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# Engaging smokers with schizophrenia in treatment for tobacco dependence: A brief motivational interviewing intervention

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ENGAGING SMOKERS WITH SCHIZOPHRENIA IN TREATMENT FOR TOBACCO  
DEPENDENCE: A BRIEF MOTIVATIONAL INTERVIEWING INTERVENTION

by

MARC L. STEINBERG

A dissertation submitted in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy  
Department of Psychology  
College of Arts and Sciences  
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Dedication

To Laura for being there through it all,  
Dana for keeping all of life's events in perspective, and  
Mom and Dad for always being proud of me.

In memory of Eugenio Ragosa.

### Acknowledgments

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Engaging Smokers With Schizophrenia In Treatment For Tobacco Dependence:  
A Brief Motivational Interviewing Intervention

Marc L. Steinberg

ABSTRACT

The purpose of this study was to determine how to best motivate smokers with schizophrenia or schizoaffective disorder to seek treatment for tobacco dependence. Smokers with schizophrenia or schizoaffective disorder (N=78) were randomly assigned to receive a Motivational Interviewing, Psychoeducational, or Minimal Control intervention. A greater proportion of participants receiving the Motivational Interviewing intervention followed through on a referral for tobacco dependence treatment within one-week and one-month post-intervention. Mixed model Analyses of Variance found no differences between groups at one-week or at one-month with respect to tobacco use or motivation to quit. Within group analyses indicated that participants in the Motivational Interviewing and Psychoeducational groups reported significant decreases in cigarettes smoked per day. Only participants in the Motivational Interviewing group showed significant increases in confidence in their ability to quit smoking.

## CHAPTER ONE

### Introduction

Although the first published evidence linking cigarette smoking to lung cancer appeared in 1950 (i.e., Wynder & Graham, 1950; Doll & Hill, 1950), the prevalence of tobacco use continued to grow in the United States. After the Surgeon General's report in 1964 (USDHEW, 1964) attitudes, and eventually behaviors, regarding smoking began to change. It is now generally accepted that smoking produces severe negative health consequences and that all smokers should be provided with advice to quit by health care professionals. Addressing tobacco dependence in smokers with schizophrenia, however, is a relatively novel concept. The following pages will make the argument that it is vitally important that smokers with schizophrenia be referred for tobacco dependence treatment.

Although tobacco use is an enormous problem in the United States, the problem is even more severe among individuals with schizophrenia. Smoking is up to three times more prevalent among individuals with schizophrenia than among the general population. The high comorbidity may be related to the perceived mood and cognitive benefits among smokers with schizophrenia. Despite the "benefits" experienced by smokers with schizophrenia, tobacco use among those with schizophrenia is even more dangerous than among those in the general population. Increased negative physical health consequences, increased chances of neuroleptic induced movement disorders, and increased psychiatric symptoms are all reasons for addressing tobacco use in this population. Importantly, despite the many barriers to quitting, evidence suggests that tobacco dependence treatment efforts can be successful without a concomitant increase in psychiatric symptoms.

The first chapter will conclude by describing issues related to motivation and reasons for quitting among smokers with schizophrenia and how brief interventions can effectively address these issues. Lastly, the rationale for this study will be described and specific hypotheses will be explained.

## Background Information

### Cigarette Use in the General Population

Cigarette smoking is the leading preventable cause of death and disability in this country (Centers for Disease Control and Prevention, 1999) with over 430,000 people dying from smoking-related causes each year in the United States (Centers for Disease Control and Prevention, 1997). This figure represents one of every five deaths in this country (McGinnis & Foege, 1993). Although the tobacco industry has challenged this figure stating that behavioral and demographic factors were not taken into account, a recent study found that statistically controlling for these factors did not substantially change federal smoking-related mortality estimates (Thun et al., 2000). Despite the astounding morbidity and mortality figures, the latest estimates from the Centers for Disease Control (2001) indicate that approximately 1 in 4 people in the United States continue to smoke cigarettes. In contrast to the large gender gap of the past, women now smoke at similar rates to men.

### Schizophrenia and Tobacco Use

#### Smoking Prevalence

The high prevalence of smoking among the general population pales in comparison to the prevalence of smoking among mentally ill populations. Based on data from the National Comorbidity Survey (Kessler, 2000) it was determined that people meeting criteria for a mental illness in the last month are significantly more likely to be current smokers than those without a mental illness (Lasser et al., 2000). In fact, it has been estimated that persons with a current mental illness smoke over 44% of all cigarettes smoked in the United States (Lasser et al., 2000).

Despite the high prevalence rates for the seriously mentally ill, relatively little attention has been paid to this group of smokers.

After controlling for gender and education level, de Leon (2002a) found that individuals with schizophrenia were 10 times more likely to have ever smoked daily than individuals in the general population. Rates of smoking initiation was similar between these two samples before the age of 20, but individuals with schizophrenia between the ages of 20 and 29 were significantly more likely to start smoking. There is therefore a larger window of smoking initiation for those with schizophrenia when compared to the general population. These differences in initiation rates were replicated when comparing smokers with schizophrenia to smokers with mood disorders (de Leon, 2002a). While there were no differences in smoking initiation rates before the age of 20, individuals with schizophrenia were significantly more likely to begin smoking between the ages of 20 and 29 than individuals with mood disorders.

Smoking prevalence in individuals with schizophrenia is even higher than the prevalence of those with other Axis I disorders. Almost 50% of patients meeting criteria for schizophrenia, schizophreniform disorder, schizoaffective disorder, delusional disorder, or atypical psychosis are current smokers (Lasser et al., 2000). Among only those patients with schizophrenia, estimates rise to 58%-88% (National Institute on Drug Abuse, 1999). After accounting for other factors, de Leon et al. (1995) found that among state hospital patients (where baseline-smoking rates are considerably higher than in the general population), the diagnosis of schizophrenia increased the risk of being a smoker by twofold. This comparison to other hospitalized patients is important in controlling for the effects of hospitalization on smoking rates and was replicated by de Leon et al. (2002a, 2002b) in two new psychiatrically hospitalized samples. Methodological improvements showed that a diagnosis of schizophrenia predicts smoking status even after controlling for alcohol

and drug abuse history (de Leon et al., 2002b). Controlling for these covariates is important because approximately 50% of individuals with schizophrenia have an alcohol or drug abuse history (Buckley, 1998). It should be noted that although de Leon et al. (2002b) describe the use of hospitalized psychiatric patients as a significant strength to control for both institutionalization and medication use, it is unlikely that medication use is similar between the patients with and without schizophrenia. Although they report that approximately 90% of the overall sample was taking antipsychotic agents, they do not report the percentage of each group taking these medications. It is possible that many of those without schizophrenia (22% of the full sample) were not taking antipsychotic agents. It is also important to note that the type of antipsychotic agent (typical or atypical) was not reported. It has been shown that use of typical antipsychotic agents is associated with a higher prevalence of smoking than atypical antipsychotic agents among the general population (Dawe et al, 1995), among individuals with schizophrenia (George et al., 1995; McEvoy et al., 1995), and among smokers with schizophrenia trying to quit (Ziedonis et al., 1997, George et al., 2000, George et al., 2002).

Males with schizophrenia appear to be especially likely to smoke cigarettes. While an increase of female smokers between 1965 and the 1980s has made the once significant gender difference for smoking prevalence virtually non-existent, significant gender differences still exist among smokers with schizophrenia. According to the Centers for Disease Control (2001), 24.8% of males and 22.4% of females were current smokers in 1998. In contrast, 55% to 84% of smokers with schizophrenia are male (Ziedonis et al., 1994; Goff et al., 1992; Kelly & McCreddie, 1999). In two independent samples of hospitalized psychiatric patients, the frequency of current smoking retained the same rank order: males with schizophrenia, male psychiatric patients without schizophrenia, females with

schizophrenia, and female psychiatric patients without schizophrenia (de Leon et al., 1995, 2002b).

### Quit Rates

In addition to a higher smoking prevalence among the mentally ill, there is a lower quit rate than in the general population. Of those who had smoked regularly at some time in their lifetime, people with a current mental illness were significantly less likely to be ex-smokers than those without a current mental illness (Lasser et al., 2000). In total, approximately 50% of ever-smokers have quit, but the quit rates drop to 30.5% and 37.1% for those with current or lifetime Axis I diagnoses (Lasser et al., 2000). Only 10% of patients with schizophrenia in an acute psychiatric unit had quit smoking after having once been daily smokers (de Leon et al., 2002a). Several possibilities exist to explain this discrepancy between the general population and those with a mental illness. The lower quit rate may be due to a lack of clinician advice for individuals with mental illness to quit, a higher rate of dependence, a lower motivation to quit smoking, or greater difficulty in maintaining abstinence.

### Tobacco Dependence Severity

In addition to the high prevalence of smoking among individuals with schizophrenia, data indicate that they may experience a higher severity of dependence. de Leon et al. (1995, 2002b) found an association between schizophrenia and heavy smoking in two independent samples of hospitalized patients. de Leon et al. (2002a) also found that after controlling for gender, education level, and age of first cigarette, smokers with schizophrenia were 2.6 times more likely to have high nicotine dependence scores (FTND score  $\geq 6$ ) than smokers in the general population. Kelly & McCreddie (1999) also found that



patients with schizophrenia were not only more likely to smoke than the general population (58% vs. 27%), but they were more likely to be heavy smokers (more than 25 cigarettes per day; 68% vs. 11%), and were less likely to quit (15% vs. 25%). Smokers with schizophrenia also appear to be more "efficient" smokers (i.e., smoking more of the cigarette and inhaling more deeply) than smokers without schizophrenia as evidenced by the higher levels of the nicotine metabolite cotinine found in smokers with schizophrenia (Olincy et al., 1997). Olincy et al. (1997) found that urinary cotinine levels of smokers with schizophrenia were 1.6 times higher than smokers without schizophrenia despite similar levels of urinary creatinine concentrations and cigarettes smoked per day. These findings indicate that the differences in cotinine are due to differential smoking "efficiency" and not due to differences in the number of cigarettes smoked or differences in renal function (as measured by urinary creatinine concentrations).

### Why Might Schizophrenia and Tobacco Use Co-occur?

#### Description of Schizophrenia

The Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV; American Psychiatric Association, 1994) conceptualizes the characteristic symptoms of schizophrenia into two main categories: positive symptoms ("an excess or distortion of normal functions") and negative symptoms ("a diminution or loss of normal functions"). Characteristic symptoms include 1) Delusions, 2) Hallucinations, 3) Disorganized speech, 4) Grossly disorganized or catatonic behavior, and 5) Negative symptoms such as affective flattening, alogia, or avolition. To meet DSM-IV diagnostic criteria for Schizophrenia an individual must experience at least two of the above symptoms for a significant portion of a one-month time span. Exceptions to the time duration criteria are made if the symptoms are successfully treated.

Furthermore, only one of the characteristic symptoms may be needed to meet criteria if delusions are especially bizarre, or if auditory hallucinations include a running commentary on the individual's thoughts and behaviors, or if two or more voices are having a conversation with each other. Characteristic symptoms must cause significant disruptions to social and/or occupational functioning and must not be better accounted for by Schizoaffective Disorder, a mood disorder, a substance use disorder, or other medical condition. The total duration of diminished functioning (including prodromal, active, and residual symptoms) must be at least 6-months (American Psychiatric Association, 1994).

Several theories address the etiology of schizophrenia. It is commonly accepted that the onset of schizophrenia is the result of environmental and genetic influences. Specifically, the "diathesis stress" model suggests that a genetic vulnerability exists (as evidenced by family, twin, and adoption studies) and environmental stressors activate the expression of these genes. It is yet to be determined exactly how this interaction works in schizophrenia however (Department of Health and Human Services, 1999).

#### Role of Dopamine

Schizophrenia is associated with multiple brain abnormalities that appear to correspond to the positive and negative symptoms of schizophrenia. In addition to enlarged cranial ventricles and decreased cerebral size, individuals with schizophrenia show excessive dopamine levels. This excess may play a role in the etiology of the symptoms of schizophrenia, may be caused by other brain abnormalities, or may even be partly related to the treatment of schizophrenia with neuroleptic medications (Department of Health and Human Services, 1999). In fact, Kelly & McCreadie (1999) hypothesize that smokers with schizophrenia may smoke more than other smokers due to the blockage of dopamine receptors by

antipsychotic medications. Dopamine receptors play an important role in reward and reinforcement and therefore smokers with schizophrenia may need to smoke more cigarettes to overcome the dopamine receptor blockage produced by their medications.

The relationship between age of psychiatric onset and age of smoking onset may also be related to dopaminergic systems (Kelly & McCreadie, 1999). Smokers with schizophrenia were found to have a significantly earlier age of psychiatric onset than nonsmokers (Ziedonis et al., 1994) with smoking initiation generally preceding the onset of psychiatric symptoms. Kelly & McCreadie (1999) found that 90% of their sample of patients with schizophrenia began smoking a mean of 11 years before the onset of psychotic symptoms. The pre-morbid characteristics found in people who later develop schizophrenia may thus play a role in smoking initiation. Individuals may therefore be trying to medicate schizophrenia's prodromal symptoms. This finding led Kelly and McCreadie (1999) to entertain the possibility that nicotine's action on the mesolimbic dopamine system may implicate heavy smoking over long periods of time as a risk factor for those with a predisposed vulnerability to developing schizophrenia.

#### Sensory Gating, Schizophrenia, and Nicotine

Individuals with schizophrenia may smoke in part to correct a deficit in sensory gating. This gating deficit experienced by many individuals with schizophrenia is thought to be partly responsible for the apparent difficulties in attention and concentration by interfering with the ability to filter out extraneous information. Sensory gating is evaluated by measuring the P50 auditory event related potential (ERP). In "normal" participants, the amplitude of the P50 wave is lower following a second auditory stimulus when compared to a conditioning auditory stimulus (Freedman et al, 1991). Evidence suggests that this deficit of P50 gating

among patients with schizophrenia is related to a desensitization of the  $\alpha$ -7 nicotinic receptor (Griffith et al., 1998). Rats and mice bred for decreased numbers of  $\alpha$ -7 nicotinic receptors experience similar deficits in sensory gating.

Both nicotine and a nicotinic agonist were independently found to normalize the sensory gating ability in fimbria-fornix lesioned rats and DBA/2 mice (Stevens & Wear, 1997). Similar results were found in C3H mice after reducing potential binding sites, and thus reducing methodological biases (Stevens et al., 2001). The animal literature is somewhat inconsistent with respect to the relationship between nicotine and sensory gating deficits, however, possibly due to the various animal strains and experimental conditions utilized (Faraday et al., 1998). Human studies seem to produce more consistent findings indicating that nicotine in humans improves sensory gating (Adler et al., 1993; Leonard et al., 1996). Individuals with schizophrenia may be trying to desensitize the  $\alpha$ -7 nicotinic receptor by smoking heavily, and thus normalize their sensory gating deficit. It is interesting that relatively large amounts of nicotine are required to desensitize the  $\alpha$ -7 nicotinic receptors, and therefore light smoking does not affect this receptor site and does not therefore substantially improve the sensory gating deficit (Freedman, 2002).

Unfortunately, this normalization of the sensory gating ability is time-limited, thus necessitating additional "doses" of nicotine to re-normalize the gating deficit. For example, individuals with schizophrenia who smoked a cigarette less than 10 minutes before being evaluated for sensory gating abilities had significantly greater sensory gating normalization than non-smokers and individuals with schizophrenia smoking more than 10 minutes before the experiment (Kumari et al., 2001). In fact, this normalization effect seems to disappear within 30 minutes after nicotine administration (Adler, 1993).

## Mood Regulation

In addition to normalizing a sensory gating deficit, thereby improving attention and concentration, cigarette smoking may reduce the dysphoric mood commonly experienced by the seriously mentally ill by inhibiting monoamine oxidase (MAO). Positron emission tomography (PET) imaging showed reduced MAO in smokers when compared to nonsmokers (Fowler et al., 1996). It is interesting to note that this MAO inhibition is due to something in the cigarette smoke other than nicotine because nicotine is not an MAO inhibitor. In addition to reducing dysphoric mood states, MAO inhibition allows for increased dopamine activity, thus activating the brain's reward system.

