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## Smoking Cessation in a University Setting: The Efficacy of an Experiential, Theory-Based Intervention for College Students

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Smoking Cessation in a University Setting: The Efficacy of an Experiential,  
Theory-Based Intervention for College Students

by

Vani Nath Simmons

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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ABSTRACT

The college setting represents an untapped “window of opportunity” to target the growing number of college student smokers. To address this need the current study tested an intervention drawing upon research from social psychology and previously effective health-related interventions. The primary purpose of this study was to examine the efficacy of an experiential, dissonance-enhancing smoking intervention for increasing motivation to quit smoking and reducing smoking by comparing it to two control groups, in a three-arm randomized study. Participants were 215 college student smokers randomized to an experiential smoking intervention, a traditional educational smoking intervention, or an experiential intervention on nutrition. A secondary purpose of the present study was to explore the influence of possible mediating variables (e.g. risk perceptions, smoking knowledge) and to investigate whether demographic or smoking history variables would moderate the effects of the intervention. As predicted, the experiential smoking intervention was more effective in increasing motivation to quit as compared to both groups. However, moderator analyses revealed that the effect was found only for females. Increased motivation to quit was also demonstrated on an immediate behavioral measure of impact. Additional analyses indicated that a greater reduction in smoking and higher quit rates at follow-up were found for participants in



both smoking conditions as compared to participants in the Nutrition control condition. Potential mechanisms of change were not supported; however, participants who received the experiential smoking intervention exhibited greater smoking knowledge and were more likely to report greater negative consequences of smoking. Findings support the efficacy of a standard didactic intervention, and the added efficacy of a more intensive experiential intervention. Implications for intervention are discussed.

## Chapter One

### Introduction

Cigarette smoking accounts for more than 400,000 deaths per year in the United States alone (MMWR, 2002). At least one-third of all cancer-related deaths are the result of cigarette smoking (Cinciripini & McClure, 1998). Smoking is related to cancer of the mouth, pharynx, larynx, bladder, stomach, pancreas, esophagus, kidney, cervix, and uterus (Siemiatycki, Krewski, Franco, & Kaiserman, 1995). Furthermore, cigarette smoking accounts for 90% of lung cancer cases. As compared to nonsmokers, current male smokers are 22 times more likely to die of lung cancer, and current female smokers are 12 times more likely. In 1987, lung cancer due to smoking surpassed breast cancer as the leading cause of cancer death among women (USDHHS, 2001). The recent Surgeon General's report on the health consequences of smoking revealed that smoking causes disease in nearly every organ of the body (USDHHS, 2004).

Quitting smoking is the single most important health behavior change most individuals can make. Smoking cessation can greatly reduce mortality and morbidity from cancer. For example, three to five years after cessation, the risk of developing oral cancer is reduced by 50%, and after ten years, a former smokers' risk is reduced to the level of a nonsmoker. Further, the risk of developing lung cancer can decrease by 20-90%, depending on length of abstinence, and risk continues to decline with increasing years of abstinence (Cinciripini & McClure, 1998). In addition to the dramatic health effects of smoking, the economic burden of smoking on society remains substantial, with

health-related economic costs associated with smoking reaching more than \$150 billion (MMWR, 2002). This suggests that even minimal reductions in smoking rates may have a significant economic impact. Research has demonstrated that smoking cessation can indeed be a cost-effective means of disease prevention. According to the Surgeon General's report (USDHHS, 2000), smoking cessation is more cost-effective than commonly provided prevention services such as cervical, breast, and colon cancer screenings. Taken together, the data suggest that smoking cessation interventions are a cost-effective and important tool for cancer prevention.

The number of people who smoke has decreased over the past 25 years and nearly half of all adults who have ever smoked have quit (USDHHS, 1989). Although this decrease in smoking rates is encouraging, fifty million people continue to smoke and 3,000 adolescents are becoming addicted each day (USDHHS, 1996). This rise in adolescent smoking among middle school and high school students has reached the college population, resulting in a corresponding increase in smoking prevalence among young adults (Wechsler, Rigotti, Gledhill-Hoyt, & Lee, 1998). The 1994 Surgeon General's report, *Preventing Tobacco Use Among Young People* (USDHSS, 1994), increased the focus of tobacco research and prevention efforts on adolescents. This attention has resulted in a large body of research on adolescent smoking, as well as an influx of school-based, community, and statewide efforts aimed at preventing tobacco use among adolescents. Although primary prevention efforts have been viewed as the ultimate goal of tobacco control efforts, secondary prevention (i.e., treatment of early stage tobacco use and dependence) deserves attention as well. Because approximately one million teenagers begin smoking each year, greater attention must be paid to helping

those who have already begun smoking. Unfortunately, until very recently, little research or intervention attention has been paid to secondary prevention of smoking.

