

1. **Avoid** the high-risk situation.

Examples:	*Don't go out for smoke breaks with smokers.* *Don't put yourself in high-stress situations that make you want to smoke.*

2. **Alter** the high-risk situation.

Examples:	*Drink juice in the morning instead of coffee.* *Go for a walk or jog instead of watching TV.* *Go outside for breaks but talk to other non-smokers.*

3. **Substitute** something in place of the cigarette.

Examples:	*Chew gum or a carrot stick instead of a cigarette.* *Do art projects or something to keep your hands busy.*

Many new ex-smokers have a difficult time thinking of ways to change their daily routine so that old smoking habits can be broken. You can get more ideas about managing your high-risk situations by asking other non-smokers to see what they are doing or how they cope with similar situations. Try out some of these things they do and see if they work for you.

Breaking the signals to smoke that come from high-risk situations will make it easier for you to resist smoking. You will find that you have fewer urges to smoke once these patterns are broken. Successfully managing high-risk situations will help you quit smoking and quit for keeps.

Nonsmoking
Game Plan:
Feeling Badly if You Slip

3-2

Despite your best effort to cope with high-risk situations, it is possible that you won't be successful every time.

If you slip and smoke a cigarette (or even a couple of cigarettes), you will most likely experience a powerful negative emotional reaction.

If you slip, you are likely to:

- Feel guilty; even somewhat depressed.
- Think of yourself as a weak person, or a failure.
- Think that this slip makes you a smoker once again.

These are **natural reactions to a slip**. In order to get back on track, fight off this negative reaction in the following ways:

1. Think of the slip as a **mistake**…everyone makes mistakes. Just like other mistakes, figure out what you did wrong and how to correct it or avoid doing it again.
2. Realize that **one cigarette** does not mean that you are a smoker.
3. Remind yourself of all your **hard work**, review your reasons for quitting and make a plan to **stay quit**.
4. **Don't smoke the next cigarette!** Just because you smoked one cigarette does not mean that you must smoke another. Your guilty, angry feelings will decrease with each passing hour and day.

NOTE: Please do not interpret this as "permission" to have a slip. Remember- the surest way to quit smoking is not to smoke the 1st cigarette!
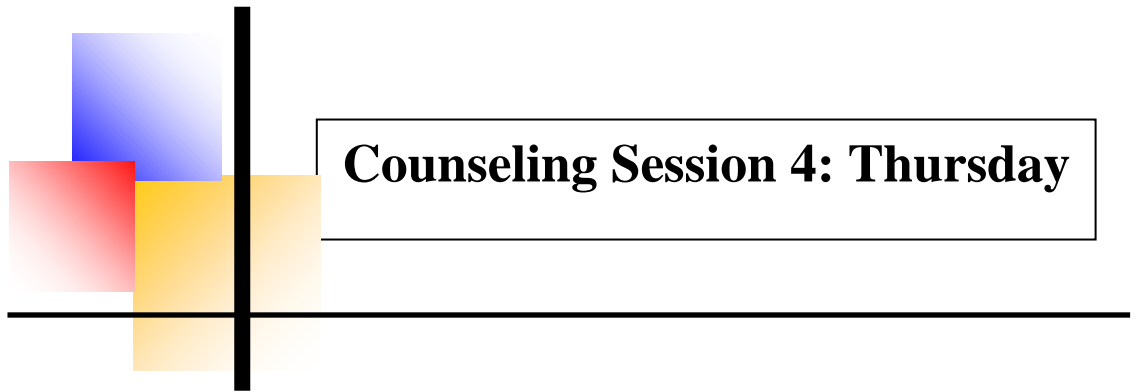
Counseling Session 4: Thursday

❖ **Reflection on Post-Quit Week**

❖ **Discussion of Quit Plan for the Future/Relapse Prevention**

❖ **Reflection on your lifestyle changes**

  ➢ **Complete: Non-Smoking Game Plan: Lifestyle Change**
    • **FORM 4-1**

❖ **Reflections on how you managed your high-risk situations**

  ➢ **Complete: Managing High-Risk Situations for Smoking Worksheet**
    • **FORM 4-2**

❖ **Re-Read and review your responses to each of the past weeks' forms**

Non-Smoking Game Plan: Lifestyle Change   4-1

Last Tuesday, we brainstormed ways that you can make changes to your lifestyle that will make it easier and more enjoyable to be a non-smoker, and make you less likely to relapse.

Now, let's go back and list specific answers to your general lifestyle questions.

1. **How did you keep cigarettes away from you?**
   a. _____
   b. _____
   c. _____

2. **How did you spend more time spent in non-smoking places, or doing non-smoking things**?
   a. _____
   b. _____
   c. _____

3. **How did you use your network to get other people to help support you in quitting and staying quit**?
   a. _____
   b. _____
   c. _____

4. **What did you do to manage stress successfully?**
   a. _____
   b. _____
   c. _____

5. **What did you do to keep from gaining weight?**
   a. _____
   b. _____
   c. _____

6. **What did you do to become more physically active?**
   a. _____
   b. _____
   c. _____

Managing High-Risk Situations for Smoking Worksheet

4-2

Last Friday, we talked about your own personal high-risk situations for relapse. We brainstormed ways that you could do things differently to put yourself at less risk for relapse.

Then, on Monday, we discussed three general ways to manage a high-risk situation: to <u>avoid</u>, <u>alter</u>, or <u>substitute</u> something else.

Let's look back now and talk about ways that you were able to manage your high-risk situations for smoking this week.

Situation	**Strategy**	**(Avoid, Alter, or Substitute?)**

Appendix K: Literature Review

Causing over 440,000 deaths annually in the Unites States alone and resulting in nearly $100 billion in direct medical costs per year, cigarette smoking is the number one cause of preventable death in the United States (Bergen & Caporaso, 1999; Centers for Disease Control and Prevention [CDC], 2002; Mokdad, Marks, Stroup, & Gerberding, 2004; NIDA, 2006). Although many smokers have attempted to quit smoking, relapse rates are high; when participants in smoking cessation interventions are followed up for one year post-treatment, relapse rates are 60-90% (e.g. Krall, Garvey, & Garcia, 2002).

A wide variety of interventions have been developed over the past several decades, in an attempt to increase cessation rates and decrease relapse rates. These interventions include pharmacotherapy, such as bupropion (marketed as Wellbutrin™ for depression, and Zyban™ for smoking cessation); nicotine replacement therapies (i.e. transdermal nicotine patches, nicotine chewing gum, nicotine inhalers, and nicotine nasal sprays); and a variety of psychotherapeutic techniques. These techniques include voucher programs; telephone- and internet-based counseling; exercise and general health awareness programs; and motivational interviewing. Many intervention programs have been implemented that have combined pharmacotherapy or nicotine replacement therapy with psychotherapeutic approaches, with high success rates (cf. Hughes & Hatsukami, 1989). Finally, harm reduction interventions have also shown efficacy in getting smokers to reduce their use if they are unable or unwilling to quit (cf. Hughes, 2001).