## Regulation of Psychiatric Symptoms

Evidence also indicates that individuals with schizophrenia may smoke in part to reduce the negative symptoms of schizophrenia. This is notable because the functional impairment experienced by individuals with schizophrenia has been more strongly associated with the negative rather than the positive symptoms (U.S. Department of Health and Human Services, 1999). To date, the data are somewhat equivocal with regard to the relationship between negative symptoms and cigarette smoking. While some investigators have reported more negative symptoms for smokers with schizophrenia than non-smokers (Goff et al., 1992) others found the opposite (Ziedonis et al., 1994). Consistent with statements by Freedman (2002), the effect of smoking on negative symptoms may be dose-dependent. Among smokers with schizophrenia consuming 25 or more cigarettes per day, negative symptoms were lower when compared to non-smokers with schizophrenia (Ziedonis et al., 1994). If Goff et al. (1992) examined heavy vs. light smokers, he may have found results concordant with Ziedonis et al. (1994). This discrepancy of results may also be due to the cross-sectional designs employed by both studies. Cross-

sectional designs do not allow for a determination of whether smoking is a marker for psychiatric severity or if smoking causes an increase in psychiatric symptoms. Ziedonis et al. (1994) assert that longitudinal designs examining smokers with schizophrenia who quit smoking would better address the question.

### Negative Consequences of Smoking

As described above, there are many possible reasons why individuals with schizophrenia smoke cigarettes. Many of these reasons (i.e., reduced sensory gating deficits, dysphoric moods, and negative symptoms) are likely to contribute to the general apathy among clinicians in addressing tobacco among their patients with schizophrenia. Just as in the general population, there are many negative consequences of smoking, however. The following negative physical health, medication-related, and psychiatric consequences will clarify the need to motivate smokers with schizophrenia to quit smoking.

#### Physical Health

Recent research has found a significantly greater smoking-related mortality and morbidity among individuals with schizophrenia. Individuals with schizophrenia have higher rates of high blood pressure and diabetes – common smoking-related medical complications (Dixon et al., 1999). Additionally, individuals with schizophrenia have three times greater mortality than the general population, with 2.5 and 3.17 times greater mortality ratios associated with circulatory diseases and respiratory diseases respectively. Although the standardized mortality ratios of non-smokers with schizophrenia are no different than for those in the general population, the mortality ratio for smokers with schizophrenia is 3.5 times that of the general population (Brown et al., 2000).

## Neuroleptic Induced Movement Disorders

Smokers with schizophrenia are often prescribed more antipsychotic medication than non-smokers with schizophrenia due to an increased metabolism of many psychiatric medications secondary to the "tar" or aromatic polynuclear hydrocarbons – not due to nicotine (Goff, 1992; Hughes, 1993; Ziedonis, 1994). Although higher doses of medication increase the risk of medication side effects, the data are equivocal with respect to the relationship between smokers with schizophrenia and increased neuroleptic-induced movement disorder.

When compared to non-smokers with schizophrenia, smokers exhibited significantly more tremor (Kelly & McCreddie, 1999) and rigidity (Ziedonis et al., 1994) than non-smokers. Whereas some report a relationship between smoking and tardive dyskinesia (Yassa et al., 1987; Bider et al., 1987; Nilsson et al., 1997), others found no such relationship (Menza et al., 1991; Goff et al., 1992; Ziedonis et al., 1994; Kelley & McCreddie, 1999). This lack of consensus may be due to the use of cross-sectional designs rather than longitudinal designs that would answer the question with more accuracy (Ziedonis, 2001).

Interestingly, one investigator found a linear relationship between cigarettes smoked per day and dyskinesia, even independent of exposure to neuroleptic medication (Nilsson et al., 1997). In a general population survey of 59-year old male non-smokers without a history of neuroleptic medication exposure, the probability of dyskinesia was 5.3%. Rates increased to 18.7% for those smoking at least 20 cigarettes per day without neuroleptic exposure, 29.7% for nonsmokers with neuroleptic exposure, and 63.6% for smokers with neuroleptic exposure (Nilsson et al., 1997). The fairly low threshold for dyskinesia (i.e., 2 of a possible 32 on the Simpson and Angus (1970) scale), a sampling bias against including psychiatric patients and a cross-sectional design should be considered while interpreting these results, however. These design limitations moderate the

importance of the reported findings in determining the increased risk of tardive dyskinesia in smokers with schizophrenia.

### Psychiatric Symptoms

Smoking status also appears to be related to positive symptoms of schizophrenia. When compared with non-smokers, smokers with schizophrenia exhibit more positive symptoms of schizophrenia (Ziedonis et al., 1994; Goff et al., 1992). In addition, smokers with schizophrenia had more hospitalizations than their non-smoking counterparts (Kelly & McCreadie, 1999; Goff et al., 1992).

### Tobacco Use Reduction

#### Neuroleptic Medications

There are many medication issues to consider when prescribing for smokers with schizophrenia. The need for higher doses of many psychiatric medications is one such issue. Another issue involves the fact that certain medications can actually influence the rate of smoking in this population.

Individuals with schizophrenia may smoke in part to reduce negative side effects from their medications (i.e., extrapyramidal symptoms) and to reduce the negative symptoms of schizophrenia (Ziedonis et al., 1994). Since clozapine (and other atypical neuroleptics) has been shown to reduce these very symptoms and side effects (Kane et al., 1988) it was hypothesized that smokers with schizophrenia would reduce their smoking once administered clozapine (George et al., 1995). Although the retrospective nature of the study is limiting, the results are promising. Self reported rates of smoking were significantly reduced after being switched to clozapine. In a similar study, a cross-sectional design was utilized to determine the



association between smoking status and medication type. Consistent with George et al. (1995), clozapine was found to be associated with a significantly lower incidence of cigarette use than typical neuroleptic medications. More remarkably, patients taking clozapine were less likely to be smokers than even those taking other atypical antipsychotics (Combs et al., 2000). No differences were found on demographic variables such as age, education, or duration of psychiatric illness. Of course the associations found between clozapine and reduced smoking rates in the George et al. (1995) and Combs et al. (2000) studies do not indicate a causal relationship because experimental designs with random assignments to groups were not utilized. McEvoy et al. (1999), however randomly assigned groups of individuals with schizophrenia to reach high, medium, or low serum level ranges of clozapine after being tapered off typical neuroleptics (i.e., haloperidol or fluphenazine). Expired carbon monoxide and number of cigarettes smoked ad libitum during a 120-minute time frame was measured before the medication switch and 12 weeks after taking clozapine. Significant reductions were found in expired CO levels and in number of cigarettes smoked over the 12-week clozapine regiment. Changes in cigarettes smoked were greater in the groups achieving high or medium serum levels of clozapine than in those achieving lower levels (McEvoy et al., 1999). Interestingly, the typical neuroleptic, haloperidol, appears to be associated with increased smoking in those with (McEvoy et al., 1995) and without (Dawe et al, 1995) schizophrenia. Non-psychiatric smokers administered 5mg of haloperidol smoked significantly more cigarettes compared to baseline (Dawe et al., 1995). Additionally, smokers with schizophrenia increased their cigarette consumption after haloperidol administration as compared to a baseline, medication-free period (McEvoy et al., 1995).

Patients with schizophrenia attending smoking cessation groups and receiving "typical" neuroleptic medication showed significantly higher rates of attrition than patients receiving newer "atypical" neuroleptics (George et al., 2000). Additionally,

patients taking atypical antipsychotics who were attending a tobacco dependence treatment group and using a nicotine transdermal patch were more than twice as likely to abstain from cigarettes and had significantly lower expired carbon monoxide readings than those on typical antipsychotic medications (George et al., 2000). This finding of the superiority of atypical antipsychotics in patients trying to quit smoking was replicated in patients taking bupropion SR (George, et al., 2002). In addition to reducing negative symptoms of schizophrenia, atypical antipsychotics such as clozapine may facilitate reduced smoking by normalizing the sensory gating deficit found in individuals with schizophrenia (Nagamoto et al., 1996).

#### Tobacco Dependence Treatment Efforts

Prescribing atypical neuroleptic medications is obviously not enough to address tobacco use in seriously mentally ill populations. Empirically validated strategies for addressing both psychosocial and pharmacological aspects of tobacco dependence are needed. Unfortunately, few studies have examined the effectiveness of tobacco dependence treatment programs for patients with schizophrenia. Indeed, the concept of helping patients with schizophrenia stop smoking is new. It was not long ago that psychiatrists were rewarding appropriate behavior among patients with schizophrenia with cigarettes (Resnick, 1993). Many in the health care profession express the attitude that smoking is one of the few pleasures experienced by patients with schizophrenia, and therefore tobacco use should not be addressed in this population. Luckily, this view is beginning to change.

The first empirical evaluation of treatment for tobacco dependence among individuals with schizophrenia was reported in the literature in 1997. There are so few studies on this topic that even treatment studies reporting very low sample sizes are being published in reputable journals. A recent study reported on a 14-week open label trial of sustained-release bupropion with adjunctive supportive group

therapy for 8 smokers with schizophrenia. Although none of the eight patients were able to achieve abstinence from cigarettes, mean expired carbon monoxide readings decreased throughout the treatment phase of the study from 39.44ppm at baseline to 11.96ppm at the end of the trial (Weiner et al., 2001). The authors report that the patients tolerated the medication well.

In a slightly larger study, Ziedonis and George (1997) tested the effectiveness of a smoking cessation program in a pilot study of 24 patients with schizophrenia. The treatment program included group therapy, individual motivational enhancement therapy, and nicotine replacement therapy. Approximately 40% reduced the number of baseline cigarettes smoked by half and 13% remained abstinent for at least six months. An important finding from this research was that schizophrenic symptoms were not exacerbated in patients who achieved extended abstinence.

The relatively low abstinence rate found by Ziedonis and George (1997) may be related to the low motivation to quit smoking that is common in smokers with schizophrenia. Approximately 75% of patients attending the pilot program described themselves as not ready to quit within the next 6-months (Precontemplation stage of change). The authors felt that the motivational enhancement piece of the program was useful in engaging these poorly motivated patients in treatment.

A specialized smoking cessation group therapy program modified for individuals with schizophrenia was found to show significantly higher rates of continuous smoking abstinence in the last 4 weeks of a 12-week trial than those in a standard American Lung Association group (George et al., 2000). Point prevalence abstinence rates did not differ between groups at the end-point. As mentioned earlier, however, differences did emerge based on typical vs. atypical medications. All patients received neuroleptic medications throughout the study and used a 24-

hour nicotine transdermal patch (21mg/day) for 6-weeks followed by a tapering regime.

Although there was no control group, Addington et al. (1998) found that 42% of patients with schizophrenia were able to stop smoking by the end of an American Lung Association's group treatment modified for use with patients with schizophrenia. Twelve percent remained abstinent at 6-months. Although cessation rates were lower in the Addington et al. (1998) study than for the general population of smokers, it represents a promising beginning and indicates the need for further research with this population.

As in other addiction research, abstinence should not be the only outcome examined. Flexibility with regard to one's view of a positive treatment outcome is recommended (Rosen-Chase & Dyson, 1998) in chronically mentally ill smokers attending smoking cessation treatment. Since multiple quit attempts are the rule rather than the exception before long-term abstinence, (U.S. Department of Health and Human Services, 1990) shifts in attitudes about smoking, sustained significantly reduced smoking, or actual abstinence should be considered positive outcomes.

The three most recent interventions reported in the literature (Weiner et al., 2001; Evins et al., 2001; George et al., 2002) examined bupropion SR combined with varying degrees of psychosocial interventions. Evins et al. (2001) examined 19 smokers with schizophrenia participating in a 12-week, double-blind, placebo controlled trial of bupropion SR while attending a cognitive-behavioral group therapy for tobacco dependence. No participants receiving placebo medications, and one receiving bupropion SR was abstinent at 6-months as verified by self-report and CO<9ppm. Seven participants reduced their baseline cigarette consumption by at least 50% (6 of 9 receiving bupropion SR and 1 of 9 receiving placebo). Results may have been more striking had the recommended dose of bupropion SR been utilized. Due to a fear of seizure, participants were prescribed only half the recommended

dose of bupropion SR (e.g., 150mg instead of 300mg). This choice was made based on a fear of inducing seizures with bupropion SR despite the fact that the seizure risk of bupropion SR is similar to other commonly prescribed anti-depressants (Williams, 2001).

During the quit attempt, psychiatric symptoms as measured by the BPRS were slightly reduced for those receiving bupropion SR and slightly increased for those receiving placebo medications, resulting in significantly lower BPRS scores for those receiving bupropion SR. This finding corroborates the findings of other investigators whereby attempts to quit smoking does not increase psychiatric symptoms for smokers with schizophrenia using nicotine replacement therapy or bupropion SR.

A more reasonable dose of bupropion SR (the recommended 150mg twice daily) was administered to smokers with schizophrenia with concomitant psychosocial interventions in a double-blind, placebo controlled trial. The psychosocial intervention included three weeks of Motivational Enhancement Therapy followed by 7 weeks of psychoeducation, social skills training, and relapse prevention (George et al., 2002). The authors reported that a higher proportion of patients receiving bupropion SR achieved 4-weeks of continuous abstinence at the end of the trial than those in the placebo group (50% vs. 12.5%). Additionally, patients receiving bupropion SR had significant reductions in CO levels and self-reported cigarettes smoked per day over time when compared to those receiving placebo. Bupropion SR was also associated with a reduction in negative, but not positive symptoms of schizophrenia over time. The authors note that the reduction in CO levels reported in this study are lower than the reduction reported their previous study using transdermal nicotine patches rather than bupropion SR (George et al., 2000). These findings were not maintained at a 6-month follow-up, perhaps due to the discontinuation of bupropion SR and group therapy after only 10 weeks.

As in previous research (George et al., 2000) antipsychotic medications had an effect on treatment outcome in this study (George et al., 2002). Patients receiving bupropion SR and taking an atypical antipsychotic medication experienced a significantly increased quit-rate when compared to those in either group taking typical antipsychotic medications.

#### Psychiatric Stability with Reduced Smoking

One common misconception that may thwart efforts to address tobacco use in individuals with schizophrenia is that smoking cessation among patients with schizophrenia will worsen psychiatric symptoms. This fear has not been supported in the literature (George et al., 2002; Weiner et al., 2001; Evins et al., 2001; George et al., 2000; Addington et al., 1998; Dalack et al., 1999). For example, a randomized, double blind study was designed to determine the effects of acute nicotine withdrawal on psychiatric symptoms in smokers with schizophrenia wearing either a placebo or nicotine transdermal patch. Over a three-day period of abstinence, neither neuroleptic-induced parkinsonian symptoms, nor the total score on the Brief Psychiatric Rating Scale (BPRS) were significantly changed regardless of patch status (Dalack et al., 1999). The authors admit that a three day period of abstinence may be insufficient to find significant changes, but this time period is reasonable due to reports of peak withdrawal symptoms occurring after 24 to 48 hours of abstinence (Benowitz, 1988). Withdrawal symptoms therefore do not appear to worsen psychiatric symptoms.

Further evidence was found when examining BPRS scores after 12-weeks of supportive group therapy and sustained-release bupropion in eight smokers with schizophrenia (Weiner et al., 2001). Although treatment resulted in a mean decrease in expired carbon monoxide, no significant changes were found on the BPRS anxiety or depression items, or the BPRS positive symptom score.

Additionally, there were no significant changes from baseline to end of treatment on neurocognitive measures or P50 suppression (Weiner et al., 2001). It should be noted that this evidence would be stronger if the sample size were large enough to have greater confidence in the statistical power of the analyses. Additionally, no changes in psychiatric symptoms were found during tobacco dependence treatment for smokers wearing transdermal nicotine patches (George et al., 2000; Addington et al., 1998).

### Motivation / Reasons to Quit

#### Motivation to Quit Smoking

The majority of smokers housed in a Mentally Ill Chemical Abuser (MICA) unit of a Veterans Affairs Medical Center agreed that smoking hurts their health (91.4% agree) and that stopping smoking improves their health (94.3% agree) (Carosella et al., 1999). Despite these beliefs, 45% of these patients were characterized as “Precontemplators” based on an algorithm developed by Prochaska and DiClemente (1983), indicating that they did not plan on quitting in the next six months. The rest of the smokers were classified as being in the Contemplation Stage (24%), Preparation Stage (24%), Action Stage (5%), and Maintenance Stage (3%) (Carosella et al., 1999). This finding is consistent with that of Hall et al. (1995) who found that 53% of veterans with chronic mental illnesses were in the Precontemplation stage of motivation to change.