The young-adult years (ages 18-24) have the highest prevalence rates of smoking (Anthony & Echeagaray-Wagner, 2000), and nearly one-third of college students report being current smokers (MMWR, 1997). The prevalence of current college smoking increased by nearly 30% from 1993 to 1997 (Wechsler et al., 1998). This increase cut across gender, age, and ethnicity. Twelve million students enter college each year, making college an opportune time for smoking interventions. Further, college-age youth represent the youngest *legal* population that the tobacco industry is able to target for promotion of their products, making college students especially vulnerable to strategies used to facilitate lifelong addiction (Sepe & Glantz, 2002; Sepe, Ling, & Glantz, 2002). For instance, tobacco companies such as Marlboro use fraternities to promote their products hosting special “Greek Nights” in which free cigarettes, t-shirts, and lighters are given away. Further, the tobacco industry has significantly increased its presence in bars and clubs over the five-year period of 1994-1999, often providing financial incentives to bar owners to promote their product (Sepe, Ling, & Glantz, 2002). Investigation of tobacco industry documents by Ling & Glantz (2002) reveals that tobacco companies market cigarettes to college students as a way to ease the stress caused by the transition from the teen years to adulthood. This research underscores the need for interventions to be available as industry efforts intensify.

College smokers have smoking behaviors that appear to be more entrenched than adolescents. Those who started smoking before college become more frequent smokers in college (Hines, Fretz, & Nollen, 1998; CDC, 2001). Nevertheless, their smoking

behavior appears to be significantly less developed than that of adult smokers. Among current college smokers, 32% smoke less than 1 cigarette per day, 43.6% smoke 1-10 cigarettes per day, and only 12.8% smoke more than a pack per day (Rigotti, Lee, & Wechsler, 2000). Further, research suggests that college students' cognitive outcome expectancies are less specific and developed than the expectancies of more experienced, adult smokers (Brandon & Baker, 1991; Copeland, Brandon, & Quinn, 1995). Thus, college students represent a much less dependent sample, as compared to the adult smoking population, making them an ideal population for intervention. Finally, unlike the decline in illicit drug use and drinking which occurs after college, smoking persists through adulthood, underscoring the need for a timely intervention (Gotham, Sher, & Wood, 1997; Breslau & Peterson, 1996). Because college represents a transitional period for smoking and other health behaviors, it may offer a unique "window of opportunity" for smoking interventions aimed at secondary prevention.

Current research suggests that, despite public health campaigns, smokers continue to underestimate the health consequences of long-term tobacco use (Weinstein, 1998). Giacopassi and Vandiver (1999) investigated college students' perceptions of tobacco use consequences and found consistent results. Specifically, results indicated that whereas students greatly overestimate the number of homicides and cocaine-related deaths, they grossly underestimate the number of tobacco-related deaths, wrongly believing that cocaine and homicides cause more deaths than tobacco. Additional research by Prokhorov and colleagues (2003) suggests that college smokers feel invulnerable to the health effects of smoking. For instance, almost ninety percent of college smokers in their sample denied having any symptoms related to smoking, yet almost all of them reported

having respiratory difficulties such as shortness of breath or persistent cough. Minimization of the tobacco problem appears to be shared by the colleges themselves. Surveys indicate that a majority of colleges permit smoking in private areas such as residence hall rooms. Thirty-two percent of colleges continue to sell tobacco products on campus and eleven colleges allow tobacco to be purchased on meal cards (Gardiner, 2002). Although more than half of the surveyed colleges reported that they offered some type of smoking cessation programs, there is little utilization of these resources (Majchrzak, Park, & Rogotti, 2002; Wechsler et al., 2001). This research suggests that smoking cessation programs offered at colleges are not sufficient. Students do not appear to be motivated to actively seek typical cessation programs; therefore, more creative and proactive secondary prevention efforts are needed. To date, the vast majority of research on college student smoking has been descriptive in nature or has simply used college students as a sample of convenience. Indeed there has been a lack of systematic research aimed at developing interventions specifically for college student smokers.