Smoking Cessation Interventions: The State of the Field

The effectiveness of various intervention strategies for smoking cessation has been assessed through the years. Cessation rates are reasonably high for a variety of

interventions, although relapse rates remain fairly high across the range of interventions, from intensive cognitive-behavioral treatments to very brief and simple interventions to various forms of pharmacotherapy. The relative effectiveness of these interventions is addressed below.

Pharmacotherapy

Bupropion. A number of antidepressant medications have been studied as smoking cessation aids. The most common of these, and the only medication to have specific FDA approval for use in smoking cessation, is bupropion. Following early anecdotal reports that smokers taking bupropion for depression (under the trade name Wellbutrin) quit smoking spontaneously, two double-blind placebo-controlled randomized clinical trials were conducted on non-depressed smokers (Ferry & Burchette, 1994). Bupropion showed efficacy as a smoking cessation aid, and it received FDA approval to be sold under the trade name Zyban as a smoking cessation medication.

Nicotine Replacement Therapy. The efficacy and effectiveness of nicotine replacement therapy (NRT), in the form of patches, gum, nasal spray, or inhaler, has been examined as a singular treatment as well as an adjunct to psychosocial interventions for smoking cessation. When administered in the absence of psychosocial interventions, NRT has shown effectiveness rates of roughly 11-30% in smoking cessation as defined by one-year abstinence in studies conducted by specialized smoking cessation clinics. However, some effectiveness studies conducted in primary care settings have shown no additional benefit to NRT over placebo, and virtually all primary-care effectiveness studies have shown lower rates of smoking cessation from NRT than those found in cessation-clinic settings. The only form of NRT that has shown significant cessation rates

compared with placebo in the primary care setting, across multiple trials, is the

transdermal nicotine patch (Campbell, 2003). These findings suggest that NRT is not

very effective in the absence of psychosocial interventions, and that those seeking

smoking cessation treatment from specialized clinics may be better motivated to quit, or

have more available resources to quit, than those seeking treatment from their primary

care providers. However, NRT has been shown to be an effective adjunct in conjunction

with intensive cognitive-behavioral interventions.

Cognitive-Behavioral Interventions

     Voucher-based Interventions. The effectiveness of a variety of psychosocial

interventions for smoking cessation has been examined with various populations.

Community reinforcement approaches (CRA) for substance abuse have been used for

decades (e.g. Hunt & Azrin, 1973) and CRA with the addition of voucher systems have

shown efficacy over treatment-as-usual for cocaine dependence (e.g. Budney & Higgins,

1998). Such programs are based on principles of operant conditioning and assume that

substance use is a behavior that is reinforced by its pleasant effects. As such,

environmental triggers – discriminative stimuli – may lead to substance use even in the

absence of physical dependence. CRA + voucher programs involve teaching participants

how to conduct their own functional analysis and learning how to avoid situations that

trigger the substance use. They are also taught specific skills to manage negative moods

and control anger. The vouchers component is a form of reinforcement for the desired

behavior of staying drug-free: with each biochemical validation of remaining drug-free,

participants receive a voucher that can be redeemed for tangible rewards, such as gift

certificates to stores (Higgins, 2001). One major problem with voucher-based systems,

however, is that they can be ineffective in creating long-term change if the substance user returns to her or his former environment. In a recent study of the effectiveness of vouchers for smoking cessation among women in a residential drug treatment center, significantly more women returned clean (tobacco-indicator-free) urine samples during the implementation of a four-week voucher intervention than did controls. However, at one year, all follow-up gains were lost (Robles, et al., 2005).

Telephone-based Interventions. In response to prior literature suggesting that telephone-based interventions for smoking cessation led to higher quit rates than no intervention, An and colleagues (2006) examined the effectiveness of pharmacotherapy plus behavioral counseling over the telephone, versus pharmacotherapy alone, for VA outpatients. Using an intent-to-treat protocol to consider dropouts as treatment failures, the rate of six-month abstinence at the one-year follow-up was 40% for the telephone-plus-pharmacotherapy group compared to 10% for the pharmacotherapy-alone group. These significant results indicate that behavioral counseling conducted over the phone is highly effective (at least when combined with pharmacotherapy) and vastly superior to pharmacotherapy alone (An, et al., 2006).

Telephone-based interventions have also shown promise with another population: lower-income, inner-city people of diverse ethnic and racial backgrounds who are living with HIV/AIDS. A recent randomized clinical trial of eight counseling sessions conducted with smokers from a large HIV/AIDS clinic showed significantly better quit rates than controls in a usual care group. Those who were called via their cellular phones for the eight sessions had a 37% quit rate at three-month follow up, compared with 10% for the usual-care control group (Vidrine, Arduino, Lazev, & Gritz, 2006). These

significant results support An and colleagues' (2006) finding that telephone-based interventions are effective for smoking cessation, and further the literature by suggesting that such interventions are useful with non-typically-studied populations.

Furthering the telephone-intervention literature was a recent study that examined the addition of printed, mailed self-help smoking cessation pamphlets to telephone-based therapy. Smokers calling the National Cancer Institute's telephone hotline for smoking cessation counseling received the standard cognitive-behavioral counseling session, but were then randomly assigned to receive one of four different mailings: a single, generic smoking-cessation pamphlet, a smoking cessation pamphlet that was tailored to the smoker's own concerns and challenges, a series of multiple pamphlets tailored to multiple baseline concerns of the smoker, or a series of multiple tailored pamphlets based on baseline concerns followed by another series of multiple pamphlets tailored to five-month follow-up concerns. At a one-year follow-up, no omnibus differences were found among the four groups. However, when the two multiple-message groups were combined and compared to the two single-message groups, those receiving multiple messages had significantly higher abstinence rates at one year than those receiving only a single message. Further, when analyses were conducted on those who reported having quit at the five-month follow-up, those who received multiple pamphlets tailored to their current concerns showed significantly higher rates of continued abstinence at one year than did those from the other three groups, who had quit at five months but did not receive additional pamphlets at that point in time. These results suggest that non-tailored generic smoking cessation pamphlets may not provide much help in addition to telephone counseling, but that multiple tailored pamphlets at baseline, followed by multiple tailored

pamphlets based on post-cessation concerns and challenges, are a helpful adjunct to telephone-based cognitive behavioral counseling for smoking cessation (Strecher, et al., 2005).