Results from long-term care units of the same Veterans Administration Medical Center show a disturbing lack of knowledge regarding smoking among the seriously mentally ill. Only 43.8% of “moderately disturbed” and 16.7% “severely disturbed” long-term care patients agreed that smoking is harmful to their health. Additionally, most did not feel that stopping smoking would improve their health

(only 25% and 33.3% of moderately and severely “disturbed” patients agreed respectively). Consistent with these beliefs, 64% of the “moderately disturbed” and 100% of the “severely disturbed” patients were in the Precontemplation or Contemplation stages with regard to their smoking.

Addington et al. (1997) found similar levels of motivation to quit smoking among sixty smokers with schizophrenia attending an outpatient clinic. Over 58% of patients were in the “precontemplation” stage, 30% were in the “contemplation” stage, and less than 12% were in the “preparation” stage. No differences were found between patients in the various stages of change on nicotine dependence severity variables such as Fagerström Test for Nicotine Dependence (Heatherton et al., 1991), number of years smoking, or cigarettes per day. Patients in the “precontemplation” stage of change reported significantly fewer previous quit attempts than patients in “contemplation” or “preparation.”

### Barriers to Quitting

Many barriers exist that contribute to the low motivation and self-efficacy of smokers with schizophrenia. One barrier may be treatment staff who smoke cigarettes and either show no interest in helping others quit smoking or even sabotage attempts to motivate smokers to quit. While recruiting patients for a tobacco dependence treatment study at Yale School of Medicine, treatment staff complained about several of the recruitment posters that showed American Lung Association pictures of diseased lungs (Ziedonis, 2001). Staff members with less of a vested interest in efforts to reduce smoking often do not appreciate the severity of the problem. Ziedonis (2001) reports that recruitment strategies needed to be focused on the patients because staff was often unhelpful.

Other barriers include socialization. Psychosocial rehabilitation clients with schizophrenia participating in a focus group noted that not smoking sets people



apart. Since there are designated times and places for smoking (which most patients with schizophrenia attend), nonsmokers are excluded from major social interactions. Patients described sharing cigarettes as a positive experience. Others described filling their frequent “empty” time with smoking cigarettes (Lucksted et al., 2000).

#### Specific Reasons for Quitting

Reasons for quitting were also discussed in the same focus group described above. Individuals with schizophrenia described health and social benefits for not smoking (Lucksted et al., 2000). Health benefits offered were mostly vague, but included both minor health concerns (e.g., cough, throat irritation) and knowledge of increased risk of heart disease and cancer. Participants also cited concerns regarding physical functioning, expense of cigarettes, and reduced cigarette odors as social benefits of quitting.

In a study examining the utility of a smoking cessation treatment program modified for patients with schizophrenia, Addington et al. (1998) measured motivation for treatment with the Reasons for Quitting Scale (Curry et al., 1990). Health concerns, self-control, immediate reinforcement, and social influence were listed as the most important reasons for quitting. These findings are similar to those reported by Ziedonis and George (1997) who found that smokers with schizophrenia attending a pilot program for smoking cessation reported that the benefits of quitting smoking include reducing cancer, pulmonary, and cardiac risks. They also reported expected benefits regarding finances, reduced home-fire risks, and less stigma associated with smoking in public.

Reasons for quitting appeared to vary with stage of change (Addington et al., 1997). Participants in the “preparation” stage of change were more likely to cite social pressure as a motivator than participants in the “precontemplation” stage of

change and more likely to cite immediate reinforcement than “precontemplators” or “contemplators.” Scores on the self-control factor of the Reasons for Quitting scale (Curry et al., 1990) significantly increased as patients advanced in the stages from “precontemplation” to “preparation.” In fact, those who were closest to quitting (i.e., those in the preparation stage) were most highly motivated by “immediate-reinforcement” motivators such as saving money. The next most important reason cited was health concerns. Precontemplators scored significantly lower on the Health concerns factor and made significantly fewer quit attempts than other patients (Addington et al., 1997).

Despite the relatively low motivation reported by the smokers with schizophrenia (Addington et al., 1997; Ziedonis et al., 1997), many are willing to attend a smoking cessation group if offered. For example, although over 58% of the individuals with schizophrenia in the Addington et al. (1997) sample were in the Precontemplation stage of change, 63% of stated that they would be willing to attend a smoking cessation group. Compared to those who were not interested, the interested smokers scored higher on the Health Concerns, Self-Control, Immediate Reinforcement, and Social Pressure scales of the Reasons for Quitting scale. There were no differences between groups on years of smoking, cigarettes per day, or Fagerström Test score (Addington et al., 1997). Outpatients with schizophrenia may be willing to attend groups related to issues with which they have only minimal concerns. The fact that group therapy is part of the daily routine for many with schizophrenia may make them more willing to attend these groups.

Learning how to motivate individuals with schizophrenia to quit smoking is an important step to parallel the new (although still scarce) interest in addressing tobacco use in this population. As treatments for helping individuals with schizophrenia emerge, it would be useful to have motivated patients to refer to treatment. Relatively few professionals in the health care field regularly ask their

patients about their smoking or provide advice to quit. The National Ambulatory Medical Care Survey (NAMCS) data indicate that tobacco use was addressed in only 37% of smokers' general medical examinations (Thorndike et al., 1998).

Interestingly, smokers with a psychiatric diagnosis were more likely to be counseled about smoking than those without (Thorndike, 2001).

### Measuring Readiness for Change

There have been many attempts to measure motivation to change addictive behaviors. A recent review (Carey et al., 1999) concludes that there is not one measure of motivation/readiness to change that stands out as superior to the others in all circumstances. Stage algorithms, self-administered questionnaires, and subjective clinician rating scales were all found to have advantages and disadvantages, but none stood out as the obvious leader.

Some measures are better suited for the general population than others. For example, the utility of subjective clinician based rating scales is limited by the fact that they are only appropriate for those already seeking treatment. Staging algorithms (based on Prochaska & DiClemente's (1983) Transtheoretical Model), on the other hand are appropriate for those both in treatment and for the general population. Algorithms ask participants to indicate their intentions to change and/or recent change-related behaviors. Based on participant responses, they are categorized as being in one of five "stages" of change (see above). The Transtheoretical Model upon which staging algorithms are based, has been strongly criticized in the literature (e.g., Sutton, 2000, Herzog et al., 2000), but widely accepted by treating clinicians (Etter and Sutton, 2002). A major problem with the "Stages of Change" model is that definitions of each stage are fairly arbitrary. For example, to be in the "Preparation Stage," one must have tried to quit smoking within the last year and plan on quitting again in the next 30 days. The time frames

are arbitrary, and the requirement of a previous quit-attempt may preclude movement along the stages. For example, a smoker cannot move along the “stages” from “Contemplation” to “Preparation” before making a failed quit-attempt, or even be in the “Preparation Stage” for the first time without first making a failed quit-attempt. Etter and Sutton (2002) found no differences in predictive validity between the traditional algorithm and one modifying the definition of “Preparation” to allow those without a previous quit attempt to be so classified. It may therefore be useful to use the modified definition, or for researchers to report the results of both the traditional and the modified algorithms.

An additional problem with the Stages of Change Algorithm is that smokers feeling ambivalent about quitting may have difficulty responding to the “yes/no” questions used to categorize smokers in the Stages of Change Algorithm. This forced response may diminish the validity of the instrument (Herzog et al., 2000). Despite these criticisms, stage of change as measured by a staging algorithm was shown to predict quit attempts and use of self-help manuals among smokers (DiClemente et al., 1991). Indications for using staging algorithms for patients using alcohol or other drugs of abuse are less promising.

Like staging algorithms, most self-administered questionnaires are based on the Transtheoretical Model. Of the eight instruments examined by Carey et al. (1999), four were based on the Transtheoretical Model, one was based on self-determination theory, and three were not based on any formal theory of change and/or motivation. Data from those measures based on the Transtheoretical Model (i.e., University of Rhode Island Change Assessment Scale (URICA), Readiness to Change Questionnaire (RTCQ), and the Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES) did not conform to the stage model. Fewer than five factors best explained the data in all cases. When picking a self-report measure from the above choices, the individual circumstances must be taken into account

(e.g., sample, addictive behavior, type of change to be measured) as there is no self-report measure that is clearly superior to the others.

The measures chosen to evaluate participant readiness for change/motivation in the present study was the Stages of Change Algorithm (Prochaska & DiClemente, 1991) and the Contemplation Ladder (Biener & Abrams, 1991). Both measures are appropriate for smokers at all levels of motivation to quit, from those not even thinking of quitting to those currently making a quit attempt. The Stages of Change Algorithm is based on the Transtheoretical Model and categorizes participants to one of six stages of change based on their smoking status and intentions to quit. Participants were categorized as being in the precontemplation, contemplation, preparation, action, maintenance, or relapse stage of change. The utility of placing participants in one of the stages of change is based on several factors. First, stages based on the Algorithm show concurrent and predictive validity (DiClemente et al., 1991; Carey et al., 1999). Results can also be used clinically as the beginnings of a discussion on readiness to change. Additionally, the stage of change model is well understood by clinicians working in the mental health and addiction fields. This allows for a better transfer of information from researcher to clinician than if other theoretical models (e.g., health beliefs model) were used as the basis for evaluating participant readiness to change. Additionally, there are approximately twice as many empirical evaluations of stages of change than there are of the health beliefs model in samples of smokers based on a PsychLit search. The Stage of Change Algorithm is also quick and easy to administer, which is advantageous for administration in individuals with schizophrenia due to cognitive impairments.

The Contemplation Ladder (Beiner & Abrams, 1991) was also chosen above other reasonable measures for several reasons. First, concurrent and predictive validity estimates are good. The Contemplation Ladder distinguished between groups of individuals making a quit attempt and those in a general worksite sample.

It also predicted quit attempts in the following six-months. In addition, scores on the Contemplation Ladder were significantly related to other variables known to be related to successful quitting such as social support to quit smoking and prior quit attempts (Biener & Abrams, 1991). Second, like the Stage of Change Algorithm, it is quick and easy to administer. Individuals with schizophrenia will not be overburdened by a long and complex measure of readiness to change, but will instead choose a number between 0 and 10 that corresponds to the appropriate anchor point on a scale indicating their intentions to quit smoking.

The Contemplation Ladder can complement the data obtained from the Stages of Change Algorithm by supplementing the categorical variable with a continuous variable (although limited by the constraints of a 0 to 10 scale). Participants are asked to indicate where they fall with regards to their intentions of quitting smoking from 0 (No thought of quitting) to 10 (Taking action to quit). The Contemplation Ladder was designed specifically to remove the pressures of social desirability of overstating their intentions by using anchor statements with socially acceptable wording at all points along the continuum. The Ladder is likely to be more sensitive to change than the Algorithm. In fact, Biener and Abrams (1991) conclude that "the ultimate utility of the Contemplation Ladder rests on its ability to validly measure changes in readiness, presuming that such changes are a forerunner of quit attempts and maintenance of abstinence." Indeed, the Contemplation Ladder was sensitive to increases in "experiential" but not "behavioral" processes of change (as measured by the Processes of Change Form (Prochaska et al., 1988)) among participants in the Brown University Working Well project (Herzog et al., 1999). More than 50% of participants showed changes in ladder groups (e.g., from scores in the range of 0-2 to scores in the range of 3-7) at one year follow-up. Specifically, "experiential" processes of change predicted changes between all Ladder groups (i.e., 0-2, 3-7, and 8-10) (Herzog et al, 2000).

## Motivational Interviewing and Brief Interventions

Motivational Interviewing has enjoyed strong empirical support as an effective means of increasing intrinsic motivation to change addictive behaviors (Miller and Rollnick, 1992; 2002). The spirit of motivational interviewing involves a collaborative relationship with the patient where motivation for change is evoked from the patient's existing sources of motivation and where it is recognized that responsibility for change lies with the patient. Four broad principles of motivational interviewing include 1) Expressing Empathy, 2) Developing Discrepancy, 3) "Rolling with Resistance," and 4) Supporting Self-Efficacy. Expressing empathy by using reflective listening, and acknowledging and normalizing feelings of ambivalence is likely to help foster a collaborative relationship. The second principle, developing discrepancy, involves presenting objective information that is inconsistent with the patient's stated goals. Presenting the patient with personalized feedback on how much money they spend on cigarettes, and on their level of expired carbon monoxide, for example, may be helpful in implementing this principle. The third principle, rolling with resistance, involves respecting the client's ambivalence or resistance to change rather than trying to counter statements of ambivalence or low motivation. It is therefore important to not argue for change, but to recognize that "resistant" behavior is a signal to change approaches. Lastly, supporting self-efficacy involves reinforcing and/or increasing the patient's beliefs that he/she can accomplish a specific goal (e.g., to not smoke in response to a dysphoric mood).

There is a large literature supporting the use of Motivational Interviewing. The studies most relevant to the current project involve a comparison of a single Motivational Interviewing session to an education or assessment-only control and the use of Motivational Interviewing with psychiatric patients.

## Evaluations of One-Session Motivational Interviewing Interventions

Two randomized clinical trials have examined the efficacy of a one-session Motivational Interviewing intervention as compared to an assessment-only control in heavy drinking college students. Borsari & Carey (2000) found those receiving the Motivational Interviewing intervention had greater reductions in drinks per month, frequency of drinking, and binges per month at 6-weeks when compared to those receiving assessment-only. Marlatt et al. (1998) found similar results at a two-year follow-up of heavy drinking college students. Those in the Motivational Interviewing group had greater reductions in the frequency, quantity, and problems associated with drinking than assessment-only controls.

Three randomized clinical trials compared a one-session Motivational Interviewing intervention to an educational intervention. Dench & Bennett (2000) examined changes in self-reported motivation as measured by the SOCRATES in a sample of alcohol dependent patients. Those receiving the Motivational Interviewing intervention showed significantly greater changes (and in the desired directions) on the Ambivalence, Problem Recognition, and Taking Steps scales as compared to those in the educational control group at six-weeks post-intervention. Saunders et al. (1995) examined Motivational Interviewing in a methadone maintenance population and found that compared to an educational control group, those receiving the Motivational Interviewing intervention showed greater treatment retention, greater immediate commitment to abstinence, and relapsed less quickly over a 6-month follow-up time period. Most recently, Murphy et al. (2001) randomly assigned college students to receive either a one-session Motivational Interviewing intervention, an educational intervention, or no intervention. At three-months post-intervention, heavy drinkers within the Motivational Interviewing group showed significantly greater reductions in weekly alcohol consumption and number of



drinking binges per week as compared to either the educational or no-treatment controls.

#### Evaluations of Motivational Interviewing in Psychiatric Patients

While Motivational Interviewing has been studied for many years, it is only recently that it has been evaluated in patients with psychiatric disorders. To date, it enjoys the same empirical support in psychiatric populations as in the general population. As compared to treatment as usual, one (Daley & Zuckoff, 1998) or two (Swanson et al., 1999) sessions of Motivational Interviewing was found to be more effective in motivating dually diagnosed patients to follow through on a referral to aftercare treatment. Martino et al. (2000) also compared a Motivational Interviewing intervention to treatment as usual in dually diagnosed patients attending a partial hospital program. Patients receiving the Motivational Interviewing intervention attended significantly more program days, were tardy to treatment less often, and left the program early on fewer days.

#### Effective Elements of Brief Interventions

Brief motivational interventions need to be further studied in psychiatric populations. Specifically, effective strategies for engaging smokers with schizophrenia in tobacco dependence treatment should be evaluated. Finding effective brief interventions that could be provided in clinical settings for individuals not necessarily seeking treatment for smoking cessation would greatly increase quit attempts by individuals who might otherwise continue smoking. Engagement in treatment to stop smoking may be especially difficult in smoking with schizophrenia where smoking is excused by the medical/psychiatric community and socially reinforced by peers (Resnick, 1993).

In an effort to determine the common features of successful brief interventions, Miller and Sanchez (1994) coined the acronym FRAMES (Feedback, Responsibility, Advice, Menu of options, Empathy, and Self-efficacy). A brief description of each of the FRAMES elements will be described in the following paragraphs, but a more complete review of the effectiveness of these elements can be found in Bien et al. (1993).