The current study tests an intervention that is based upon theories and empirical research from the social psychology literature on attitude and behavior change and is experiential in nature. Research suggests that experiential, or active, learning is more likely to produce enduring changes in attitudes and behavior than is more traditional didactic instruction (Miller et al., 1996; Onion & Bartzokas, 1998; Viswevaran & Schmidt; 1992). That is, information must be delivered in a manner more effective than the typical didactic, non-interactive methods that passively relay information (e.g., pamphlets, videos). An example of an experiential intervention for college students is the alcohol expectancy challenge paradigm used by Darkes and Goldman (1993, 1998). In

this intervention, college students are given either alcohol or placebo beverages (or if they are underage, they observe others drinking the beverages) prior to an opportunity for a social interaction. They then are asked to guess which students had received alcohol versus placebo, and they subsequently discover that their guesses are no better than chance. This procedure has been found to reduce subsequent drinking among participants. The absence of a high quality placebo cigarette and the fact that smokers' expectancies appear to more accurately reflect the pharmacological effects of the drug than do drinkers' expectancies, makes a similar paradigm for smoking unfeasible. However, the experiential, active learning characteristics of the intervention serve as a model for the current study. It is also important to note that a recent task force report on college alcohol abuse concluded that whereas interventions such as increased publicity have demonstrated efficacy upon the student population as a whole, only more intensive programs, such as experiments challenging alcohol expectancies, are effective with at-risk and dependent drinkers (NIAAA, 2002). Given the high risk of dependence, even among light smokers, intensive interventions such as the one described above are also warranted for smoking among college students.

Prior research has suggested that presenting smokers with risk information may not be an effective strategy because smokers use cognitive dissonance reducing techniques (Festinger, 1957) to discount the *personal relevance* of the messages offered by the intervention (e.g., Halpern, 1994; Jenks, 1992; McMaster & Lee, 1991). Cognitive dissonance may be applied to tobacco use because the behavior conflicts with the health information to which they are continually exposed. According to dissonance theory, there are three methods a smoker can use to reduce such dissonance. First, individuals

can change their behavior by quitting smoking. Second, as Festinger (1957) suggests, information that increases dissonance can be misinterpreted or ignored by the person wishing to reduce the dissonance in order to avoid psychological discomfort. Thus, smokers can deny information received about the harmful effects of smoking or they may question the validity of research linking smoking with harmful health outcomes. In fact, through the use of focus groups and factor analytic procedures, Lo Conte (1995) has identified and categorized several risk minimizing belief patterns smokers exhibit that contribute to lowered personal risk estimates. For instance, smokers are more likely than nonsmokers to endorse the belief that one can compensate for hazardous smoking behavior by adopting health promoting behaviors such as diet and exercise. Further, smokers are more likely to doubt the link between smoking and adverse health consequences. Finally, the third way that smokers can reduce dissonance is by adding new cognitions that are consonant with the behavior. That is, smokers may contend that they are so addicted to smoking that their behavior is “out of their hands” and they are unable to quit smoking (Jenks, 1992). Alternatively, smokers may claim that the positive effects of smoking are worthwhile despite the risks of getting cancer.

In line with the theory of cognitive dissonance, McMaster and Lee (1991) found that, despite an equal level of factual knowledge, smokers endorsed a greater number of rationalizations for smoking than nonsmokers and ex-smokers. For example, nearly half of the smokers in their sample endorsed the following statements: "smokers can usually tell if they are being harmed by cigarettes" and "smokers can totally reverse damage to their health by deciding to give up smoking." Similarly, consistent with cognitive



dissonance interpretation, Dawley, Fleisher, and Dawley (1985) and Halpern (1994) found that the more a person smokes, the stronger the denial of risks.