Questionnaire with Prompts. One simple, brief intervention developed recently in a primary care setting entailed a five-item questionnaire that assessed how patients were to quit smoking, and provided a handful of prompts for clinicians to offer a minimal level of smoking-cessation counseling with no training needed. At follow-up 8-10 months later, self-reports of patient smoking cessation were at 12% for those who received the questionnaire and whose clinician had counseling prompts, as compared with 2% and 4% of those in two different control groups. Although this study did not use a randomized design (i.e. three pre-existing medical teams conducted the three levels of the intervention), their significant results over control show great promise for brief smoking cessation interventions (Milch, Edmunson, Beshansky, Griffith, & Selker, 2004).

Expressive Writing. Another brief intervention recently examined was part of a smoking cessation program for young adults in an office setting. Participants aged 18-21 were randomly assigned to receive a brief office intervention (i.e. a group discussion of smoking cessation advice) or the office intervention plus expressive writing. Those in the expressive writing group were asked to journal their thoughts regarding their negative affect, stress, and readiness to quit smoking. Contrary to expectations, those in the office-intervention-only group had higher rates of smoking cessation at 24 weeks than did those in the office intervention-plus-expressive writing group (20% vs. 10%), suggesting that expressive writing is not effective or even countereffective as a brief intervention for smoking cessation (Ames, et al., 2005).

Computer-based Interventions. As discussed above, standard cognitive-behavioral interventions have been adapted for the telephone, both for rural, elderly Midwest VA patients (An, et al., 2006) and for inner-city people living with HIV/AIDS (Vidrine, et al., 2006). These interventions typically consist of the same cognitive-behavioral counseling techniques that would be used in a face-to-face clinic setting. Of interest to those wishing to develop a brief intervention for smoking cessation is whether brief interventions can be delivered via computer. Computerized interventions show promise because they can be used for those in remote locations (via the internet) as well as those waiting in a primary-care setting (e.g. patients waiting to see a doctor can make use of a self-directed computerized intervention).

A pilot study of the use of a "video doctor"- that is, an interactive computer program that either tailors advice to individual smokers' concerns or conducts motivational interviewing (as described in detail below) – found that patients enjoyed the video doctor and found interaction with the program to be easy. Trials are currently underway to determine the effectiveness of the video doctor. If this program is effective, it will provide an inexpensive and virtually labor-free brief intervention for smoking cessation (Gerbert et al., 2003).

Another computer-based brief intervention for smoking cessation, developed for use in a primary care setting, with smokers who were preparing to undergo heart surgery. At preadmission visits, patients completed a self-directed computerized intervention that provided standard advice for smoking cessation. Nine months following the intervention (and of varying time lengths following the actual heart surgery), 60% of the patients reported that they had quit smoking prior to their surgery, and 80% of the patients found

the computerized intervention appropriate and helpful. Although this study did not make use of a control group, at the very least it suggests the feasibility and acceptability of a computerized brief intervention in a primary care setting. Further research will need to be conducted to determine if such interventions are effective (Haile, et al., 2002).

The promise of the internet for smoking cessation interventions is manifold: not only can the internet reach smokers who are not seen in primary care settings (something that that can already be achieved by cellular phone, as described above); it can also be used as a recruitment tool for finding smokers who have not requested assistance in smoking cessation. The website WebMD (http://www.webmd.com) is a large health information resource that is widely read throughout the population. A recent study by those involved with the website was able to recruit 538 adult smokers through an e-mail sent to those on the WebMD mailing list and through advertisements on other websites. These participants completed web-based questionnaires that had comparable reliability to paper-and-pencil questionnaires and received computerized smoking cessation advice. Despite reporting high levels of nicotine dependence, 40% of those completing a one-month follow-up questionnaire reported making a serious quit attempt and 8% reported seven-day abstinence. As such, this method of internet recruitment and intervention shows promise as a way to reach those not being reached by traditional venues of intervention (Stoddard, et al., 2005). Nonetheless, follow-up questionnaires were only completed by 43% of participants, and participants were not followed up beyond one month. Between the high attrition rates, the lack of biochemical verification of smoking status, and the brief follow-up period, it is difficult to give this study much weight in its own regard as a measure of efficacy or effectiveness. Residential interventions, such as

the one currently proposed, provide far superior control over attrition rates and biochemical verification of smoking status. However, residential interventions also suffer from the same brevity of follow-up.

The question of whether internet-based interventions are equally effective as face-to-face interventions was addressed directly with a sample of adolescent smokers, aged 11-18. These smokers were randomly assigned to receive a four-session smoking cessation intervention in a clinic, or to an internet-based smoking cessation resource, tailored to adolescents, available to those in the internet condition for 24 weeks. Thirty-day abstinence rates at week 24 were 12% for those in the clinic condition versus 6% for those in the internet condition. One likely reason for the failure of the internet intervention to achieve comparable success rates to the clinic intervention is that use of the internet resource dropped to one-third of those in the internet condition by the third week of the study. The conclusion achieved by the authors of this study was that internet interventions are less successful in sustained contact and personalized message tailoring than are face-to-face interventions (Patten, et al., in press). However, in light of the success achieved with personalized mailings from the National Cancer Institute (Strecher et al., 2005) described above, and the high patient acceptability of the "video doctor" (Gerbert, et al., 2003), it is likely that were an internet-based intervention developed that interacted more with smokers and responded to them with messages tailored to their concerns throughout the cessation process, that such an intervention would achieve higher rates of continued participation and increased abstinence rates. Nonetheless, in-person follow-ups would still be important to verify smoking status via biochemical analysis (e.g. CO monitoring).

Health Promotion and Exercise. Health promotion strategies attempt to increase self-efficacy to quit smoking and to promote healthy lifestyle choices (Martinelli, 1999). Because relapse following initial smoking cessation is associated with concerns about gaining weight and body fat, and is associated with physiological components of nicotine withdrawal syndrome (Hatsukami & Hughes, 1985), the efficacy of exercise counseling as an adjunct to standardized smoking cessation counseling has been studied. Ussher and colleagues (2003) conducted a randomized controlled trial in which they provided NRT to all participants, and randomly assigned participants to receive either specific exercise counseling to educate them as to how to use aerobic exercise (such as stationary bicycling) to reduce withdrawal symptoms and inhibit weight gain, or a control condition in which they were given general health education with equal contact time as those in the active condition. Although the exercise counseling was somewhat helpful in both of the smaller goals (reducing weight gain and reducing withdrawal symptoms), participants receiving exercise counseling did not achieve greater rates of abstinence at a six-week follow-up: the rate of abstinence at six weeks for the experimental condition was 40% compared with 39% for controls (Ussher, West, McEwen, Taylor, & Steptoe, 2003). Similar findings have been reported for isometric exercise (i.e., stationary muscle contractions that a worker could perform at her or his desk): although this form of exercise reduces withdrawal symptoms, including the desire to smoke, it is not efficacious as a tool for smoking cessation (Ussher, West, Doshi, & Sampuran, 2006).