Throughout a brief intervention, an empathic therapeutic style should be used (Miller & Rollnick, 1991). Brief interventions utilizing confrontational, non-empathic styles have not been associated with positive treatment outcomes (Miller, 1985; Miller & Rollnick, 1991). Effective brief interventions also often collect information via standard, structured assessment measures regarding substance use and substance-related problems. This information is then provided as objective feedback in a non-confrontative manner. This feedback often includes comparisons of the individual's assessment data to relevant normative data. These comparisons are intended to help individuals recognize that they are engaging in behaviors they may have good reason to change (U.S. Department of Health and Human Services, 2000).

Once personalized feedback is provided, individuals must be given a sense of personal responsibility for change as perceived personal responsibility for change has been associated with better treatment outcomes (Deci, 1975; Miller, 1985). Clinician views should not be imposed on individuals considering behavior change, but rather, clinicians should make it clear that only the individual considering change can make such decisions. Showing respect for the individual's ability to make his or her own decisions does not preclude giving advice, however. Empirical evidence suggests that offering suggestions to facilitate changes in substance use can be effective (U.S. Department of Health and Human Services, 2000).

Consistent with offering advice and stressing personal responsibility, Miller & Rollnick (1991, 2002) suggest offering a menu of options. When someone feels that they are making an independent decision, they are more likely to follow-through (U.S. Department of Health and Human Services, 2000). Empirical evidence suggests that treatment dropout is decreased and effectiveness increased (Costello, 1974; Parker et al., 1979) when clients are offered options in their treatment choices.

The last element often found in effective brief interventions is attempting to increase self-efficacy for change. Before attempting to change a given behavior it is helpful to believe that one has the specific skills necessary for change (Bandura, 1989; Marlatt & Gordon, 1985). Individuals who do not believe that they are capable of changing are unlikely to make an attempt.

Brief interventions may be helpful for many treatment-related outcomes. The present study examined the efficacy of three interventions at facilitating a referral to seek tobacco dependence treatment. Brief interventions have been used successfully to facilitate referrals to seek alcoholism treatment (e.g., Chafetz, 1961; Chafetz et al., 1962; 1964) and to reduce relapse for those maintaining abstinence from cigarettes (Brandon et al., 2000).

### Rationale for the Present Study

In comparison to the general population, people with schizophrenia are more likely to smoke cigarettes (National Institute of Drug Abuse, 1999), smoke more cigarettes per day (Kelly & McCreadie, 1999), and smoke more “efficiently” (Olincy et al., 1997). They are less likely to quit smoking (Lasser et al., 2000; Kelley & McCreadie, 1999) and more likely to die of smoking-related diseases than the general population (Brown et al., 2000; Dixon et al., 1999). These differences in prevalence may be related to an increased vulnerability to nicotine’s effects, greater dependence, lower motivation to quit, and/or the ability to moderate the symptoms of schizophrenia and psychiatric medication side effects. Smokers with schizophrenia experience the same smoking-related physical health consequences as the general population, only in greater proportions (Dixon et al., 1999). The rates of cardiovascular and respiratory diseases among individuals with schizophrenia are reported at up to double those of age-matched controls (Dalack et al., 1998).

Beyond suffering the same health consequences as the general population, individuals with schizophrenia experience unique negative consequences that make smoking in this population of great concern. Aromatic polynuclear hydrocarbons (“tar”) cause many psychotropic medications to be metabolized at a faster than normal rate, thereby causing smokers with schizophrenia to be prescribed higher medication doses (Goff, 1992; Hughes, 1993; Ziedonis, 1994). Additionally, in comparison to non-smokers with schizophrenia, smokers are hospitalized more often (Kelly & McCreadie, 1999; Goff et al., 1992), are more likely to abuse other substances (Ziedonis et al., 1994), and exhibit more positive symptoms of schizophrenia (Ziedonis et al., 1994; Goff et al., 1992). They also experience

greater medication side effects such as tremor (Kelly & McCreadie, 1999), rigidity (Ziedonis et al., 1994), and possibly tardive dyskinesia (Yassa et al., 1987; Bider et al., 1987; Nilsson et al., 1997). While the negative consequences from smoking cigarettes in the general population are abundant, the deleterious effects of smoking among individuals with schizophrenia are even greater.

As stated earlier, the devastating effects of smoking for individuals with schizophrenia are unfortunately paired with a low motivation to quit smoking. At present, tobacco use is often excused rather than properly addressed in individuals with schizophrenia (Resnick, 1993) despite the U.S. Department of Health and Human Services recommendations that tobacco use be assessed in all patients. The most recent clinical practice guidelines on "Treating Tobacco Use and Dependence" states that all patients should be asked about their tobacco use status routinely and advised to quit if they are current tobacco users. If a patient states that they he or she is not ready to quit, the guidelines recommend using a brief motivational intervention to enhance motivation to quit (Fiore et al., 2000). There are currently no empirically supported interventions designed specifically to motivate individuals with schizophrenia to quit smoking despite the strong need. In addition to the recommendations of the Clinical Practice Guideline (Fiore et al., 2000), Ziedonis (2001) and George (2001) feel that using brief motivational interviewing strategies has been helpful in engaging smokers with schizophrenia in their clinical trials on tobacco dependence treatment for smokers with schizophrenia.

The goal of the present intervention is to enhance motivation to seek treatment for tobacco dependence among individuals with schizophrenia. Research has shown that once individuals with schizophrenia attend a treatment program to help them quit smoking, they are capable of quitting. This study will help motivate smokers with schizophrenia to seek treatment and provide an appropriate referral for assistance. A brief Motivational Interviewing intervention utilizing the elements

identified as being the active and effective elements common to brief interventions (i.e., the FRAMES model) will therefore be compared to a psychoeducation group and a minimal control group offering standard advice and referral for treatment. Two comparison groups were deemed important for this study because if the Motivational Interviewing intervention did not prove superior to the Psychoeducational intervention, it would be useful to have a lower intensity (minimal control) intervention with which to compare. Motivational interviewing has been associated with greater initial outpatient treatment attendance (Swanson et al., 1999; Daley & Zuckoff, 1998) and treatment engagement (Ziedonis & George, 1997) in psychiatric populations. Smokers with schizophrenia are expected to benefit from Motivational Interviewing as well.

The present study will examine the utility of using a brief Motivational Interviewing intervention to enhance the motivation of smokers with schizophrenia to quit smoking. Although abstinence from cigarettes is not an expected outcome of this brief intervention, the results from a recent study (Abrams et al., 2000) indicates that enhancing motivation to change tobacco use may be an important intermediate goal because increases in motivation were associated with increased chances of future abstinence.

## Specific Hypotheses for the Current Study

### Baseline Hypotheses

1. Due to random assignment to groups, no differences should exist between groups on demographic or tobacco use related variables.
2. Interventions will be distinguishable based on participant perception of intervention components.

### Primary Hypothesis

1. A greater proportion of participants receiving a Motivational Interviewing intervention will follow-up on a referral for tobacco dependence treatment as compared to those receiving a psychoeducational or minimal control intervention.

### Secondary Hypotheses

1. When compared to participants receiving the psychoeducational or control interventions, participants receiving the Motivational Interviewing intervention will show a greater readiness to change as measured by scores on the Contemplation Ladder and the Stages of Change Algorithm.
2. When compared to participants receiving the psychoeducational or control interventions, participants receiving the Motivational Interviewing intervention will have lower expired CO readings, and cigarettes smoked per day.

### Additional Hypotheses

1. Baseline readiness to change as measured by the Contemplation Ladder and the Stages of Change algorithm will be significantly related to:
  - A. Past quit attempts as measured by:
    - Number of quit attempts in the past year
    - Time since last quit attempt
    - Greatest length of abstinence from smoking
  - B. Degree of tobacco dependence as measured by:
    - Fagerström Test for Nicotine Dependence score
    - Expired breath CO reading



## CHAPTER TWO

### Method

### Design

A 5:5:2 randomization procedure was utilized whereby participants had 2.5 times the chance of being assigned to an intervention group as compared to the control group. This randomization procedure was chosen because while it was desirable to have approximately equal numbers of participants in the more intensive interventions (i.e., Motivational Interviewing and Psychoeducation), the greater effect size associated with comparisons of intervention groups with the minimal control group allowed for fewer participants to be randomized to the minimal control intervention.

Smokers diagnosed with a chart-review-confirmed diagnosis of schizophrenia or schizoaffective disorder were randomly assigned to one of the three conditions described below. Participants from all three conditions participated in identical follow-up procedures:

#### Motivational Interviewing (MI) Intervention

Before arriving at the final version of this intervention, it was developed and adjusted based on pilot testing with approximately 15 seriously mentally ill smokers attending an inpatient psychiatric unit. The intervention was adjusted based on patient response to various intervention components and for brevity.

Participants receiving the Brief Motivational Interviewing intervention underwent an assessment interview using the instruments listed in the "Measures" section below. The FRAMES elements described by Miller and Sanchez (1994) were

used with Motivational Interviewing to enhance participant motivation to attend tobacco dependence treatment. The FRAMES elements as they were utilized in the present study are described in detail below.

Feedback. Charts (see Appendices) were utilized to provide personalized feedback based on assessment measures described in the “Measures” section. Physical dependence to cigarettes (as measured by the Fagerström score) was graphically compared to the average of other smokers. The amount of money spent on cigarettes per week, month, and year in addition to rough estimates of motivation and self-efficacy to quit smoking was graphically displayed. The tobacco-related health issues identified as relevant to the participant were also discussed.

Responsibility. Participants’ own responsibility for making decisions to change was emphasized. Participants were told that how they used the information provided in the intervention was up to them. The fact that the decision to attend treatment or not was ultimately theirs was emphasized.

Advice. Permission was asked before providing advice regarding seeking the assistance of a tobacco dependence treatment program. This strategy demonstrated respect for participants and reinforced the idea that only they can take responsibility for such a personal decision. At the same time, however, this strategy provided guidance for change.

Menu. By providing a menu of options to facilitate a quit-attempt, participants were encouraged to take responsibility for their own decision to change. Participants are more likely to follow-through with a decision made through collaboration rather than to a paternalistic recommendation. When a referral was made, multiple treatment options were emphasized.

Empathy. An empathic counseling style was utilized throughout the brief intervention. This style allowed participants to discuss their ambivalence regarding change and feel as though their concerns about quitting were understood.

Self-efficacy. Attempts to enhance self-efficacy were made by discussing the participants' current level of confidence. Participants were asked what would need to occur in order for them to feel more confident in their ability to quit. A similar intervention was utilized with a rough estimate of participant motivation.

This intervention lasted approximately 40 minutes and was concluded with a referral for treatment to a specialized tobacco dependence treatment program.

#### Psychoeducational Intervention

Participants receiving the Psychoeducational Intervention underwent an assessment interview identical to that administered to participants receiving the Motivational Interviewing intervention. Participants then participated in a brief psychoeducational discussion on general benefits of quitting and the deleterious health effects of smoking (see Appendix N). This intervention lasted approximately 40 minutes to match the Motivational Interviewing intervention in contact time because contact time has a clear effect on tobacco-related changes (Fiore et al., 2000). This intervention also concluded with a referral for treatment to a specialized tobacco dependence treatment program.

#### Minimal Control Intervention (control)

Participants receiving the Minimal Control intervention underwent a 5-minute assessment interview (see Appendix A) including the Fagerström Test for Nicotine Dependence (Heatherton et al., 1991) and Contemplation Ladder (Beiner & Abrams, 1991) in addition to providing an expired air carbon monoxide (CO) reading. They were then advised to quit smoking and referral options were offered identically to the Motivational Interviewing intervention and the Psychoeducational intervention. Although this group was designed as a control group meant to approximate the minimalist interventions utilized in clinical settings, this intervention was actually

more intensive in order to collect information to be used as covariates in statistical analyses. This intervention lasted approximately five minutes.

### Length of Intervention

The amount of contact time is an important variable. First, it was important for the interventions to be brief. Individuals with schizophrenia may have difficulty sustaining attention for long intervals of time and the effectiveness of the interventions should be maximized by the full attention of the participant. Additionally, it is unrealistic for health care or mental health professionals to spend an inordinate amount of time with every patient to discuss tobacco use when the patient is not seeking tobacco dependence treatment. Utilizing relatively brief contact times therefore increased the chance of technology transfer related to this study.

There is clear evidence from a recent meta-analysis (Fiore et al., 2000) that even a very short intervention (1-3 minutes) may produce greater change than no intervention (odds ratio of 1.4). Additionally, Fiore et al. (2000) report that when compared to no contact, 31-90 minutes of total contact time among a general population of smokers was associated with an odds ratio of 3.0. Each intervention was therefore expected to increase motivation to quit smoking compared to baseline. The results of the Fiore et al. (2000) meta-analysis reinforce the notion that the Motivational Intervention should be of comparable length to the Psychoeducational Intervention in order to control for effects of time.

### Follow-up Time Frame

Participants were followed-up at one-week and one-month post-baseline. These time frames were chosen for several reasons. First, individuals with schizophrenia may have difficulty sustaining motivation without short-term

reinforcement (Paul et al., 1977). Any increases in motivation to seek assistance in quitting smoking are likely to be short-lived unless acted upon and reinforced. Additionally, longer time periods may introduce problems with reduced motivation and self-efficacy after a failed unaided attempt at changing their tobacco use. A longer time period would also introduce the potential confound of third variables influencing the participants' thoughts and behaviors regarding tobacco use. One-month is short enough of a time frame that any behavioral or attitudinal changes regarding tobacco use can safely be said to be the result of the intervention rather than outside events. It was assumed that one month would provide participants with enough time to process the information and follow through with efforts to change their tobacco use.

#### Participants

Participants were current smokers of at least 10 cigarettes per day with a diagnosis of schizophrenia or schizoaffective disorder as confirmed by chart review. Smokers were excluded from the study if they could not understand the consent form and if they were already attending tobacco dependence treatment.

#### Measures (See Appendices)

Chart review. Demographic information was gathered, and a diagnosis of schizophrenia or schizoaffective disorder was confirmed for all participants (see Appendix B).

Smoking History Questionnaire. All participants were asked to provide such information as the number of previous quit attempts in the past year, most recent quit-attempt, longest abstinence from smoking, previous use of NRT or Bupropion,

money spent per pack of cigarettes, and the number of years they have smoked (see Appendix C).

Fagerström Test for Nicotine Dependence (FTND; Heatherton et al., 1991).

The Fagerström Test for Nicotine Dependence is a six-item questionnaire obtaining information related to level of physical dependence on nicotine, scored on a scale from 0 (low dependence) to 10 (high dependence) (see Appendix D). The FTND has been shown to have adequate internal validity (Cronbach's alpha = .61 to .64) for a 6-item measure (Pomerleau et al., 1994; Heatherton et al., 1991). Payne et al. (1994) found somewhat lower internal validity (Cronbach's alpha = .56) in addition to a two factor solution based on a principal components analysis with Varimax rotation. The FTND was found to be significantly related to cotinine levels (Pomerleau et al., 1994; Heatherton et al., 1991), withdrawal symptoms after nicotine deprivation (Payne et al., 1994), CO measurements (Payne et al., 1994) and number of years smoked (Pomerleau et al., 1994). Heatherton et al. (1991) report that using a 2-item subset of the FTND called the Heaviness of Smoking Index (HSI; Heatherton et al., 1989) is often an acceptable replacement for the full FTND. The two items comprising the HSI are the best predictors of biochemical markers for smoking. All participants were administered the full Fagerström Test for Nicotine Dependence

Expired Breath Carbon Monoxide (CO). All participants provided expired breath carbon monoxide samples by blowing into a carbon monoxide monitor (see Appendix C). Carbon monoxide readings have an approximately 90% sensitivity and specificity for determining smoking status but are more accurate for heavier smokers than for light smokers. Sensitivity is limited by a relatively short half-life. Elimination of carbon monoxide varies by pulmonary ventilation rate, ranging from a half-life of one hour during exercise and up to 8 hours during sleep. Environmental sources of carbon monoxide may limit specificity so that it may be difficult to

differentiate between light and non-smokers (SRNT Subcommittee on Biochemical Verification).

History of Smoking Related Illnesses. Participants receiving the Motivational Interviewing intervention provided information regarding personal experiences with smoking-related illness.