Research has also demonstrated that cognitive dissonance theory can be applied to health related interventions. For instance, Stone and colleagues (1994) employed principles from cognitive dissonance theory to influence the adoption of safe sex practices among college students. Specifically, they induced hypocrisy by asking participants to write pro-attitudinal speeches advocating condom use, while they were reminded of their own failure to use condoms in the past. Participants were also videotaped, requiring them to make a public commitment towards condom use. Participants purchased significantly more condoms when given the opportunity as compared to the control condition.

According to Wilson and colleagues (2002) how an individual presents themselves publicly (eg. on videotape) can influence how they behave. Research has demonstrated that health related interventions that require participants to make a public commitment are more effective in changing behavior than educational (Wilson et.al, 2002) or cognitive interventions aimed at modifying risk perceptions (Leake, Friend, & Wadhwa, 1999; Eitel & Friend, 1999).

In a prior study (Simmons, Webb, & Brandon, in press), 144 college smokers were recruited and randomly assigned to 4 conditions in a 2x2 factorial design. Participants were asked to prepare a counter-attitudinal essay about (Factor 1) the risks of smoking and/or (Factor 2) the feasibility of quitting smoking. Participants in a control condition wrote essays about the history of tobacco. Participants then read the essay to a video camera and were told that their video would be used as an intervention for

adolescent smokers. The primary experimental finding was a significant interaction ( $p = .04$ ) between the two factors on intentions to quit smoking, such that either manipulation increased intentions, but their impact was not additive. The primary correlational finding was that, as hypothesized, degree of cognitive dissonance was associated with intentions to quit smoking ( $p = .02$ ). The findings from this study suggest that attitudes and intentions to quit smoking can be influenced by a brief experiential intervention. The current study extends this research by increasing the potency of the social psychological elements of the study and including a follow-up measure of smoking behavior.

The goal of the present study was to test a theory-based experiential intervention designed to reach college student smokers. This line of research is based upon the goal of delivering to college students information about the negative consequences of smoking and their ability to quit smoking.

**Specific Aim 1. To test the efficacy of an experiential intervention for increasing motivation to quit smoking and reducing smoking behavior.** Specifically, we tested the efficacy of the experimental intervention by comparing it to two control groups, in a three-arm randomized study. The first control group, Standard Didactic Smoking Intervention, represented a more traditional educational smoking intervention. The second control group comprised an experiential intervention for a non-tobacco topic—Diet and Nutrition. This intervention was added to control for generalized effects of the experiential component itself, as well as for the multiple assessments. We expected to find the greatest changes in cessation motivation and behavior from the Experiential Smoking Intervention as compared to either control group. No prediction was made regarding outcome differences between the two control groups.

**Specific Aim 2. To explore the influence of possible mediating variables including: risk perceptions, smoking-related outcome expectancies, cognitive dissonance, and smoking-related knowledge, on intervention outcomes. We were also interested in investigating whether demographic or smoking history variables would moderate the effects of the interventions.** Research suggests that risk perceptions, smoking-related outcome expectancies, and cognitive dissonance are related to changes in smoking behavior. Specifically, as smokers move closer to making a commitment to quit smoking, their risk perceptions increase, as do their negative expectancies for smoking, and the uncomfortable dissonance related to the fact that they are still smoking. In addition, positive expectancies appear to decrease as smokers make a decision to quit. Consistent with the results of the prior study, we expected to find these changes in perceptions of risk and smoking expectancies following the smoking interventions. We also included measures of smoking-related knowledge to ascertain whether information was retained. Finally, research has suggested that treatment outcome can be influenced by variables such as the smokers' level of nicotine dependence or gender (Fiore, 2000); therefore we were interested in examining whether demographic (e.g., gender, age, education) or smoking history variables (e.g. nicotine dependence) would moderate the effects of the interventions. Because this aim was more exploratory, specific hypotheses regarding mediating and moderating variables were not specified.