Stress Management. Stress management skills can be an effective component of smoking cessation interventions because many smokers report high levels of stress

(Parrott, 1998) and stress management techniques can decrease relapse rates (Lloyd & Foster, 2006).

  Motivational Interviewing. Many consider motivation to change behavior a crucial factor in the success of behavioral and cognitive-behavioral interventions; in line with this reasoning, motivational interviewing (MI) is a treatment strategy that capitalizes on the ability of therapists to increase patients' motivation to change behavior (Brown & Miller, 1993; Miller, 1995). MI involves using active listening and reflecting, and aims to move patients through Prochaska and DiClemente's (1982) three stages of change: precontemplation, contemplation, and decision to change. In this model, those in the precontemplation stage have not yet begun to think about behavior change; a smoker who is in this phase would report not having thought about quitting smoking. The contemplation stage is characterized by thinking about behavioral change but not being ready to engage in it, and the decision to change stage is characterized by being ready to change, and attempting to do so. Without the therapist intervening to increase the patient's motivation to change, only those in the third stage of this model would be successful targets for smoking cessation interventions. Thus, the reason that MI is likely useful for smoking cessation is because it increases the number of smokers who will be potentially able to quit smoking and it does not require that only those who are immediately ready to quit smoking to be targeted by interventions (Miller, Sovereign, & Krege, 1988). MI is described by Miller and colleagues (e.g. Rollnick, 2001) as a counseling style as opposed to a specific set of techniques. For this reason, its proponents argue, successful MI interventions involve careful training of clinicians to be good listeners and use reflective statements, and not simply teaching MI as prompts. Thus,

although MI can be an effective albeit brief intervention, it requires more clinician training than other brief interventions summarized above (e.g. a simple questionnaire with prompts; an interactive computer-based intervention).

It should be noted that MI is not simply a variation of non-directive Rogerian therapy, and in fact has shown effectiveness over non-directive therapy in trials comparing the two (Heather, 2001). Asking a smoker why she or he wants to quit is less important in MI than is listening to why she or he wants to quit (Rollnick, 2001), and clinicians learning MI should be carefully supervised such that they are trained to lead patients, through a dialectic approach, to increased levels of motivation (Miller, 2001). However, contrarians (e.g. Longabaugh, 2001) have suggested that MI's success rates are attributable to its effectiveness with patients who are high on anger as opposed to low on motivation. This treatment is effective, they say, because it reduces the anger and contrarian attitudes of patients, and not because it increases their motivation to change. Dunn, DeRoo, and Rivara (2001a) have suggested that further research on the active components of MI is necessary to account for the specific mechanisms of change.

MI was initially developed to prepare individuals with substance abuse disorders to change their behavior (Miller, 1983). It has been adapted for use with smoking cessation and has shown to be successful as a smoking cessation tool for adult smokers (e.g. C. C. Butler, et al., 1999) but has not shown effectiveness over comparison treatment with adolescents Colby, et al., 1998). However, in the Colby and colleagues (1998) study with adolescents, a small sample size may be responsible for the positive trend to not show statistical significance for the effectiveness of MI over treatment-as-usual. Dunn, Deroo, and Rivara (2001b) conducted a meta-analysis of the effectiveness

of MI for substance abuse, smoking, and other health behaviors, and concluded that the effectiveness of MI for substance abuse has been proven, but that its effectiveness for smoking cessation and other behaviors is not yet clear. McCambridge and Strong (2004) have shown clear and significant effect sizes for the ability of MI to reduce tobacco use, and have suggested that the primary success of MI for smokers is in harm reduction and not in full cessation and abstinence. Such effects have even greater practical success in terms of utility: McCambridge and Strong (2004) found these effects at a three-month follow-up to a single session of MI. Tait and Hulse (2003), in a meta analysis, found that the effectiveness of MI over other treatments had a small effect size for smoking cessation but a medium-to-large effect size for polysubstance use (e.g. alcohol and smoking; alcohol, illicit drugs, and smoking), suggesting its effectiveness lies within broader contexts of behavioral change regarding substance use and health as opposed to specifically targeting tobacco use.

In addition to the small but significant effectiveness of MI with non-disordered smokers (e.g. the adult hospital patients in C.C. Butler and colleagues' study and the college students in McCambridge and Strong's study), it has also shown great success among populations of smokers with mental illness. Miller and Rollnick (2002) reported results from a number of studies showing the effectiveness of MI in inpatient psychiatric wards, and postulated that MI enhances the therapeutic relationship, thus making smoking cessation interventions more palatable and engaging for patients. A recent study specifically testing the effectiveness of MI for motivating smokers with schizophrenia or schizoaffective disorder to quit smoking found that those assigned to receive MI contacted tobacco dependence treatment counselors at significantly higher rates, and

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attended initial smoking cessation counseling visits, than did those assigned to receive

standard psychoeducational counseling or generic advice (Steinberg, Ziedonis, Krejci, &

Brandon, 2004).

<div align="center">Harm Reduction</div>

Cigarette smoking categorically puts smokers at higher risk for a variety of

negative health outcomes, but the risk of a number of tobacco-related illnesses is dose-

dependent, and so smokers who are successfully able to reduce their cigarette intake and

maintain this reduction may be able to reduce their risk of tobacco-related illness and

death (D. K. Hatsukami, personal communication, 2001). Although harm reduction may

be perceived as a failure by clinicians attempting to motivate smokers to quit smoking, it

deserves to be examined as an adjunct to smoking cessation interventions for those who

are unable to quit, or in contexts in which a full smoking cessation intervention may not

be feasible.

In one retrospective study of heavy, medium, and light African American smokers

(Okuyemi, Richter, Mosler, Nazir, & Resnicow, 2002), light smokers reported that they

had already successfully engaged in a number of smoking reduction strategies, including

intentionally limiting their smoking, stubbing out cigarettes after smoking less than half

of the cigarette, setting a daily maximum limit for cigarettes smoked and adhering to the

limit, changing their brand of cigarette to a less-preferred brand, limiting the

environments in which they smoked (e.g. not smoking inside the house or car), inhaling

less deeply, switching to a lighter cigarette, or abstaining from smoking on specific days

(e.g. not smoking on Sundays). Heavy and moderate smokers in this study reported

having attempted fewer of these strategies. Thus, from Okuyemi and colleagues' (2002)

study, it can be inferred that those inner-city, African American smokers who have attempted to reduce their smoking have largely been successful, and that those who have not been successful, for the most part, have not attempted to engage in such strategies. These results suggest that psychoeducation comprising behavioral harm reduction strategies may be effective for reducing the risk of tobacco-related disease and death in inner city African Americans.

Interventions for the Unwilling.