Stages of Change Algorithm (DiClemente et al., 1991). Motivation to quit smoking was categorized using the Prochaska and DiClemente (1991) stages of change model (see Appendix E). DiClemente et al. (1991) describe evidence of good concurrent and predictive validity. For example, smokers in the preparation stage of change were more active across processes of change than those in the contemplation stage. Additionally, it was found that cigarettes per day and nicotine dependence severity were lower for those in the preparation stage than those in earlier stages of change. Baseline stage of change was predictive of post-test and 6-month follow-up quit attempts. Lastly, those in the preparation stage of change were more likely to use tobacco dependence self-help manuals than those in earlier stages. The traditional and a modified definition of the "Preparation Stage" will be reported in response to conceptual concerns with this measure (see Measuring Readiness to Change above).

The algorithm was not administered to those in the Minimal Control intervention so as not to instigate potentially self-motivational thoughts regarding quitting. Since the standard advice and referral for treatment were meant to be the only active ingredients in the Minimal Control intervention, it was important to make the assessment phase as neutral as possible for participants in the Minimal Control group.

Contemplation Ladder (Biener and Abrams, 1991). In response to several conceptual concerns regarding the Stages of Change Algorithm (see Measuring Readiness to Change above), the Contemplation Ladder was used as an additional

measure of intention to quit. Intention to quit smoking was measured as a categorical variable via a one-item, 11-point rating scale of motivation to change (see Appendix F). Biener and Abrams (1991) report good concurrent and predictive validity. Ladder scores for a general worksite sample were significantly lower than for a sample of clinic patients. Concurrent validity was demonstrated by a positive correlation between Ladder scores and number of previous quit attempts and current intention to quit. Ladder scores were not significantly correlated with age or sex. Although Ladder scores did not predict abstinence from smoking, it did predict participation in worksite tobacco-related events such as a cotinine assessment, lung function tests, and carbon monoxide readings. This was not administered to those in the Minimal Control group due to fears of its potential power to increase participant motivation, and it was important to make the assessment phase as neutral as possible for participants in the Minimal Control group.

**Perceived Importance to Quit Smoking.** Level of motivation to quit was measured by asking participants to indicate how important they feel it is for them to quit smoking. An 11-point rating scale was utilized anchored by “Not at all important (0)” to “Extremely important (10)” (see Appendix H). This was not administered to those in the Minimal Control intervention.

**Self-Efficacy to Quit Smoking.** Self-efficacy to quit smoking was measured by asking participants to indicate how confident they are that they could quit smoking if they chose to quit. An 11-point rating scale was utilized anchored by “Not at all confident (0)” to “Extremely confident (10)” (see Appendix H). This was not administered to those in the Minimal Control intervention.

**Perception of Others’ Smoking.** Participants were asked to guess the percentage of the U.S. adult population smoking cigarettes. It was assumed that smokers with schizophrenia would overestimate this figure due to the high



percentage of their peers who smoke cigarettes. This was not administered to those in the Minimal Control intervention.

Treatment Fidelity Scale. Although the principal investigator conducted all intervention sessions based on an intervention-specific protocol, it was important to have evidence that the three interventions provided could be identified as unique and separate interventions. To this end, a 13-item, True/False questionnaire was administered (see Appendix P) to participants receiving the Motivational Interviewing intervention and the Psychoeducational intervention. This was not administered to those in the Minimal Control intervention because length of intervention differentiated between the other interventions and the Minimal Control. The True/False questions referred to unique, concrete components contained in the Motivational Interviewing and Psychoeducational interventions and were designed to evaluate the ability of the participants to recognize the unique components of the intervention they received.

#### One-week follow-up measures

All participants were administered the Fagerström Test for Nicotine Dependence, the Stages of Change Algorithm, and Contemplation Ladder. They also provided a carbon monoxide reading and reported their perceived importance of quitting smoking, and self-efficacy to quit smoking. Participants were asked if they contacted a tobacco dependence treatment program since the baseline interview. Local tobacco dependence providers were contacted to confirm participant self-report.

#### One-month follow-up

Participants were contacted in person or via telephone to ask if they contacted a tobacco dependence treatment program since the baseline interview.

Local tobacco dependence providers were contacted to confirm participant self-report. They also reported the number of cigarettes smoked per day and indicated their current Stage of Change with regard to quitting smoking.

### Apparatus

#### EC50 Micro III Bedfont Smokerlyzer

A breath carbon monoxide monitor was used to measure expired breath carbon monoxide (CO) levels as measured in parts per million (ppm) and to estimate Carboxyhaemoglobin (COHb) levels as measured in percentage of oxygen in the bloodstream that has been replaced by carbon monoxide.

#### Motivating Ambivalent Smokers to Quit Computer Program

A tobacco use feedback program, "Motivating Ambivalent Smokers to Quit (MASQ), was created by the principal investigator in Microsoft Excel 97 (Krejci, Steinberg, & Ziedonis 2001). Charts were utilized to provide objective feedback to participants receiving the Motivational Interviewing intervention. Charts visually compared participants with other smokers on Fagerström Test for Nicotine Dependence score, compared their CO levels with that of a non-smoker, visually displayed the specific amount of money spent on cigarettes, and displayed their motivation to change and self-efficacy. Specific cigarette-related health issues identified as relevant to the participant were also displayed.

### Procedure

Faculty and staff members working in outpatient treatment programs for individuals with schizophrenia or schizoaffective disorder were asked to refer their patients who smoke to participate in this study. Additionally, flyers were displayed in areas likely to be seen by patients meeting inclusion criteria. Flyers indicated that

participants did not have to want to quit smoking to participate in the study and would be paid \$10 for the baseline and one-week interview, therefore earning \$20 if they participate in both interviews. It was found that the most successful recruitment strategy however was face-to-face solicitation of participants.

Participants meeting inclusion criteria provided written informed consent and were randomly assigned to one of three interventions (Motivational Interviewing intervention, Psychoeducational intervention, or Minimal Control Intervention). Consent forms were approved by the Institutional Review Boards of the Robert Wood Johnson Medical School and the University of South Florida. Participants who had difficulty understanding the consent form were deemed ineligible for the study.

Individuals agreeing to participate made two appointments with the experimenter for similar times of day, approximately one week apart. It was important to schedule interviews for similar times of day for both baseline and follow-up meetings so as to have comparable expired breath carbon monoxide readings. Expired CO levels are sensitive to recent cigarette smoke inhalation and cumulative smoke inhalation throughout the day. Therefore a reading taken early in the morning after oxygen levels have partly been replenished overnight will not be comparable to a reading taken late in the evening.

The principal investigator conducted all interventions based on structured protocols. Supervision was provided by a licensed clinical psychologist formally trained in Motivational Interviewing and in training others in this therapeutic style. Baseline interviews lasted approximately 40 minutes for participants randomly assigned to the Motivational Interviewing or Psychoeducational interventions and approximately 5 minutes for those assigned to the Minimal Control intervention. All participants were paid \$10 for the baseline and one-week meetings. Identical assessment information was collected from participants assigned to the Motivational Interviewing or Psychoeducational interventions. Those receiving the Motivational

Interviewing intervention were provided with personalized feedback and a referral for treatment following the assessment while those receiving the Psychoeducational Intervention were engaged in discussion regarding psychoeducational materials created by the American Lung Association and provided a referral for treatment. Participants receiving the Minimal Control intervention underwent a reduced assessment battery and were provided with the same referral to treatment as the other intervention groups.

Follow-up interviews were identical for all intervention groups and were conducted by a research assistant blinded to participant group assignment. One-week follow-up interviews lasted approximately 15 minutes and included a carbon monoxide reading, assessment of cigarette use and assessment of motivation to quit smoking. Attempts to seek assistance in quitting smoking were also documented at this session. Tobacco dependence treatment staff corroborated self-reported treatment seeking attempts. One-month follow-up interviews lasted approximately 5 minutes and included assessment of cigarette use and assessment of motivation to quit smoking. Attempts to seek assistance in quitting smoking were again documented at this session and were again corroborated by treatment staff.

## CHAPTER THREE

### Results

Data were analyzed using SPSS for Windows Release 11.0.1 (SPSS, Inc., 2001).

#### Accounting for Missing Data

The main hypothesis of this study was that a greater proportion of participants receiving the Motivational Interviewing intervention would follow-up on a referral to tobacco dependence treatment than those receiving the Psychoeducational or Minimal Control interventions. No data were lost to follow-up in analyses of this hypothesis since these data were retrievable from treatment staff when participant self-report was unavailable. Treatment staff were routinely asked to provide this information to corroborate participant self-report and this data served as a substitute for participant self-report in its absence. A small percentage of participant data were lost to follow-up in the evaluation of tobacco use and motivation to change however. Two participants (6.3%) receiving the Motivational Interviewing intervention were lost to follow-up at one-week and at one-month. None were lost from the Psychoeducational intervention at one-week while one (2.9%) was lost to follow-up at one-month. No participants were lost to follow-up from the Minimal Control intervention group.

Data were carried forward to replace missing values, thus avoiding the potential bias of listwise deletion associated with missing data and is commonly employed in addiction research. A lack of change from the previous data collection point is assumed to provide a fairly conservative estimate of the missing data. The pattern of results did not differ between this strategy and listwise deletion.

Table 1

## Baseline Characteristics

	M	SD	%
Age	43.78	8.96	
Male Gender			67.9
Race/Ethnicity			
Caucasian			76.9
African American			17.9
Hispanic			3.8
Asian			1.3
Substance Use Disorder			53.2
Length of Psychiatric Illness	20.78	10.56	
Global Assessment of Functioning	50.12	8.10	
Age Began Smoking	16.65	4.80	
Years Smoking	28.87	9.79	
Cigarettes Per Day	26.53	12.65	
CO (ppm)	22.24	11.35	
FTND	5.98	2.05	
Heaviness of Smoking Index	3.96	1.48	
Estimate of Others' Smoking	51.80%	22.92	
Contemplation Ladder	4.90	2.90	
Importance of Quitting	5.98	3.17	
Confidence in Ability to Quit	4.14	3.00	
Stages of Change – DiClemente et al. (1991) Definition <sup>a</sup>			
Precontemplation			69.7
Contemplation			24.2
Preparation			6.1
Stages of Change- Modified Definition <sup>b</sup>			
Precontemplation			69.7
Contemplation			16.7
Preparation			13.6

Note: No differences exist between groups on any baseline variables.

<sup>a</sup> Stage of Change algorithm based on DiClemente et al. (1991) definition.

<sup>b</sup> Stage of change algorithm based on modified definition – not requiring previous quit attempt in last year for classification in Preparation Stage of Change.

### Demographics

Participants were 78 smokers with a chart-review-confirmed diagnosis of a schizophrenia spectrum disorder. Mean age was 43.78 years old (range 24.2-71.5) with a mean length of psychiatric illness of 20.78 (10.56) years. Participants were 67.9% male and 76.9% Caucasian. While 51.3% were diagnosed with schizophrenia, 48.7% were diagnosed with schizoaffective disorder. Over 53% had a history of a substance use disorder. Mean highest Global Assessment of Functioning in the past year was 50.12 (8.09) (see Table 1). No differences were found between groups on any demographic variables.

### Tobacco Use

Participants began smoking at a mean (SD) age of 16.65 (4.80) and had been smoking for 26.87 (9.79) years. They smoked 26.53 (12.65) cigarettes per day at the time of the baseline assessment with a corresponding mean expired breath carbon monoxide of 22.24 (11.35) parts per million. Tobacco dependence as measured by the Fagerström Test for Nicotine Dependence (FTND) was a mean 5.99 (3.17) out of a possible 10. The Heaviness of Smoking Index was 3.96 (1.48) out of a possible 6. No differences were found between groups for any tobacco use variables.

### Money Spent on Cigarettes

Based on self-reported cost per pack and self-reported cigarettes smoked per day, the median dollars spent on cigarettes per month was \$142.50 (range \$57.15 – \$319.13). The majority of participants (87.2%) were receiving public assistance, at a median benefit of \$596 (range of \$60 - \$1500) per month. It was therefore calculated that the median percentage of income spent on cigarettes each month

was 27.36% (range of 6.3% to 331.3%). No differences were found between groups with respect to money spent on cigarettes.

#### Motivation to Quit

Motivation to quit smoking as measured by the Contemplation Ladder was 4.90 (2.90), self-reported importance to quit smoking was 5.98 (3.17), and self-reported confidence in ability to quit smoking was 4.14 (3.0) (all measured on a 0 to 10 scale). Based on the DiClemente et al. (1991) Stages of Change algorithm 69.7% were in the Precontemplation Stage, 24.2% were in the Contemplation Stage, and 6.1% were in the Preparation Stage of Change. Five participants were moved from the Preparation Stage to the Contemplation Stage after applying DiClemente's requirement that only those who have made a 24-hour quit attempt in the past year be eligible for the Preparation Stage. This altered the distribution so that 16.7% were in the Contemplation Stage and 13.6% were in the Preparation Stage. Participants over-estimated the proportion of others who smoke cigarettes. They estimated that 51.8% (22.92) of all adults smoke cigarettes. The modal response was 80%.

Despite the fact that all participants smoked at least 10 cigarettes per day, and were in regular contact with mental health treatment providers, 32.1% report not receiving a recommendation to quit by a doctor or counselor in the last year. Recommendations to quit smoking were provided by a doctor for 44.9%, by a counselor for 5.1% and by both a counselor and a doctor for 19.2%. No differences were found between groups on any motivation-related variables.



## Treatment Fidelity

The principal investigator administered the interventions based on written protocols (see Appendix L, M, and N). Nonetheless, it was important to determine that the interventions were noticeably different to the participants. To this end, 13 treatment fidelity items were evaluated to examine the utility of each item. Items were determined to have utility if the proportions within each 2X2 table (True/False X Motivational/Psychoeducational Intervention) favored one group over the other and were associated with a significant chi square statistic. All but one item differentiated between groups based on these analyses.

To examine treatment fidelity, independent samples t-tests were conducted to determine differences between groups in intervention-consistent responses. Consistent with hypotheses, participants receiving the Motivational Interviewing intervention answered "true" to a greater number of Motivational Interviewing-consistent items than those in the Psychoeducational intervention,  $t(32.73) = 8.169$ ,  $p < 0.001$ , while those receiving the Psychoeducational intervention answered "true" to a greater number of Psychoeducational-consistent items than did those in the Motivational Interviewing intervention,  $t(41.23) = -7.685$ ,  $p < 0.001$ . These analyses included all treatment fidelity items, including the item that did not differentiate well between groups. Degrees of freedom were corrected based on violations of the assumption of equal variances as measured by significant Levene's Test for Significant Variances.

### Follow-up On Referrals for Treatment-One Week Post-Intervention

Chi-square analyses were computed to determine differences between intervention groups with respect to the dichotomous variable related to follow-up calls (i.e., presence or absence of participant contact with a tobacco dependence treatment provider). A greater proportion of participants receiving the Motivational

Interviewing Intervention followed up on the referral for treatment within one-week than those receiving the Psychoeducational Intervention (25.8% vs. 0.0%;  $\chi^2(1) = 10.006$ ,  $p = 0.002$ ) and than those receiving the Minimal Control Intervention (25.8% vs. 0.0%;  $\chi^2(1) = 3.805$ ,  $p = 0.051$ ; see Figure 1).