## Chapter Two

### Method

#### *Experimental Design Overview*

The current study employed a randomized three-arm design. The three conditions included the Experiential Smoking Intervention (Exp-Smoke) and two control conditions. The first control condition, Standard Didactic Smoking Intervention (Standard) allows us to test if an experiential, theory-based intervention is more effective than a typical didactic intervention. The second control condition was the Experiential Nutrition Intervention (Exp-Nutrition). This was essentially a no-treatment control condition. However, by providing an experiential learning experience focused on a topic other than smoking (i.e., nutrition), it controlled for any effects of the experiential component itself, as well as for the multiple assessments. The two primary dependent variables were change in self-reported intention to quit smoking, measured before and after the intervention, and change in smoking behavior over the month following the intervention. Secondary dependent variables that were examined as potential mediators include risk perceptions, smoking-related outcome expectancies, cognitive dissonance, and smoking-related knowledge. Demographic and smoking history variables were also examined as possible moderators.

#### *Participants*

Participants in the study were 215 college student smokers at the University of South Florida. Participants were recruited in classrooms and through Freshman

orientation sessions. Specifically, a screening questionnaire with a question about smoking status was administered to students. Those students who indicated that they smoked were contacted and screened by telephone for the following inclusion criteria: enrolled at the University of South Florida, 18-24 years of age, able to speak and read English, and smoking five or more cigarettes per week. Because smoking status was assessed by one of a series of questions on the questionnaire, we were able to mask the focus of the study, and thus prevent participants from determining why they were eligible for the study. Students in their last semester were excluded to minimize loss to follow-up.

### *Measures*

*Demographic questionnaire.* Demographic data including age, education (including year in school), marital status, ethnicity, and parental educational attainment was collected.

*Smoking Status Questionnaire.* The Smoking Status Questionnaire was administered in order to ascertain current smoking status and smoking history, as well as to assess nicotine dependence levels of the participants. The questionnaire included the *Fagerström Test for Nicotine Dependence* (FTND), which is the standard measure of nicotine dependence (Heatherton, Kozlowski, Frecker, & Fagerström, 1991).

*Contemplation Ladder* (Biener & Abrams, 1991). The contemplation ladder was administered to measure intention to quit smoking. The contemplation ladder has been conceptualized as a continuous measure of motivation. The ladder comprises ten rungs ranging from "No thoughts of quitting" to "Taking action to quit." Participants were instructed to circle the number on the ladder that best indicates where they are in terms of

thinking about quitting. Evidence for the contemplation ladder as a predictor of smoking cessation has been established (Biener & Abrams, 1991; Herzog et al., 2000). The contemplation ladder was administered at three time points including; pre-intervention, post-intervention, and at one-month follow-up

*Stages of Change Questionnaire* (Prochaska & DiClemente, 1983). The stages of change algorithm consists of a 3-item measure of motivation to quit smoking. The stages of change algorithm has predicted both attempts to quit smoking and actual cessation (DiClemente et al., 1991). Although this algorithm lacks some of the psychometric advantages of the Contemplation Ladder and it produces a different distribution of quitting motivation (Nath, Herzog, & Brandon, 2002), it is widely used, and its inclusion allows for comparisons with other published studies. The stage of change measure was administered post-treatment and at one-month follow-up.

*Risk Perception Questionnaire*. There is currently no single measurement tool that can be used to assess smoking risk perceptions (see Weinstein, 1998). For the proposed study, risk was assessed by asking participants about their likelihood of developing six smoking related diseases (e.g. lung cancer, heart disease, emphysema) using a 7-point Likert Scale from 1 (Extremely Unlikely) to 7 (Extremely Likely). Additionally, participants were asked about their overall chance of developing a smoking-related disease. This question was successful at reflecting the different interventions used in a prior study (Simmons, Webb, & Brandon, in press), providing evidence of its construct validity. Participants were instructed to circle the number that best represented their perceptions of risk.

*Smoking Consequences Questionnaire* (Brandon & Baker, 1991). The Smoking Consequences Questionnaire (SCQ) was developed for college students, and it measures smoking-related outcome expectancies on four factors: Positive Reinforcement/Sensory Satisfaction, Negative Reinforcement/Negative Affect Reduction, Appetite/Weight Control, and Negative Consequences. Coefficient alpha reliabilities for the four scales ranged from .91-.96. The SCQ scale scores discriminated among smokers with varying levels of smoking experience suggesting construct validity. The SCQ was included to measure changes in positive and negative expectancies due to the interventions.