Of interest in the development of a smoking cessation intervention for use with smokers in a residential drug treatment program are interventions that have been conducted with other populations that did not seek out smoking cessation treatments. One such population is high-school students who were caught smoking at school. A recent randomized clinical trial of 261 high-school students caught smoking at school assessed the effectiveness of a four-session behavioral intervention for smoking cessation, with monthly follow-up calls, on abstinence rates at one year. Although participants reported enjoying participating in the intervention, and the psychoeducational component was successful (i.e., they had significant increases in their knowledge of tobacco-related harm), the effectiveness rates of the intervention were not superior to placebo (Robinson, Vander Weg, Riedel, Klesges, & McLain-Allen, 2003).

Challenges to Implementing Smoking Cessation Interventions with Diverse Populations

The vast majority of the above-cited studies showing effectiveness for smoking cessation interventions have been developed for and tested with mainstream populations (i.e. predominantly White Americans in primary care settings). However, significant differences in smoking rates, as well as differences in the health effects of smoking, exist

between racial and ethnic groups. Rogers and Crank (1998) found that non-Latino African Americans and non-Latino Whites did not significantly differ in their rates of smoking (26% vs. 25%, respectively). However, African Americans experience higher rates of tobacco-related morbidity and mortality than do Whites (Okuyemi, Scheibmeir, Butler, & Ahluwalia, 2003; Okuyemi, Ahluwalia, et al., 2002).

Given that the vast majority of drug users smoke cigarettes (Richter, Ahluwalia, Mosier, Nazir, & Ahluwalia, 2002; Richter, et al., 2005), it should be noted that the population of inner-city substance abusers – comprised primarily of African-Americans – is highly likely to smoke and to experience worse health outcomes than other groups from their smoking. Thus, they have a high need for successful smoking cessation interventions, and yet most research in the field has not specifically examined the effectiveness of various interventions with this populations In order to develop effective interventions for diverse populations, such as African Americans and/or inner-city drug abusers, specific information regarding substance use within those populations is essential (Bernstein, et al., 2005; Payne & Diefenbach, 2003). Although only a handful of research groups have specifically examined the challenges of smoking cessation in African Americans, a number of other disadvantaged groups have been examined, and many of the lessons learned from these populations could be adapted for use with inner city African Americans in residential substance abuse treatment. An examination of several diverse populations, in addition to a review of the extant literature on smoking in inner city African Americans, reveals several common themes. These include less access to health care resources, higher rates of psychopathology, and interest in culturally competent treatment providers.

Cross-Cultural Research across a Variety of Diverse Populations

Rural White Appalachians and Lack of Resources. Perhaps ironically, research with lower-income rural White populations can shed some light on the challenges of lower-income, urban African-American populations. Horn and colleagues (Horn, Dino, Kalsekar, & Fernandes, 2004; Horn, Dino, Kalsekar, Massey, Manzo-Tennant, & McGloin, 2004) found that rural Appalachian adolescent smokers experienced increased levels of psychopathology and decreased access to health care resources – similar to African-American inner-city drug abusers (Payne & Diefenbach, 2003). Horn and her colleagues found that an intensive intervention (i.e. 10 weeks of face-to-face counseling sessions) was significantly more effective than a brief intervention (i.e. a single 15-minute brief intervention) at the end of 10 weeks through a one-year follow-up. However, there was a nonsignificant trend toward increased cessation at one year from end-of-program for participants in both conditions, suggesting that both the brief intervention and the intensive intervention had overall positive effects on smoking cessation in a sample of underprivileged smokers.

Native Americans and Cultural Relevance. Horn and her colleagues (2005) utilized the same research protocol described above with a sample of Native American adolescents in Appalachia. Native Americans smoke at higher rates than those of other racial and ethnic groups, and yet are under-studied in research on interventions for smoking cessation. Although this population consisted of recalcitrant smokers, very few of whom were able to quit, intent-to-treat analysis showed that 18% (i.e. six individuals) of males receiving the intensive intervention quit smoking as opposed to 3% (i.e. one individual) of males in the brief-intervention group quit smoking. None of the females in

this sample were able to quit smoking, across both treatment groups. Such data suggest that smokers from underprivileged populations may experience more difficulty quitting smoking, or they may suggest that extant treatments are not addressing concerns relevant to the needs of these populations.

Choi and colleagues (2006) examined a different population of Native American smokers, conducting focus groups to collect qualitative data on how smoking cessation interventions could be adapted to increase their cultural relevance to this population. It was found that participants had a strong preference for an increase in specific imagery (e.g. pictures of people in pamphlets, anecdotes used in treatment) that related to Native American culture, and that participants had a strong preference for transdermal NRT over bupropion with regard to pharmacotherapy. It is not clear what success (if any) such adaptations to interventions for diverse populations could have on improving the effectiveness of smoking cessation interventions. However, with the low success rates found in Horn and colleagues' research for brief or intensive treatment interventions, adaptation to the current interventions in the form of cultural relevance deserves further research.

Latinos and Acculturation. Population surveys of smoking rates across racial and ethnic groups have found that Latinos and Asian Americans smoke at lower rates (20% and 17%) than do non-Latino African Americans and non-Latino Whites (26% and 25%; Rogers & Crank, 1998). A recent study examined smoking patterns and beliefs, and their relationship to successful smoking cessation, among less-acculturated Latinos, bicultural Latinos, and non-Latino Whites in New England. Although both Latino groups smoked similar numbers of CPD (i.e. significantly lower than the non-Latino Whites), and

reported similar levels of nicotine dependence (again, lower than the non-Latino Whites), the stated motivations for smoking, beliefs about smoking, and amount of negative-affect-reducing smoking for the bicultural Latinos more closely resembled those of the non-Latino Whites than they resembled the less-acculturated Latinos (Bock, Niaura, Neighbors, Carmona-Barros, & Azam, 2005). Further, the impact that these significant differences in smoking motivation and beliefs, and in the use of smoking to reduce negative affect, had on the effect of a comprehensive smoking cessation intervention (i.e. behavioral counseling, self-help manuals, and NRT) on successful abstinence at a six-month follow-up were mediated by acculturation status. This is to say, motivational variables that have been shown to predict successful smoking cessation in some groups (e.g. middle-class Whites) may not predict smoking cessation in minority groups. Bock and colleagues' (2005) findings suggest that, in tailoring smoking cessation interventions to diverse populations, the relationships between baseline variables and quit rates found in White populations should not be presumed to exist among the population at hand. A treatment that hinges on increasing smokers' perceived self-efficacy in quitting may not be helpful or necessary in some populations (e.g. non-acculturated Latinos), if self-efficacy is not predictive of quit rates within this population. Extrapolating from these results, one could imagine that the factors predictive of successful smoking cessation among inner-city African American drug abusers may well be different than those predictive of cessation among the typically-studied mainstream population, and that pilot studies measuring predictors of smoking cessation success in this population would be a helpful first step in developing successful interventions for this population.