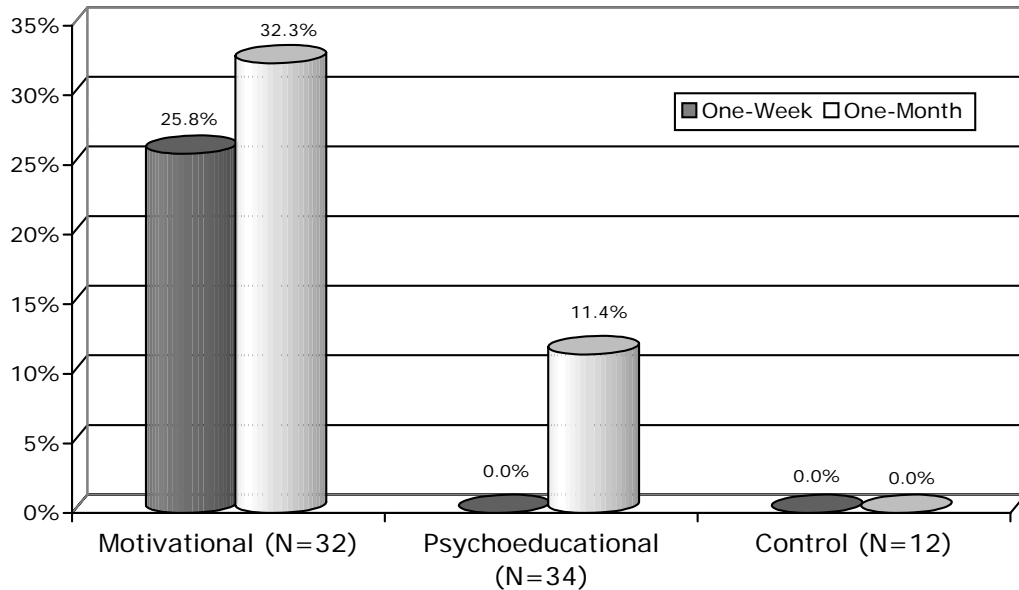


Figure 1. Percentage of participants receiving each intervention following up on referral to tobacco dependence treatment at one-week and one-month post-intervention

#### Follow-up On Referrals for Treatment - One Month Post-Intervention

Differences in proportions of participants following up on the referral to treatment were again examined at one-month post-intervention. A greater proportion of participants receiving the Motivational Interviewing Intervention followed up on a referral for treatment within one-month than those receiving the Psychoeducational Intervention (32.3% vs. 11.8%;  $\chi^2(1) = 4.030$ ,  $p = 0.045$ ) and than those receiving the Minimal Control Intervention (32.3% vs. 0.0%;  $\chi^2(1) = 5.044$ ,  $p = 0.025$ ). There were no significant differences between the proportion of those following up on the referral for treatment between those receiving the

Psychoeducational and Minimal Control Interventions (11.8% vs. 0.0%;  $\chi^2(1) = 1.546$ ,  $p = 0.214$ ).

### Motivation To Change Variables

Three separate 2 X 3 mixed model Analyses of Variance (ANOVA) were computed to determine differences between groups on motivation to change. The main effect of time (pre- to post-intervention) was analyzed as a within subjects variable while differential effects of group (Motivational Interviewing, Psychoeducational, and Minimal Control) on changes in motivation over time was analyzed as a between subjects variable by examining the time X group interaction term.

Neither the main effect of time,  $F(1,74) = 0.207$ ,  $p = 0.650$ , nor the time X group interaction term,  $F(2,74) = 0.089$ ,  $p = 0.915$ , was significant for Contemplation Ladder scores. In addition, neither the main effect of time,  $F(1,64) = 1.641$ ,  $p = 0.205$ , nor the time X group interaction term,  $F(1,64) = 1.847$ ,  $p = 0.179$ , was significant for self-reported importance of quitting. There was however, a significant increase in self-reported confidence in participants' ability to quit over time,  $F(1,64) = 9.137$ ,  $p = 0.004$ , although the interaction term did not reach statistical significance,  $F(1,64) = 0.591$ ,  $p = .0.445$ , indicating that there was no differential effect over time by group. In addition to mixed model ANOVAs, paired samples t-tests were performed to examine changes in motivation within each intervention group over time (see Table 2).

Table 2

Mean (SD) Changes in Motivation Scores From Baseline to One-week Follow-up

	Group		
	Motivational Interviewing N=32	Psychoeducation N=35	Minimal Control N=12
Contemplation Ladder			
M	+0.000	+0.088	+0.417
SD	(3.65)	(2.56)	(.996)
Importance of Quitting			
M	+0.0312	-1.058	
SD	(3.33)	(3.26)	
Confidence in Ability to Quit			
M	+1.188**	+0.706	
SD	(2.46)	(2.62)	

\*\* Change score  $p < 0.01$ 

Note: No significant differences between groups.

Chi square analyses indicate that there were no differences in the proportion of participants remaining unchanged, increasing, or decreasing in stage of change (see Table 3) for those in the Motivational Interviewing intervention as compared to those in the Psychoeducational intervention at one-week or at one-month,  $\chi^2(2) = 0.689$ ,  $p = 0.709$ . It is interesting that any changes in Stage occurred within the first week. There were no changes in Stage between weeks one through four. Transformation in stage of change could not be evaluated for those in the Minimal Control Intervention because Stage of Change was not evaluated at baseline in this group.

Table 3

Changes In Stages Of Change<sup>a</sup> From Baseline To Follow-Up

	Motivational Interviewing	Psychoeducation
Stage of Change After One-Week		
% Increased	34.4%	44.1%
% Decreased	15.6%	14.7%
% No Change	50.0%	41.2%
N	32	34
Stage of Change After One-Month		
% Increased	34.4%	44.1%
% Decreased	15.6%	14.7%
% No Change	50.0%	41.2%
N	32	34

Note: No significant differences between groups.

<sup>a</sup> A modified Stage of Change algorithm was utilized so as to allow participants to move from Contemplation to Precontemplation without making a quit attempt in the past year.

## Baseline Motivation As A Predictor of Treatment-Seeking

Baseline levels of motivation did not predict treatment-seeking behavior (see Table 4). Three one-way Analyses of Variance were computed to examine differences in baseline levels of motivation between those who did and did not seek treatment within one-month post-intervention. There were no differences between groups on baseline Contemplation Ladder scores,  $F(1,76) = 1.862$ ,  $p = .177$ , self-reported Importance of Quitting,  $F(1,64) = .219$ ,  $p = .641$ , or self-reported confidence in ability to quit,  $F(1,64) = .791$ ,  $p = .377$ . A 2 X 2 Chi-square analyses (treating-seeking vs. non-treatment seeking X Preparation Stage of Change vs. Lower Stage of Change) indicated that there were no differences between groups with respect to intention to quit in the next 30 days,  $\chi^2(1) = .003$ ,  $p = .957$ .

Table 4

## Baseline Motivation and One-Month Treatment Seeking Status

	Treatment Seekers	Non-Treatment Seekers
Contemplation Ladder	5.85 (2.51)	4.65 (2.94)
Importance of Quitting	5.57 (3.18)	6.02 (3.17)
Confidence for Quitting	3.43 (2.62)	4.22 (3.01)

Note: No significant differences between groups.

## Tobacco Use

Contrary to hypotheses, there were no differences in reductions of cigarette use per day between groups,  $F(4,150) = 1.741$ ,  $p = 0.144$ , although overall cigarettes smoked per day decreased over time,  $F(2,150) = 6.471$ ,  $p = 0.002$ . There were also no differences between groups in changes of carbon monoxide levels,  $F(2,73) = 1.475$ ,  $p = 0.236$ , nor were there uniform decreases in carbon monoxide levels over time  $F(1,73) = 2.317$ ,  $p = 0.132$ . In addition to mixed model ANOVAs, paired samples t-tests were performed to examine changes in tobacco use within each intervention group over time (see Table 5).

Table 5

Mean (SD) Changes in Tobacco Use From Baseline to Follow-up.

	Group					
	Motivational Interview N=32		Psychoeducation N=34		Minimal Control N=12	
	<u>1-Week</u>	<u>1-Month</u>	<u>1-Week</u>	<u>1-Month</u>	<u>1-Week</u>	<u>1-Month</u>
Cigarettes Per Day						
M	-1.96	-5.11*	-2.44	-5.85**	-2.50	+.083
SD	(6.23)	(9.64)	(8.77)	(8.59)	(6.74)	(3.37)
Carbon Monoxide						
M	-4.41	-----	+.156	-----	-.750	-----
SD	(12.68)		(10.57)		(4.99)	

Note: No significant differences between groups, however significant within group differences were found. Change score \*p<0.05, \*\*p<.01

### Predictors of Motivation to Change

#### Past Quit Attempts

One-tailed Pearson Product Moment correlations were computed (see Table 6) to examine the relationship between past quit attempts and motivation to change at baseline. Contemplation Ladder score ( $r = -0.245$ ,  $p = 0.025$ ) and Importance of quitting ( $r = -0.260$ ,  $p = 0.017$ ) were significantly negatively related to time since last quit attempt. Confidence in ability to quit was unrelated to time since last quit attempt and the number of 24-hour quit attempts in the past year was unrelated to measures of motivation to change.

Table 6

## Pearson Correlations Between Motivation To Change And Past Quit Attempts

Variable	1	2	3	4	5	6
1. Contemplation Ladder	---	.392*	.253*	.133	-.245*	.124
N		65	65	65	65	65
2. Importance of Quitting		---	.276*	.193	-.260	-.101
N			66	66	66	66
3. Confidence in Ability to Quit			---	-.195	-.186	-.108
N				66	66	66
Number of Quit Attempts				---	.064	-.062
N					66	66
Time Since Last Quit Attempt					---	.008
N						66
6. Longest Quit Attempt						---

\*p &lt; .05 (1-tailed)

One-tailed Spearman Rho correlations were computed (see Table 7) to examine the relationship between the ordinal Stage of Change variable and past quit attempts. Stage of Change was significantly positively correlated with number of previous quit attempts in the past year ( $r = 0.346$ ,  $p = 0.002$ ), time since last quit attempt ( $r = 0.226$ ,  $p = 0.034$ ), and length of longest quit attempt ( $r = 0.299$ ,  $p = 0.007$ ). For these analyses, smokers were not required to have made a quit attempt in the last year to be classified as belonging in the Preparation Stage so as to avoid a confound based on the DiClemente et al. (1991) definition of Preparation.



Table 7

## Correlations Between Stages of Change And Past Quit Attempts

Variable	1	2	3	4
1. Stages of Change <sup>a</sup>	---	.346*	.226*	.299*
N		66	66	66
2. Number of Quit Attempts <sup>b</sup>		---	-.064	-.062
N			66	66
3. Time Since Last Quit Attempt <sup>b</sup>			---	.008
N				66
4. Longest Quit Attempt <sup>b</sup>				---
N				

\*p &lt; .05 (1-tailed)

<sup>a</sup> 1-tailed Spearman's Rho Correlations<sup>b</sup> 1-tailed Pearson Product Moment Correlations

## Tobacco Use

One-tailed Pearson Product Moment correlations (see Table 8) were conducted to examine the relationship between tobacco dependence and motivation to change. Contemplation Ladder scores were significantly, negatively related to measures of nicotine dependence such as the Fagerström Test for Nicotine Dependence ( $r = -0.202$ ,  $p = 0.041$ ) and the Heaviness of Smoking Index (a subset of the FTND;  $r = -0.223$ ,  $p = 0.025$ ). There was no relationship between nicotine dependence and Importance of Quitting or Confidence in ability to quit.

Table 8

Pearson Correlations Between Motivation To Change And Tobacco Use And/Or Dependence

Variable	1	2	3	4	5	6	7
1. Contemplation Ladder	---	.392*	.253*	-.223*	-.202*	-.162	.018
N		65	65	77	75	77	75
2. Importance of Quitting		---	.276*	.019	.002	-.060	-.019
N			66	66	64	66	64
3. Confidence in Ability to Quit			---	-.110	-.075	-.063	-.059
N				66	64	66	64
4. Heaviness of Smoking Index				---	.913**	.755**	.264*
N					76	78	76
5. Fagerström Test For Nicotine Dep.					---	.672**	.162
N						76	75
6. Cigarettes per Day						---	.228*
N							75
7. CO							---

\* $p < .05$ , \*\* $p < .01$  (1-tailed)

One-tailed Spearman Rho correlations were computed to examine the relationship between the ordinal Stage of Change variable and tobacco dependence (see Table 9). There was no relationship between motivation as measured by the Stage of Change algorithm and measures of tobacco dependence (i.e., Fagerström Test for Nicotine Dependence, cigarettes smoked per day, and Carbon Monoxide levels).

Table 9

## Correlations Between Stage Of Change And Tobacco Use And Dependence

Variable	1	2	3	4	5
1. Stage of Change <sup>a</sup>	---	.024	.078	-.061	-.002
N		66	64	66	64
2. Heaviness of Smoking Index <sup>b</sup>		---	.913**	.755**	.264*
N			76	78	76
3. Fagerström Test Of Nicotine Dep. <sup>b</sup>			---	.672**	.162
N				76	75
4. Cigarettes Smoked Per Day <sup>b</sup>				---	.228*
N					76
5. CO <sup>b</sup>					---
N					---

\*p&lt;.05, \*\*p&lt;.01 (1-tailed)

<sup>a</sup> 1-tailed Spearman's Rho Correlations<sup>b</sup> 1-tailed Pearson Product Moment Correlations

## CHAPTER FOUR

### Discussion

#### Clinical Implications and Interpretations

This study is the first to examine the efficacy of Motivational Interviewing in motivating smokers with schizophrenia to seek tobacco dependence treatment. As hypothesized, a greater proportion of participants receiving a brief Motivational Interviewing intervention followed through on a referral for tobacco dependence treatment as compared to those receiving a brief Psychoeducational intervention or a Minimal Control intervention. There were no differences between the Psychoeducational and control interventions. These findings held true at one-week and at one-month post-intervention. Although most (69.7%) of the participants in this study indicated that they had no intention of quitting smoking within the next six-months (Precontemplation Stage), over 32% of those receiving the Motivational Interviewing intervention followed through on a referral for tobacco dependence treatment within one-month post-intervention.

The results of this study are significant since they indicate that the most prevalent strategies for addressing tobacco in this population are not the most effective, and that Motivational Interviewing may emerge as a superior alternative brief intervention. Although I am unaware of any data documenting treatment strategies utilized in this population, anecdotal evidence indicates that the most prevalent strategy for addressing tobacco in this population is to make a brief recommendation to quit. In exceptional circumstances, psychoeducational approaches are implemented, whereby smokers with serious mental illnesses are

warned of the dangers of smoking as part of a psychoeducational group in a day treatment program. The results of this study indicate that Motivational Interviewing would be a better strategy.

The fact that the Psychoeducational Intervention was no more effective than a Minimal Control intervention highlights the ineffectiveness of psychoeducation efforts in this population. The Minimal Control intervention was designed to approximate a no-treatment control, however this was balanced against the need to collect baseline data in this group. The Hawthorne Effect (Mayo, 1933) would suggest that just paying attention to a behavior is likely to instigate change in that behavior, and therefore the Minimal Control intervention was not referred to as a “no-treatment” control. The Minimal Control intervention lasted only five minutes as compared to the 40-minute Psychoeducational intervention. Prior research would indicate that contact time is an important variable in motivating smoking change (Fiore et al., 2000) and therefore the greater length of the Psychoeducational intervention was expected to produce better outcomes than the much shorter Minimal Control intervention. However, this was not the case.

In addition to a significantly greater proportion of participants receiving the Motivational Interviewing Intervention following up on the referral than those in the other groups, the Motivational Interviewing intervention was associated with a quicker response among those who sought treatment. Of those who followed up on the referral for treatment, 80% from the Motivational Interviewing intervention contacted a treatment provider within one week. Interestingly, all four of those receiving the Psychoeducational intervention waited until after the first week to contact a tobacco dependence treatment provider. No participants receiving the Minimal Control intervention followed through on the referral for treatment within one-month post-intervention.

This time-lag is of interest since schizophrenia and schizoaffective disorder are characterized by amotivational behavior patterns. Bellack and DiClemente (1999) discuss the difficulty experienced by individuals with schizophrenia in following through with a commitment made in treatment. It may therefore be beneficial to design an intervention that produces immediate change since this population may be less likely to change once the initial impetus has passed.

The most parsimonious explanation for these data is that Motivational Interviewing is superior to psychoeducational interventions in promoting tobacco dependence treatment-seeking whereas psychoeducational interventions are no more effective than minimal interventions in this population. This explanation is consistent with previous research comparing Motivational Interviewing to other assessment or advice-only approaches in the general population (Borsari & Carey, 2000; Colby et al., 1998; Dench & Bennett, 2000; Marlatt et al., 1998; Murphy et al., 2001; Saunders et al., 1995) and in psychiatric populations (Daley et al., 1998; Daley and Zuckoff, 1998; Swanson et al., 1999; Martino et al., 2000).

A second explanation, and one not necessarily mutually exclusive of the first, is that the Motivational Interviewing intervention was better at compensating for neurocognitive deficits common in this population. Although special efforts were taken to interest participants in the psychoeducational intervention by engaging the participant in conversation about the educational material, participants appeared more attentive to the information discussed during the Motivational Interviewing intervention. The multi-sensory format (i.e., verbal information paired with graphical information) provided by the Motivational Interviewing intervention may have been easier to understand for the participants than the auditory-only information provided in the Psychoeducational intervention.