*Dissonance Thermometer* (Elliot & Devine, 1994; Devine et al., 1999). This 14-item instrument was administered immediately following the intervention to measure affective discomfort associated with cognitive dissonance. This measure of affect is comprised of four factors: Discomfort, Negself, Positive, and Embarrass. Cronbach alphas reported for all four scales exceeded .80. Participants were asked to indicate how they are feeling "right now" on a 7-point Likert scale from 1 (Does Not Apply at All) to 7 (Applies Very Much). Prior research has found the measure to be reliable and predictive of intentions to quit smoking (Nath et al., 2002) and has indicated that the discomfort factor represents a distinct affective consequence of dissonance induction (Elliot & Devine, 1994). The discomfort factor consists of the items *uncomfortable*, *uneasy*, and *bothered*.

*Test of Smoking Knowledge*. In order to measure how well participants retained factual smoking information (which participants were exposed to in both smoking interventions) a 10-item multiple-choice test of factual material was administered.

*Smoking Follow-up Interview.* One month after completion of the study, participants received a follow-up telephone call to assess their smoking status. The time-line follow-back procedure (Sobell & Sobell, 1992) was used to recreate their smoking over the past month.

*Behavioral Measure.* As a short-term behavioral measure of movement toward smoking cessation, smoking cessation pamphlets were placed at the exit of the experimental room and the number of pamphlets picked up by participants following the intervention was recorded.



Table 1

*Summary of Assessment Procedures*

Telephone Screening	<ul style="list-style-type: none"> <li>• Participants were screened for inclusion and exclusion criteria, embedded among distraction questions</li> </ul>
Pre-Intervention	<ul style="list-style-type: none"> <li>• Demographic Questionnaire</li> <li>• Contemplation Ladder</li> </ul>
Post-Intervention	<ul style="list-style-type: none"> <li>• Risk Perception Questionnaire</li> <li>• Smoking Status Questionnaire</li> <li>• Smoking Consequences Questionnaire</li> <li>• Dissonance Measure</li> <li>• Contemplation Ladder</li> <li>• Stages of Change Questionnaire</li> <li>• Test of Smoking Knowledge</li> <li>• Comparable Nutrition questionnaires</li> <li>• Behavioral Measure – Smoking Cessation Pamphlet</li> </ul>
One-Month Follow-up	<ul style="list-style-type: none"> <li>• Timeline follow-back (measures smoking behavior for the last month)</li> <li>• Contemplation Ladder</li> <li>• Stages of Change Questionnaire</li> </ul>

*Procedure*

*Intervention Conditions*

*Experiential Smoking Intervention (Exp-Smoke).* Participants in this condition participated in an active learning task in which they engaged in a discussion of smoking related topics (e.g., health risks of smoking, increasing costs of cigarettes, feasibility of quitting). This discussion was videotaped and played back for participants to view. Within this experiential learning framework, principles from social psychology were employed to enhance attitude change. The delivery of the speech on video induces a public commitment and has proved to be an effective tool in attitude change (e.g., Dickerson et al., 1992; Pallak et al., 1980; Stone et al., 1994). Further, having

participants publicly advocate beliefs that are clearly inconsistent with their own behavior (e.g., having current smokers state the hazards of smoking) induces hypocrisy that can motivate behavior change (e.g. Eitel & Friend, 1999; Leake, Friend, & Wadhwa; 1999). Specifically, according to cognitive dissonance theory (Festinger, 1957), when people experience psychological discomfort (which results from feeling one is being hypocritical) they will be motivated to reduce this discomfort by changing their attitudes and/or behavior (Draycott & Dabbs, 1998). Stone and colleagues (1994) have used this technique successfully to increase condom use among young adults. Thus, this intervention borrows experiential techniques used from both effective alcohol (e.g., Darkes & Goldman, 1993, 1998) and safe sex (Stone et al., 1994) interventions. Further, although this study is not based on the Transtheoretical Model, the experimental design is consistent with the theorized processes of change. For instance, it is highly likely that our experimental manipulation taps the consciousness raising, social liberation, and self-reevaluation processes of change. Further, according to the TTM, stages are moderated by three factors, one of which is decisional balance. Decisional balance refers to the relative weight given to the "pros" and "cons" of smoking and can influence whether or not an individual takes action. These "cons" include smoking related health risks. Our experimental manipulation was designed to emphasize the "cons" of smoking thus influencing stage progression.