Koreans and Generational Effects. Another factor found in the cross-cultural research that may be relevant to a variety of diverse populations was found in a recent Korean trial in which participants were randomly assigned to receive a brief, burse-delivered intervention for smoking cessation plus additional telephone follow-ups versus no intervention. At a five-month follow-up, no significant difference was found between those receiving the intervention versus controls. However, a marked difference was found for those smokers aged 49 years or less (comprising approximately 50% of the original sample): among younger smokers, the intervention was highly effective compared to no treatment, with odds ratios of cessation at 5.76 (95% CI: 1.34-24.74) for younger smokers in the experimental condition and 1.03 (95% CI: 0.53-1.99) for older smokers in the experimental condition. Thus, an intervention that appeared to be completely ineffective for smokers was in fact highly effective for younger smokers and ineffective for older smokers, moderated by age (Kim, Lee, Hwang, & Lee, 2005). It is possible that the lower rates of effectiveness found in treatments for diverse populations may result from such moderator effects that are not found in mainstream populations; such effects deserve further study among diverse populations.

Research Examining Factors Specific to African-American Smokers

African American smokers and White smokers have more similarities in stated reasons for smoking than they do differences: although White female smokers are significantly more likely than African American female smokers to cite weight control as a reason for smoking, on most stated reasons for smoking, significant differences have not been found between the two populations (Sanchez-Johnson, Ahluwalia, Fitzgibbon, & Spring, 2006). Additionally, as stated above, the overall rates of smoking are not

significantly different for African Americans and White smokers in the United States. However, a number of factors that influence the onset, maintenance, cessation, and relapse of smoking have been found to differ between African Americans and other groups; most commonly studied are those factors that differentiate African American smokers from White smokers, the population that is most commonly researched and towards which most interventions are primarily developed.

Peer and Family Acceptance of Smoking. Specific socio-environmental factors that influence the onset of smoking in adolescents have been found to be significantly different across racial and ethnic groups. African American adolescents are significantly more likely than White or Latino adolescents to smoke with their smoker relatives, to have their smoking accepted by their relatives, to spend time in places where smoking is permitted, and to report smoking to "fit in" (Dornelas, et al., 2005). These factors are likely to all work against successful abstinence following smoking cessation for African American smokers, and to lead to higher rates of relapse following smoking cessation.

Although Sanchez-Johnson and colleagues (2006) reported their findings based on an adolescent population, the socio-environmental factors influencing African American adolescents are likely the same for African American adults, and future research should measure whether peer- and family-acceptance of smoking predicts relapse and whether peer- and family-acceptance of smoking is higher among African Americans of all ages. If both patterns are found to be significant, addressing this specific issue in smoking cessation interventions for African American smokers is likely to lead to more successful interventions for this population.

Stress. Much has been made in the literature regarding stress and smoking. It appears that, as a general rule, one of the most common reasons stated by smokers for their behavior is that they experience high levels of stress, and that smoking reduces their negative affect (Parrott, 1998). Although this finding may not be culturally universal (cf. Bock, et al., 2005), it has been replicated in a sample of inner city African Americans (Pulvers, et al., 2004). As found with mainstream (i.e. primarily White) populations, a gender effect is also found among African American smokers regarding negative affect: women are significantly more likely to report that they smoke to reduce negative affect than are men (Pulvers, et al., 2004). One recent study (Manning, et al., 2005) examined the relationship of stress to smoking cessation among 300 primarily female, primarily middle-aged, inner-city African American smokers. The participants in this study were receiving placebo pills plus cognitive-behavioral counseling as part of a randomized controlled trial of bupropion. Although perceived stress at baseline did not predict treatment success, reduction in stress from baseline was significantly associated with success in smoking cessation and maintaining abstinence through a six-month follow-up. Additionally, a cross-sectional positive correlation was found between reported stress levels and non-abstinence at follow-up. These findings illustrate the usefulness of stress-reduction and –management techniques for inner city, lower-income African Americans – especially women – attempting to quit smoking and remain smoke-free.

Menthol Cigarettes. African American smokers have a strong preference for menthol cigarettes over non-menthol cigarettes; in other ethnic groups this pattern is reversed. Because menthol versus non-menthol is one of the strongest and consistent differences between African American smokers and smokers of other racial and ethnic

groups, menthol cigarettes have been targeted as a potential factor that leads to the significantly worse tobacco-related health outcomes that African Americans experience compared to smokers from other racial and ethnic groups (Okuyemi, Scheibmeir, Butler, & Ahluwalia, 2003; Okuyemi, Ahluwalia, et al., 2002). Cross-sectional research on inner-city African American smokers found that menthol smokers were significantly younger than non-menthol smokers and were significantly more likely to smoke cigarettes with longer rod length (i.e. 100-mm cigarettes as opposed to the more standard 85-mm cigarettes), and with higher levels of nicotine and tar. A nonsignificant trend among this sample was for menthol smokers' past quit attempts to be of shorter duration than those of nonmenthol smokers (Okuyemi, Ebersole-Robinson, Nazir, & Ahluwalia, 2004). Because the relationship between menthol cigarette smoking and successful smoking cessation has not been shown to be significant, it is possible that menthol cigarette smoking may not be a factor in smoking cessation. Further, the fact that Okuyemi, Ebersole-Robinson and colleagues (2004) found a relationship between menthol cigarette smoking and rod length, and between menthol cigarette smoking and nicotine and tar levels, suggest that the relative harm from menthol cigarette smoking may result not from the process of inhaling menthol with cigarettes (which would be implausible because over-the-counter medications, such as Vicks VapoRub, entail inhaling menthol). It is more likely that, if menthol cigarette smoking is responsible for differentially worse health outcomes for African American smokers, it is the result of a few specific popular brands among younger African American smokers (e.g. Newport) being menthol cigarettes that are also stronger than most other cigarettes, menthol or non-menthol.

The Paradox of Fewer Cigarettes, Worse Health Outcomes. African American smokers smoke fewer CPD than other smokers, and yet experience worse health outcomes. This may be associated with the intake of high-nicotine, high-tar brands such as Newport. Although African American smokers generally smoke fewer CPD than White smokers, and focus group and survey research (Okuyemi, Ahluwalia, et al, 2004; Okuyemi, Schelbmeir, et al., 2004) has shown that they perceive themselves to be at lower risk for tobacco-related diseases than heavy smokers, they do indeed perceive themselves to be addicted to nicotine and report interest in treatment for smoking cessation. One study of smokers within the inner-city African American population found that light smokers were likely to be female, young, and smoke an average of seven CPD (Choi, Okuyemi, Kaur, & Ahluwalia, 2004). Nonetheless, light smokers in this study reported similar numbers of past quit attempts at similar durations as did heavier smokers, suggesting an equal level of addiction and an equally strong need to quit. Because most research on smoking cessation interventions has been conducted on heavier smokers (for example, FDA trials of novel pharmacotherapy for smoking cessation on which the author of the current paper has worked have had inclusion criteria of 10 or more CPD), future research on nicotine-dependent light smokers would be especially helpful for inner-city African American smokers.