It is curious that the Motivational Interviewing intervention was not associated with greater increases in motivation to change or greater decreases in

tobacco use when compared to the other groups given that it was associated with a greater proportion of participants following through on the referral to treatment. There were also no differences between groups in the proportions increasing their Stage of Change. Additionally, baseline levels of motivation did not differentiate between those who did and those who did not seek treatment at one-month post-intervention. Two possibilities exist to explain this discrepancy. First, this discrepancy may be related to a mismatch between the motivational assessment and the behavioral outcome measure. While the behavioral outcome of interest was seeking tobacco dependence treatment, the assessment instruments asked about motivation to quit smoking. Seeking treatment for tobacco dependence may not have translated into a true desire to quit smoking. Participants could have sought treatment with the intention of exploring the issue of tobacco use further or with the intention of reducing their tobacco intake, without a desire to quit altogether. Motivation to seek treatment was never assessed directly. In addition, had the motivational assessment included measures of motivation to reduce smoking rather than only measures of motivation to quit smoking, important information may have been discovered. Although harm-reduction strategies are controversial (Hughes, 1995), it is possible that this population may think more in terms of tobacco reduction than abstinence and therefore motivation to reduce in addition to quitting smoking may be worth measuring in future studies. All motivation-related measures used in this study could be modified to inquire about reduced smoking.

An alternative explanation for the apparent discrepancy in the data may be related to the treatment-readiness of this population. Participants in this study were attending treatment for schizophrenia from 1 to 5 days per week, so attending therapy already makes up a substantial part of their day. It may be that this population is willing to attend treatment for issues about which they are only slightly concerned. This explanation is consistent with the findings of Ziedonis & George

(1997) and Addington et al. (1997). Ziedonis & George (1997) found that 75% of patients attending a tobacco dependence treatment program were classified as being in the Precontemplation Stage. In addition, although over 58% of the smokers with schizophrenia interviewed by Addington et al. (1997) were in the Precontemplation stage of change, 63% stated that they would be willing to attend a smoking cessation group. Of those seeking treatment by one-week post-intervention in the present sample, all were in the Contemplation Stage of Change. Of those seeking treatment between weeks one through four post-intervention, 25% were classified in the Precontemplation Stage of Change, 37.5% were in the Contemplation Stage of Change, and 35.7% were in the Preparation Stage of Change. While this is substantially different than those in the previously cited studies, it is still unusual that so many patients without a stated intention of quitting smoking were seeking treatment for tobacco dependence. This has important implications for treatment programs targeting the seriously mentally ill. If tobacco dependence treatment programs were offered as part of a treatment program for the seriously mentally ill, it is likely that many patients would attend.

The fact that over 30% of the participants receiving the Motivational Interviewing intervention followed through on the referral for treatment is even more impressive when recognizing that almost 70% of the total sample, and 75% of the Motivational Interviewing group was classified as being in the Precontemplation Stage of Change. While this percentage is consistent with the findings of Ziedonis & George (1997) that 75% of smokers with schizophrenia were classified in the Precontemplation Stage, this figure is higher than that reported in other studies (e.g., Carosella, 1999; Addington, 1997; Hall et al., 1995) where 45%-58% were so classified. It is important to note, however, that smokers were excluded from the present study if they were already seeking treatment for tobacco dependence. In addition, if participants immediately expressed a desire to seek treatment for



tobacco dependence during or before the consent process, they were referred for treatment without being invited to participate in the study so as not to delay treatment and not to introduce a methodological confound.

It should be acknowledged that although almost one-third of those receiving the Motivational Interviewing intervention and over 11% of those receiving the Psychoeducational interventions sought treatment for tobacco dependence, the number of participants that will actually quit smoking is unknown.

#### Advice to Quit Smoking

In the general population, tobacco use is addressed in less than 50% of smokers' general medical exams (e.g., Thorndike et al., 1998). While tobacco use was addressed more often in the current sample, 32.1% report not having been given a recommendation to quit by a primary care physician, psychiatrist, or counselor in the last year. Although differences between psychiatrists and primary care physicians with respect to the likelihood of addressing tobacco were not assessed in the present study, Thorndike et al. (2001) found that primary care physicians were significantly more likely to address tobacco use in their patients with schizophrenia than were psychiatrists. Since the participants in this study have regular contact with medical or counseling staff (some have contact five times per week), it is disappointing that tobacco use was not addressed in a greater proportion of the participants.

#### Perceptions of Others' Smoking

At baseline, participants were asked to estimate the percentage of adults in the United States who smoked cigarettes. While the latest estimates are that approximately 23% of all adults smoke cigarettes (Center for Disease Control, 2001), the modal estimate was 80%. This over-estimate of others' smoking is

indicative of the environment in which this population spends most of their day. A large percentage of the day treatment program population from which most of the participants were recruited were smokers. Social activities related to smoking constitute a substantial proportion of the unstructured time in this population's day. Most participants use the time between group therapy activities to go outside and smoke cigarettes. It was not uncommon for more than a dozen people to be smoking just outside the day treatment program's building at one time. It is therefore not surprising that participants in this study have the perception that most people smoke.

#### Limitations of the Present Study

A limitation of this study relates to the check on intervention fidelity. The Motivational Interviewing and Psychoeducational interventions each lasted approximately 40 minutes whereas the Minimal Control intervention lasted approximately 5 minutes. Whereas time spent with participants differed substantially between the Minimal Control and the other interventions, the content and style differed between the Motivational Interviewing and Psychoeducational interventions. Despite these obvious differences, and the use of written treatment protocols, it was important to have objective information corroborating that the interventions were distinguishable to participants in the two higher intensity interventions.

The self-report check on intervention fidelity supports the assumption that participants received the intervention to which they were randomly assigned. This indicates that participants experienced the interventions as intended. One of the 13 fidelity check items did not differentiate well between groups. Although permission was asked before providing advice to quit smoking in the Motivational Interviewing intervention, but not in the Psychoeducational intervention, most participants stated that permission was asked of them, regardless of group assignment. This may have

reflected a strong therapeutic alliance in all conditions, such that participants inferred that the therapist must have been considerate enough to ask permission before giving advice.

Additional approaches to checking treatment fidelity may have allowed for greater confidence in the assumption that the interventions were different, and that the Motivational Interviewing intervention, indeed employed Motivational Interviewing. One strategy would have been to audiotape the interventions and to have a rater blind to treatment condition rate the sessions for compliance. This approach would have allowed for a check on intervention fidelity based both on participants' experience of the intervention and on outside observer's view of the interventions.

An additional limitation relates to the psychiatric diagnoses of the participants. Participants' diagnoses were included in the study based on chart-review confirmations. Although clinicians who regularly work with the seriously mentally ill made the diagnoses, the use of structured clinical interviews would ensure reliable diagnoses.

In addition to structured clinical interviews, other supplementary assessment information may have made this a stronger study. For example, carbon monoxide readings were not taken at the one-month follow-up interview because most follow-up interviews were conducted over the phone. Because a significant decrease in smoking was found among those receiving the Motivational Interviewing intervention at one-month, it would have been helpful to determine if this was associated with a corresponding decrease in carbon monoxide level. It is common for smokers to regulate their nicotine intake by compensating for fewer cigarettes with stronger inhalation. Carbon monoxide would have helped to determine the degree of compensatory smoking.

It is also regrettable that information on participant medications cannot be reported. It has been shown that use of typical antipsychotic agents is associated with a higher prevalence of smoking than atypical antipsychotic agents among the general population (Dawe et al, 1995), among individuals with schizophrenia (George et al., 1995; McEvoy et al., 1995), and among smokers with schizophrenia trying to quit (Ziedonis et al., 1997, George et al., 2000, George et al., 2002). Although an attempt was made to collect information regarding medication use, participant self-report was deemed too unreliable and many participants reported not knowing which medications they were taking.

Lastly, it should be noted that the strategy for managing missing data was only one of several potential strategies. In abstinence-based substance abuse treatment research it is common for researchers to assume that a participant has relapsed to substance use if they are lost to follow-up. The appropriateness of this strategy is not as clear cut in a study such as this where continuous, rather than dichotomous outcomes are examined. Bringing the last value forward to replace missing values for variables such as cigarettes smoked per day and CO level seem appropriate since there is unlikely to be much spontaneous variability in smoking behavior among smokers over the short term. Motivational variables, however, tend to be more changeable, and it is therefore less clear as to the most appropriate strategy for accounting for missing motivational data. Options include replacing missing data by bringing the last value forward (as was done in this study), assuming the worst-case scenario of no motivation to change, or employing listwise deletion and not including cases with missing data. Since there were very few missing data points, the implications of the strategy chosen were minimal in this study. It was decided, however, that bringing the last value forward would provide the most accurate data compared to employing listwise deletion or assuming the worst-case scenario. Employing listwise deletion assumes that those lost to follow-up are no

different than those for whom all data is available, and this is simply not the case in many situations. Listwise deletion also reduces the statistical power available by reducing the sample size. Assuming the worst-case scenario of a large reduction in motivation among participants for whom data were not available also seemed implausible. Most participants who were lost to follow-up were missing because they stopped (often temporarily) attending their day treatment program and were therefore unavailable for interviews. This lack of availability is unlikely to be related to smoking behavior or motivation related to quitting smoking. Assuming the worst-case scenario therefore seems too severe an assumption. Bringing the last value forward to replace missing data made the most reasonable assumptions of the data and was therefore employed as a strategy for managing missing data.

#### Future Research

Future research should try to replicate this study by examining new samples of participants with schizophrenia. The present sample comprised primarily patients attending day treatment programs, but individuals with schizophrenia at less intense levels of care should also be studied. It is possible that the different levels of functioning in the various levels of treatment could have an impact on the intervention.

It would also be useful to evaluate the relative impact of the various portions of the Motivational Interviewing intervention feedback. Based on participant reaction, the chart regarding money spent on cigarettes seemed to have the greatest impact for the greatest number of participants. Several patients were astounded by the amount of money they were spending and commented on how they never realized just how much smoking cost them. The apparent impact of this part of the intervention may be related to the financial limitations many individuals with a serious mental illness experience. Most (87.2%) of the participants in this study

were receiving public assistance and therefore had a limited income. They spent a median of 27.36% of their monthly income on cigarettes despite the fact that almost one-third of the participants smoked less expensive, generic brand cigarettes.

Others seemed most moved by the feedback related to carbon monoxide. While all participants were very interested in learning of their CO reading, some became quite concerned over the implications. In contrast to the usual messages regarding theoretical increased risk ratios for various illnesses caused by smoking, the carbon monoxide reading provided personalized evidence of the actual, immediate consequences of smoking. It is possible that the immediacy of the feedback and its personalized nature contributed to greater participant engagement in the Motivational Interviewing intervention than the Psychoeducational intervention or the Minimal Control intervention.

The relative impact of the different intervention components could vary based on participant characteristics. In addition, studies examining the characteristics of smokers with schizophrenia who could most benefit from a Motivational Interviewing intervention would be worthwhile. Baseline levels of motivation, tobacco dependence, financial situation, antipsychotic medication type, or psychiatric functioning could all play a role in matching hypotheses.

Additionally, future studies should address some of the limitations of this study. Additional assessment measures such as structured clinical interviews and assessment of motivation to reduce, in addition to quit smoking should be included. The appropriateness of the various assessments should also be examined in this population. As noted earlier, it may be that although the Fagerström Test for Nicotine Dependence is the most commonly used measure of physical dependence to tobacco products, it may not be as appropriate for smokers with schizophrenia as it is for the general adult population. Instruments modified specifically for this population may also better measure self-efficacy for quitting. There are likely to be

unique environmental cues that may precipitate a relapse to smoking in those with a serious mental illness to which those in the general population are not exposed. Smokers with schizophrenia may also be motivated to smoke, or to quit smoking, for slightly different reasons than those in the general population.

A doctoral candidate in clinical psychology with training in Motivational Interviewing conducted this study. It would be interesting to see if general counselors could be trained to deliver this intervention in day treatment programs where smokers with schizophrenia attend groups throughout the day. As mentioned earlier, smokers with schizophrenia may be willing to attend tobacco dependence treatment groups even if they do not have immediate plans for quitting. Technology transfer studies could also be designed to examine the generalizability of this Motivational Interviewing intervention to community treatment programs.

The present study could also be expanded to other populations. Smokers with Bipolar Disorder have a similar prevalence of smoking as those with schizophrenia and often attend the same treatment programs for their mental illness. Although the biology contributing to the relationship between smoking and schizophrenia may be different than that contributing to the relationship between smoking and bipolar disorder, these groups experience similar environmental pressures that are likely to maintain their smoking behavior and make them less likely to quit. In addition, this protocol could be expanded to other non-psychiatrically impaired populations such as college students, pregnant smokers, or substance abusers.

Lastly, outcomes other than treatment-seeking could be examined. A study utilizing the Motivational Interviewing intervention protocol utilized in this study could be designed to encourage reduced smoking as an initial step towards quitting. Although harm reduction strategies are controversial (Hughes, 1995) due to fears of

compensatory smoking, strategies such as scheduled reduced smoking (Cinciripini and colleagues, 1994, 1995) have shown promise.

In conclusion, this study found that a Motivational Interviewing intervention was more effective than either a Psychoeducational or Minimal control intervention in motivating smokers with schizophrenia to seek tobacco dependence treatment. It is important to motivate this population to quit smoking because the negative consequences of smoking in this group exceed those associated with smoking in the general population. The interest in helping smokers with schizophrenia to quit smoking has accelerated since the late 1990's (e.g., George et al., 2002; Weiner et al., 2001; Evins et al., 2001; George et al., 2000; Dalack et al., 1999; Addington et al., 1998; Ziedonis and George, 1997). As better psychosocial treatments for this population are developed it will become increasingly important to determine the best way to motivate smokers with schizophrenia to seek tobacco dependence treatment.



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## Appendices

Appendix A: Control Group Interview

1. Contemplation Ladder – see Appendix F.
2. How many minutes after you wake up do you smoke your first cigarette?  
(0) after 60 minutes (1 hour)  
(1) 31 to 60 minutes  
(2) 6 to 30 minutes  
(3) within 5 minutes
3. How many cigarettes do you smoke each day? \_\_\_\_\_.  
(enter number of cigarettes)  
(0) 10 or less  
(1) 11 to 20  
(2) 21 to 30  
(3) 31 or more

Expired CO Reading: \_\_\_\_\_ ppm

\_\_\_\_\_ %

Time of Day CO  
reading was measured: \_\_\_\_\_

Appendix B: Chart Review Form

Patient ID \_\_\_\_\_

Gender                    M / F

D.O.B.                  \_\_\_\_/\_\_\_\_/\_\_\_\_

Axis I Diagnoses:

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Appendix C: Smoking History Questionnaire

Age started smoking: \_\_\_\_\_

Last Quit-Attempt  
(>24 hours): \_\_\_\_\_

Number of Previous Quit  
Attempts in past year  
(>24 hours): \_\_\_\_\_

Longest Abstinence  
from cigarettes: \_\_\_\_\_

Previous Use of NRT:

Zyban / Patch / Gum / Spray / Inhaler

Cost per cigarette pack: \$\_\_\_\_\_

Expired CO Reading: \_\_\_\_\_ppm

\_\_\_\_\_%

Time of Day CO  
reading was measured: \_\_\_\_\_

Appendix D: Fagerström Test for Nicotine Dependence

1. How many minutes after you wake up do you smoke your first cigarette?
  - (4) after 60 minutes (1 hour)
  - (5) 31 to 60 minutes
  - (6) 6 to 30 minutes
  - (7) within 5 minutes
  
2. Do you find it hard to refrain from using tobacco in certain places (forbidden situations)? (i.e., movies, church, library, smoke-free building?)
  - (0) No
  - (1) Yes
  
3. Which cigarette would you hate most to give up?
  - (1) The first one in the morning
  - (0) Any others
  
4. How many cigarettes do you smoke each day? \_\_\_\_\_.  
(enter number of cigarettes)
  - (4) 10 or less
  - (5) 11 to 20
  - (6) 21 to 30
  - (7) 31 or more
  
5. Do you smoke more frequently during the first hours after waking than during the rest of the day?
  - (0) No
  - (1) Yes
  
6. Do you smoke if you are so ill that you are in bed most of the day?
  - (0) No
  - (1) Yes

## Appendix E: Stage of Change Algorithm

Are you currently a smoker?