*Procedure for the Exp-Smoke Intervention.* Participants who met the screening criteria were scheduled for appointments in groups of 3-8 at the Psychological Services Center (PSC) at the University of South Florida. Upon arrival, participants were escorted to a group therapy room located within the PSC. Participants were introduced to the

study and were told that the goal of the project was to create a series of videos for high school seniors on a variety of health-related topics. Specifically, we told participants “we would like to invite you to participate in the making of a video by allowing us to tape you as you discuss a health-related topic.” Participants were informed that they were chosen because college students are one step ahead of high school seniors and that the students in our target audience tend to look up to them.

Research suggests that attitude change is greatest when individuals believe that they chose to engage in the dissonance-enhancing (hypocritical) behavior (e.g., Cooper et al., 1978; Harmon-Jones, 2000; Zanna & Cooper, 2000). Therefore, we fostered the appearance of choice by focusing on the optional nature of the task by asking participants if they wish to participate and stressing that participation is voluntary. To do this, we used strategies utilized effectively by prior research paradigms (Wenzlaff & LePage, 2000; Beauvois, Bungert, & Mariette, 1995). We asked participants, “Would you like to participate in this task?” and further stated, “Remember your participation is completely *voluntary*, are you sure you would like to participate?” Receiving a positive response to these questions emphasizes free choice. After providing consent, participants were paid \$20 for their participation. Participants then completed the demographic questionnaire and both the nutrition and smoking versions of the Contemplation Ladder.

After completing the baseline questionnaires, the topic of discussion was chosen. Since participants were randomly assigned to conditions prior to the intervention, steps were taken to ensure that participants “chose” smoking as the topic of discussion. We did this by asking participants to choose the topic they would like to discuss and then subtly suggesting the topic of their speech, making it appear that they had chosen the

topic. They were told that videos were still needed on two topics—tobacco smoking and proper diet and nutrition—and that they may choose as a group which topic to focus upon. However, the experimenter led the group to choose the tobacco topic. For instance, the experimenter would state the following, “We have two topics left to cover, nutrition and smoking. Since I see here that you all are smokers, and we need more smoking videos, it would be nice if you chose the smoking topic, however, the decision is entirely up to you. Which topic do you want to do?” Together, these strategies fostered an appearance of choice; and allowed participants to feel that they were making the ultimate decision.

After the group “chose” to make the tobacco video, participants were handed a list of 15 points and requested to cover the points during the video. These points related to the health risks of smoking, more immediate negative consequences of smoking (e.g., bad breath, economic cost), and the importance of quitting early on, prior to the development of long-term, heavy nicotine dependence. Participants were told that they should attempt to incorporate at least 3 of the points on the list and were also given the freedom to add comments that they felt would convince high school students to quit smoking. A second experimenter operated the video camera. Over the next 30-35 minutes, the experimenter led an open discussion of tobacco smoking, guiding the discussion only to ensure that a number of targeted points were covered, and that each individual contributed to the discussion.

After the videotaped discussion was completed, brief segments of the videotape were played back to the participants. Participants were then administered post-treatment assessments, including the Contemplation Ladder, Stages of Change Questionnaire, Risk

Perception Questionnaire, Smoking Consequences Questionnaire, and Test of Smoking Knowledge. Participants also completed the appropriate Nutrition versions of these questionnaires.

*Experiential Nutrition Intervention (Exp-Nutrition).* Aside from the topic of discussion, the procedures were identical to the Exp-Smoke condition. In this condition the experimenter guided the group to choose to make the nutrition-related video rather than the tobacco video. As with the Exp-Smoke condition, participants completed both the smoking and nutrition-related questionnaires.

*Didactic Smoking Intervention (Standard).* This condition was included so that we could test whether the Exp-Smoke intervention was more effective than a more typical didactic intervention that covers much of the same factual information. Participants were shown an anti-smoking video (*Butt-Out: The Proven Quit Smoking Plan*, American Cancer Society and American Lung Association) followed by a question and answer session with the experimenter. As with the other conditions, participants then completed the post-treatment assessments.