Smoking Cessation Interventions for Inner-City Smokers in Residential Drug Treatment

Although patterns of poor health outcomes among diverse populations are frequently chronicled, effective interventions for smoking cessation are far less often developed and implemented, and targeting treatments for diverse populations should be prioritized in public health research (Ivers, 2003). Growing literatures on treatments

targeted for inner-city smokers in residential treatment for drug abuse, and for African American smokers, suggest there is promise for treatments that work.

Given the factors shown to be effective in the contemporary literature on successful interventions for smoking cessation, residential treatment centers provide a challenge to those attempting to facilitate smoking cessation in such an environment. Intensive cognitive-behavioral interventions for smoking cessation, especially when combined with pharmacotherapy, have shown effectiveness (e.g. Brown, Niaura, & Bock, 2001). However, such an intervention usually requires six or eight weeks of counseling and pharmacotherapy to be effective. Going beyond eight weeks, a variety of smoking cessation interventions have shown that follow-up messages, targeted to an individual's needs and concerns post-cessation, are also important to maintain abstinence rates at one year post-treatment (need citation). However, participants may not be in the center for eight weeks to complete such an intensive treatment to the duration shown in the literature to be effective, and are seldom if ever in centers for a full year for follow-up contact, which has also been shown to increase effectiveness of continued abstinence (need citation). Those who complete residential treatment may not have phone numbers at which they can be contacted for follow-ups to ensure continuance of abstinence, and centers may not have the resources to implement such a program were it feasible.

In contrast to the time- and energy-intensive interventions described above, a number of brief interventions for smoking cessation have been developed in recent years, and some of them have shown remarkable utility. Although brief interventions do not often lead to high cessation rates, neither do time-intensive interventions: relapse rates are often 60-90% within one year for intensive interventions and 80-90% for brief

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interventions (Krall, Garvey, & Garcia, 2002; Shadel & Niaura, 2003). The resources are not always available to implement multi-session behavioral interventions, but fortunately, several very short, simple, and inexpensive interventions have shown significant effectiveness in smoking cessation compared with control conditions. It appears that brief interventions are successful with smokers at lower levels of nicotine dependence, but that highly dependent smokers require more intensive interventions (e.g. Horn, Fernandes, Dino, Massey, & Kalsekar, 2003). Brief interventions can be conducted by pharmacists (e.g. Maguire, McElnay, & Drummond, 2001), primary care physicians (e.g. Milch, Edmunson, Beshansky, Griffith, & Selker, 2004), or nurses. Long-term success has been shown from brief interventions with lower income populations at public health clinics (Manfredi, Crittenden, Cho, & Gao, 2004).

Although some research has suggested that longer and more intensive interventions are more effective than brief interventions for smoking cessation with highly dependent smokers (e.g., Horn, et al., 2003), other research has indicated that intensive treatments are not more effective than brief interventions (e.g. Lancaster & Stead, 2004, 2005; Sanz-Pozo, et al., 2006). Further, intensive interventions are not often feasible within the context of residential substance abuse treatment centers. It should be noted that the intensity of interventions is not a dichotomous phenomenon: relapse rates follow a somewhat continuous negative correlation with the length of treatment in minutes (Abrams & Niaura, 2003). Residential treatment centers seldom have the time or financial resources to commit to computerized smoking-cessation aids, pharmacotherapy, or intensive cognitive-behavioral treatments specific to smoking. Nonetheless, a modified

"standard treatment" that takes sixty minutes does not require great amounts of resources or time.

In addition to the problems of limited time and other resources, however, many residential treatment centers are based on the principles of Narcotics Anonymous (NA), which revolve around complete abstinence from drugs of intoxication. Because caffeine and nicotine are not drugs of intoxication, NA has not traditionally targeted them as foci of treatment. In fact, one popular image of NA meetings is that of a smoke-filled room. Anecdotally, then, NA-based treatment centers can be said to be environments not traditionally suited to the goals of smoking cessation: their staff may potentially lack the motivation or the specific training to implement the types of smoking cessation interventions that have shown the highest effectiveness rates. Additionally, their substance-abuse counselors may be smokers themselves, which could cause them to feel hypocritical or self-conscious about implementing such an intervention. Further, inner-city treatment centers that are comprised primarily of lower-income African Americans face the additional challenge of working with a population that has been under-researched with regard to smoking cessation intervention and whose members face specific socioenvironmental factors known to contribute to relapse. As such, attempted implementation of the "gold standard" treatments touted in the empirical literature may be difficult, if the "gold standard" treatments were not designed with this population in mind, nor tested on them.

The Study At Hand: Resource-Thrifty and Population-Tailored

The proposed intervention is a modified version of "gold standard" smoking cessation therapy: it involves four, 15-minute therapy sessions, conducted by masters-

degree-level therapists; the only physical resources required are rooms to conduct the sessions and a CO monitor for biochemical verification of smoking status; and the therapy comprises a number of empirically-supported techniques, including motivational interviewing and decisional balance, behavioral strategies for managing high-risk situations for relapse, and cognitive strategies for managing a potential slip in light of the abstinence violation effect.

The reasons why this smoking cessation intervention has potential within an inner-city residential substance-abuse treatment center are myriad. This intervention uses easy-to-follow therapist and participant manuals, creating standardization for better internal validity. However, individual responses are taken into account, creating a client-tailored effect: each individual participant is prompted to give their own reasons for smoking, and for wanting to quit; their own high-risk situations for relapse; and to generate their own "game plan" for maintained smoking cessation, and to evaluate the effectiveness of the techniques that they develop and use. Targeted messages to individual smokers, pre-quit and post-quit, intensify brief interventions and lead to higher cessation rates and lower relapse rates (e.g. Strecher, et al., 2005). Additionally, the combination of cognitive-based techniques and behavior-modification techniques has shown better effectiveness than either alone (e.g. Miller, 2000). In the absence of intensive, multi-session cognitive-behavioral counseling, brief but tailored messages offering constructive behavior-change techniques will be offered to smokers in the residential treatment setting. The MI component could offer smokers the tools to increase their motivation, and concrete behavior change techniques for smoking cessation – and reduction – will likely result in a

treatment whose effectiveness is not dramatic, but represented a significant improvement

over no treatment whatsoever.

Appendix L: Adherence to Protocol Assessement

Table 11. Adherence to Protocol in Treatment Condition.