- Yes, I currently smoke
- No, I quit within the last 6 months (ACTION STAGE)
- No, I quit more than 6 months ago (MAINTENANCE STAGE)
- No, I have never smoked (NONSMOKER)

(For smokers only) In the last year, how many times have you quit smoking for at least 24 hours?

(For smokers only) Are you seriously thinking of quitting smoking?

- Yes, within the next 30 days (PREPARATION STAGE if they have one 24-hour quit attempt in the past year - refer to previous question... if no quit attempt then CONTEMPLATION STAGE)
- Yes, within the next 6 months (CONTEMPLATION STAGE)
- No, not thinking of quitting (PRECONTEMPLATION STAGE)

## Appendix F: Contemplation Ladder

Each rung on this ladder represents where various smokers are in their thinking about quitting. Circle the number that indicates where you are now.



**(10) Taking action to quit (e.g., cutting down, enrolling in a program).**

**(9)**

**(8) Starting to think about how to change my smoking patterns.**

**(7)**

**(6)**

**(5) Think I should quit but not quite ready.**

**(4)**

**(3)**

**(2) Think I need to consider quitting someday.**

**(1)**

**(0) No thought about quitting.**



Appendix G: Motivation and Self-Efficacy

How IMPORTANT would it be for you to quit smoking at this time?

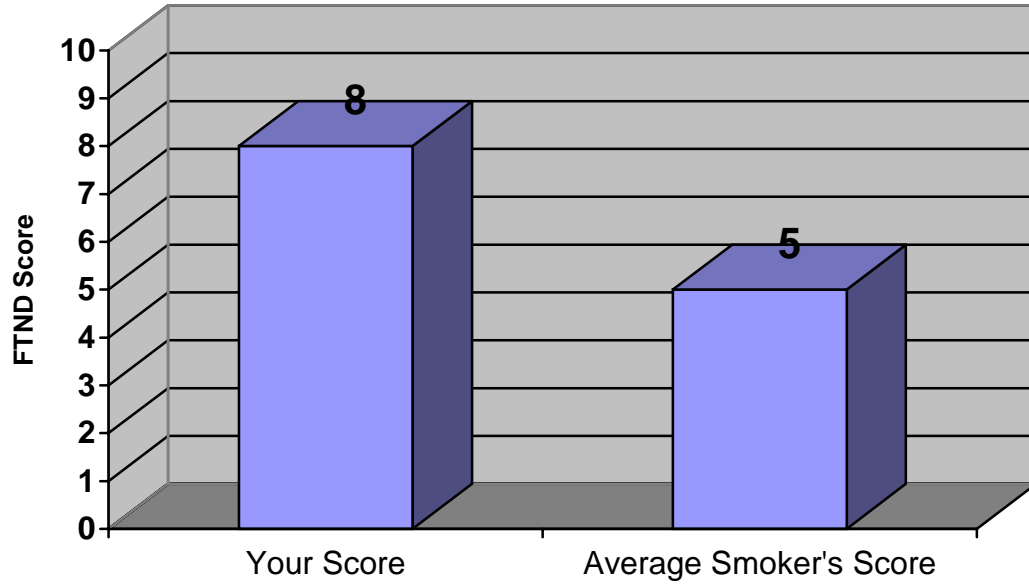
0 1 2 3 4 5 6 7 8 9 10  
Not at all Somewhat Extremely  
Important Important Important

How CONFIDENT are you that you could quit if you tried?

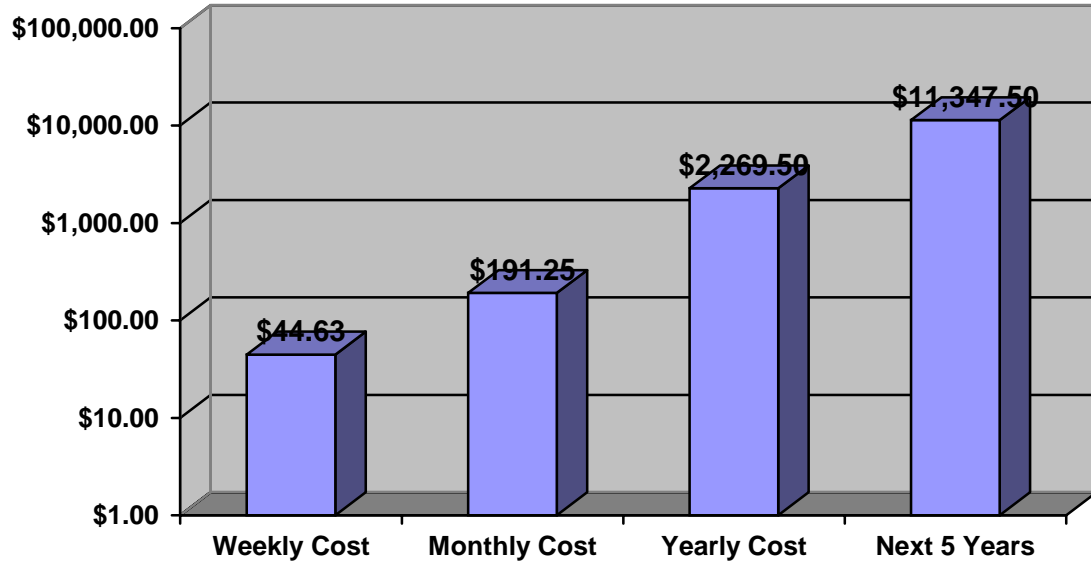
0 1 2 3 4 5 6 7 8 9 10  
Not at all Somewhat Extremely  
Confident Confident Confident

Appendix H: Tobacco Dependence Feedback

### Tobacco Dependence



### Amount You Spend on Cigarettes



How else could you spend this money?

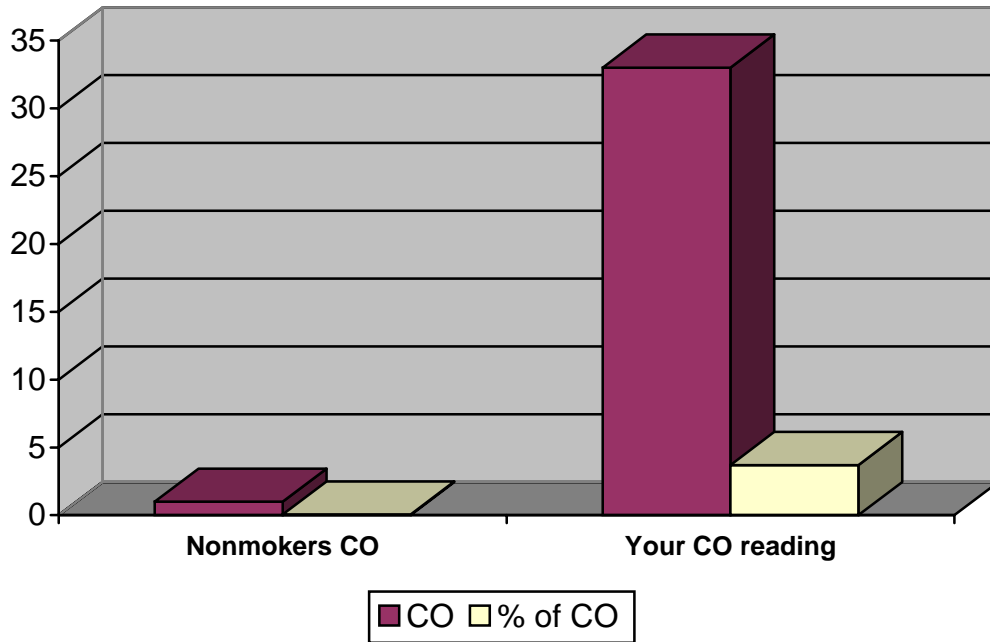
An extra **\$44.63** every week?

An extra **\$191.25** every month?

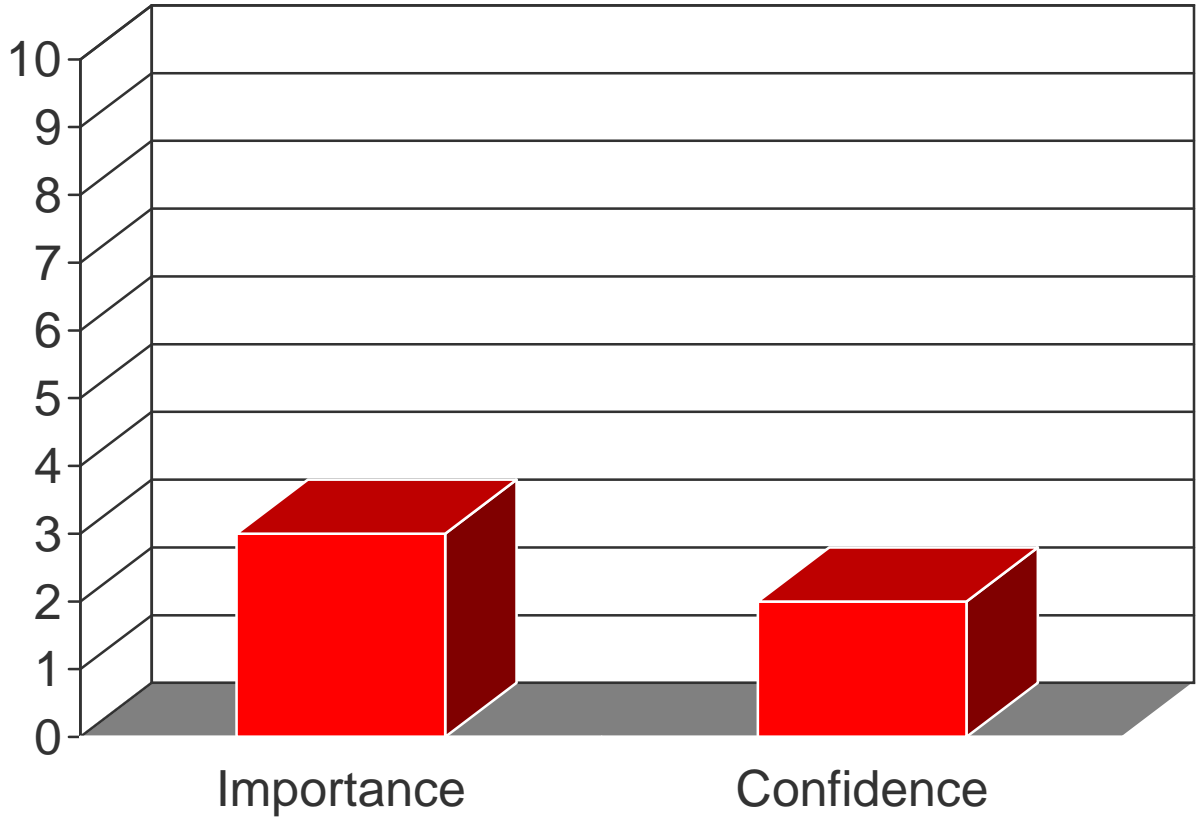
An extra **\$2,269.50** every year?

An extra **\$11,347.50** after five years?

### Amount of Carbon Monoxide (CO) in Your Lungs Compared to A Nonsmoker



Appendix K: Feelings about Quitting Smoking Feedback



## Appendix L: Timeline of Events for Minimal Control Group

After appointments are made and written consent is provided...

1. Participants will provide the following information:

- Contemplation Ladder rating
- Minutes to first cigarette of the day
- Cigarettes per day
- Age started smoking
- Expired breath CO reading

2. Participants will then be told the following:

"I'm going to recommend that you quit smoking. Here are the names of some people who can help you to quit smoking. In fact they specialize in helping people with a mental illness to quit smoking."

3. Participants will then be reminded of their next appointment where they will complete the follow-up interview.

## Appendix M: Timeline of Events for Psychoeducational Group

After appointments are made and written consent is provided...

1. Participants respond to all questions listed in the measures section.
2. Participants are engaged in a discussion based on an American Lung Association brochure describing the general benefits of smoking and the general dangers of smoking.
3. Participants are given an opportunity to ask questions regarding the material presented.
4. Participants will then be told the following:  
  
"I'm going to recommend that you quit smoking. Here are the names of some people who can help you to quit smoking. In fact they specialize in helping people with a mental illness to quit smoking."
5. Participants will then be reminded of their next appointment where they will complete the follow-up interview.

## Appendix N: Timeline of Events for Motivational Interviewing Intervention

After appointments are made and written consent is provided...

1. Participants will respond to all questions listed in the measures section.
2. Participants will then be shown feedback charts (see Appendices J-L) displaying:
  - Their tobacco dependence as compared to other smokers
  - The amount of money they spend on cigarettes weekly, monthly, yearly, and for a 5-year time span
  - Their CO and COHb readings as compared to the average non-smoker
  - Their motivation and self-efficacy to quit smoking

They will also be given feedback regarding the cigarette-related health issues they identified as relevant.

3. An empathic counseling style will be used while encouraging participants to express their thoughts regarding each feedback chart. Self-motivational statements will be elicited and reflected at this time and participant ambivalence towards change will be acknowledged and normalized. Participants will be asked why they chose point X on the motivation (0-10) scale rather than 0 in order to elicit self-motivational statements. They will be asked the same question regarding self-efficacy. Additionally, they will be asked what it would take for them to increase from point X on the self-efficacy scale to X+1 or X+2. This strategy would lead to a discussion that is likely to increase self-efficacy.

4. Once participants have finished discussing the feedback information, the investigator will ask permission to give his opinion regarding the information that has been discussed. Advice to quit will then be offered while simultaneously stressing the fact that it is the participant's decision – thereby emphasizing their own responsibility for change. Lastly a menu of options for change will be discussed including self-quitting, attending a tobacco dependence clinic, or smoking as usual.

5. After participants agree to receive a referral, participants will then be told the following:

Here are the names of some people who can help you to quit smoking. In fact they specialize in helping people with a mental illness to quit smoking."

6. Participants will then be reminded of their next appointment where they will complete the follow-up interview.



## Appendix O: Follow-up Meeting Summary

1. At one-week post baseline, participants will meet with a research assistant for further assessment.
2. The following assessment measures will be administered:
  - Fagerström Test for Nicotine Dependence
  - Stages of Change Algorithm
  - Contemplation Ladder
  - Perceived Importance of Quitting Smoking
  - Self-Efficacy to Quit Smoking
3. Participants also provide measures of expired breath carbon monoxide (at one week, but not at one-month).
4. Participants are asked if they have made contact with a tobacco dependence treatment program or have tried to quit smoking (treatment contacts are corroborated with treatment staff).
5. At one-month follow-up participants will be called on the telephone to ask if they have made a quit attempt, or have contacted a tobacco dependence treatment program since the baseline interview.

## Appendix P. – Treatment Fidelity

Please read the following questions very carefully, and answer each item truthfully. Please circle the words "True" or "False" to the right of each statement.

1. T / F You talked about the link between cigarettes and nicotine
2. T / F You talked about how much money you spend on cigarettes every week.
3. T / F You talked about why smokers aren't satisfied with one or two cigarettes per day.
4. T / F You talked about how many people die early from smoking cigarettes.
5. T / F The researcher tried to talk you into quitting smoking
6. T / F You talked about **your own** health issues and how they relate to smoking.
7. T / F You talked about the different nicotine withdrawal symptoms.
8. T / F You talked about second-hand smoke.
9. T / F You talked about how addicted, or "hooked" on cigarettes you are compared to other smokers
10. T / F You talked about how much carbon monoxide is in your lungs compared to non-smokers.
11. T / F You were asked **why** it is important for you to quit smoking.
12. T / F You were asked what might make you more confident that you could quit smoking if you wanted to.
13. T / F The researcher asked permission before giving you advice about smoking.

### About the Author

Marc Steinberg earned a Bachelor's Degrees with High Honors in Psychology and with Honors in Communication from Rutgers College – Rutgers University in 1993. He then earned a Master of Arts in Clinical Psychology from the University of South Florida in 1998. He completed a pre-doctoral clinical internship at the East Orange Veteran's Affairs New Jersey Healthcare System in 2000 and is currently working in the Division of Addiction Psychiatry at Robert Wood Johnson Medical School – University of Medicine & Dentistry of New Jersey. He has authored several peer reviewed publications and presented data at national meetings of the College on Problems of Drug Dependence and the Society for Research on Nicotine and Tobacco. He is married and has one daughter.