		Subject X	Subject Y	Subject Z
SESSION 1	Program Overview	YES	YES	YES
	Past Quit Experiences	NO	YES	YES
	Reasons for Quitting	YES	YES	YES
	Game Plan	YES	YES	YES
	Social Support	YES	YES	YES
	Quit Day Expectations0	NO	YES	NO
SESSION 2	ID High-Risk Situations	YES	YES	YES
	Cope with Situations	YES	YES	YES
	Prepare for Quit Day	YES	YES	YES
SESSION 3	Discuss Quit Day Experience	YES	YES	YES

SESSION 4	Discuss Quit Wk Experience	YES	YES	YES
TOTAL # PROMPTS		9/11	11/11	10/11
TOTAL # BAD PROMPTS		0	0	0
RATIO		.82	1.00	.91

Table 12. Adherence to Protocol in PMR Placebo Condition.

		Subject P	Subject Q
SESSION 1	R foot	YES	YES
	R leg	YES	YES
	L foot	YES	YES
	L leg	YES	YES
	Seat	YES	YES
	Gut	YES	YES
	Torso	YES	YES
	R hand	YES	YES
	R arm	YES	YES
	L hand	YES	YES
	L arm	YES	YES

	Shoulders	YES	YES
	Neck	YES	YES
	Head	YES	YES
SESSION 2	R foot	YES	YES
	R leg	YES	YES
	L foot	YES	YES
	L leg	YES	YES
	Seat	YES	YES
	Gut	YES	YES
	Torso	YES	YES
	R hand	YES	YES
	R arm	YES	YES
	L hand	YES	YES
	L arm	YES	YES
	Shoulders	YES	YES
	Neck	YES	YES
	Head	YES	YES
SESSION 3	R foot	YES	YES
	R leg	YES	YES
	L foot	YES	YES
	L leg	YES	YES
	Seat	YES	YES
	Gut	YES	YES

	Torso	YES	YES
	R hand	YES	YES
	R arm	YES	YES
	L hand	YES	YES
	L arm	YES	YES
	Shoulders	YES	YES
	Neck	YES	YES
	Head	YES	YES
SESSION 4	R foot	YES	YES
	R leg	YES	YES
	L foot	YES	YES
	L leg	YES	YES
	Seat	YES	YES
	Gut	YES	YES
	Torso	YES	YES
	R hand	YES	YES
	R arm	YES	YES
	L hand	YES	YES
	L arm	YES	YES
	Shoulders	YES	YES
	Neck	YES	YES
	Head	YES	YES
TOTAL #		56/56	56/56

PROMPTS			
TOTAL # BAD PROMPTS		0	0
RATIO		1.00	1.00

Appendix M: Additional Analyses

Table 13. Covariate X Time (Linear).

Variable	Denominator *df*	F	p
Time	24.598	.694	.413
Age	45.386	2.499	.121
Time	25.117	.812	.376
Smoking Temptation	32.295	8.190	.007*
Time	24.853	.600	.446
DASS	42.774	.373	.545
Time	24.544	.533	.472
FTND	45.933	12.902	.001*
Time	25.108	.620	.438
Motivation to Quit	46.584	.014	.907
Time	24.434	.601	.446
Age of Regular Smoking	49.159	4.615	.037*
Time	25.984	.567	.458
Sex	47.042	4.654	.036
Time	25.844	.559	.461
Treatment Condition	48.645	2.743	.104

*Statistically significant effect of covariate on CPD ($p < .05$).

Table 14. Covariate X Time (Quadratic).

Variable	Denominator *df*	F	p
Time^2	59.590	1.416	.239
Age	45.949	2.503	.121
Time^2	52.665	1.157	.287
Smoking Temptation	31.955	5.935	.021*
Time^2	74.898	1.254	.266
DASS	42.446	.300	.587
Time^2	86.155	1.244	.268
FTND	46.887	12.298	.001*

Time^2	71.088	1.251	.267
Motivation to Quit	46.676	.014	.905
Time^2	60.769	1.393	.243
Age of Regular Smoking	51.162	4.567	.037*
Time^2	92.503	1.177	.281
Sex	46.822	4.632	.037*
Time^2	86.243	1.377	.244
Treatment Condition	48.419	2.825	.099

*Statistically significant effect of covariate on CPD ($p < .05$).

Table 15. Covariate X Treatment Condition.

Variable	Denominator df	F	p
Treatment Condition	33.255	3.007	.092
Age	44.906	3.355	.074
Treatment Condition	37.503	2.410	.129
Smoking Temptation	30.408	4.916	.034*
Treatment Condition	34.548	2.190	.148
DASS	36.100	.404	.529
Treatment Condition	32.224	2.196	.148
FTND	48.908	13.276	.001*
Treatment Condition	37.169	2.329	.135
Motivation to Quit	39.887	.001	.972
Treatment Condition	34.768	2.057	.160
Age of Regular Smoking	40.283	3.943	.054
Treatment Condition	40.173	.938	.339
Sex	46.154	2.547	.117

*Statistically significant effect of covariate on CPD ($p < .05$).

Appendix N: Analyses of Heavy and Light Baseline CPD on Treatment Effect

Table 16. Univariate Analysis of Variables: Light Smokers.

Covariate	Denominator df	F	p
Sex	18.897	3.517	.076
Age	21.722	.705	.410
Temptation	15.195	.005	.945
DASS	16.943	.688	.418
FTND	21.418	3.531	.074
Age of regular smoking	22.839	6.906	.015*
Motivation	19.760	.124	.728
Time	20.317	.164	.690
Time^2	7.662	.159	.701
Treatment	21.107	2.083	.164

*Statistically significant effect of covariate on CPD ($p < .05$).

Table 17. Multivariate HLM: Light Smokers.

Covariate	Denominator df	F	p
Sex	21.519	2.637	.119
Temptation	13.398	3.414	.087
FTND	17.675	9.294	.007*
Treatment	23.616	.797	.381
Time	17.930	.003	.957
Treatment Effect (Treatment X Time)	18.383	.061	.807

*Statistically significant effect of covariate on CPD ($p < .05$).

Table 18. Univariate Analysis of Variables: Heavy Smokers.

Covariate	Denominator df	F	p
Sex	25.909	1.106	.303
Age	23.351	1.507	.232
Temptation	20.891	5.925	.024*
DASS	23.988	.627	.436
FTND	25.224	6.378	.018*
Age of regular smoking	29.207	.784	.383
Motivation	26.014	.341	.564
Time	31.633	1.329	.258
Time^2	16.106	1.080	.314
Treatment	28.463	5.452	.027*

*Statistically significant effect of covariate on CPD ($p < .05$).

Table 19. Multivariate HLM for Heavy Smokers (Including Treatment Effect).

Covariate	Denominator df	F	p
Sex	24.197	3.777	.064
Temptation	18.496	7.144	.015*
FTND	23.977	4.909	.036*
Treatment	22.861	4.119	.054
Time	52.316	.909	.345
Treatment Effect (Treatment X Time)	55.278	.178	.675

*Statistically significant effect of covariate on CPD ($p < .05$).

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