#### *Follow-Up*

One month after the intervention, all participants received a follow-up phone call to assess smoking status. During the follow-up call, the Smoking Follow-up Interview was administered to assess participants' smoking behavior since the intervention, including their current smoking behavior (i.e., number of cigarettes smoked in each of the past seven days). In addition, the researcher administered the Contemplation Ladder and the Stages of Change Questionnaire to assess current motivation to quit smoking. Participants were then debriefed. Specifically, they were told that the purpose of this

study was to learn more about new approaches to help people quit smoking and that we hoped to use information gained from their participation to design effective interventions. In addition, they were told that because we were in the early stages of the research, we were just testing how everything would work, and thus their videotape would not be shown to high school students. Participants were paid \$15 for completing the follow-up call. One participant was unable to be reached for follow-up.

## Chapter Three

### Results

Participants were 215 college student smokers (136 female, 79 male) from the University of South Florida. Participants were randomly assigned to the Exp-Smoke (n = 72; 47 female, 25 male), Exp-Nutrition (n = 71; 45 female, 26 male), and Standard (n = 72; 44 female, 28 male) conditions. Demographic and smoking history variables are presented in Table 2. A series of one-way analyses of variance (ANOVAs) and chi-square analyses indicated that the groups were equivalent on all demographic and smoking history variables.

Table 2

*Participant Characteristics*

Variable	%	<i>M</i>	<i>SD</i>
		20.19	1.73
GPA		3.1	.48
Smoking History			
Years smoked		3.43	2.34
Cigarettes smoked per week		55.35	45.86
Fagerström Score		2.03	2.63
Ethnicity			
Caucasian	83		
Black	3		
Asian	3		
Native American	0		
Other	11		
Hispanic	16		
Year in school			
Freshman	31		
Sophomore	24		
Junior	26		
Senior	20		
Other	0		
Marital Status			
Never married	98		
Married	2		
Divorced	0		

*Readiness to Quit Smoking*

Readiness to quit smoking was assessed by administering the contemplation ladder at baseline, post-intervention, and at one-month follow-up. Table 3 below depicts unadjusted contemplation ladder scores. To investigate differences between intervention groups with respect to readiness to quit, Analyses of Covariance (ANCOVA) were conducted with baseline ladder scores as a covariate; adjusted means are reported in subsequent analyses.



Table 3

*Ladder Scores Across Time, unadjusted means*

Condition	Pre-Intervention		Post-Intervention		One-month follow-up	
	Mean	SD	Mean	SD	Mean	SD
Exp-Smoke	5.47	3.02	6.76	2.67	7.42	2.44
Standard	6.00	2.24	6.47	2.20	7.19	2.07
Exp-Nutrition	6.06	2.86	6.10	2.82	5.82	2.50

As predicted, after controlling for baseline scores, a difference in post-intervention contemplation ladder scores was found across conditions,  $F(2, 211) = 15.61$ ,  $p < .001$ . Specifically, immediately following the intervention, participants in the Exp-Smoke condition reported higher intentions to quit smoking than participants in the Exp-Nutrition,  $M = 6.99$  vs.  $M = 5.85$ ;  $F(1, 140) = 30.25$ ,  $p < .001$ , and Standard conditions,  $M = 6.96$  vs.  $M = 6.27$ ;  $F(1, 141) = 8.38$ ,  $p = .004$ . The estimated effect sizes for the Exp-Smoke condition relative to the Exp-Nutrition condition and the Standard condition are  $\eta^2 = .178$  and  $\eta^2 = .056$ , respectively. Participants in the Standard condition reported greater readiness to quit smoking than participants in the Exp-Nutrition condition,  $M = 6.49$  vs.  $M = 6.08$ ;  $F(1, 140) = 6.57$ ,  $p = .011$ .

At one-month following the intervention, there was a significant difference between groups with respect to readiness to quit,  $F(2, 210) = 15.18$ ,  $p < .001$ . Specifically, participants in the Exp-Smoke and Standard condition continued to report higher intentions to quit smoking as compared to the Exp-Nutrition condition ( $ps < .001$ ).

Although participants in the Exp-Smoke condition continued to report greater readiness to quit as compared to the Standard condition ( $M = 7.52$  vs.  $M = 7.10$ ), the difference was no longer significant at one-month follow-up ( $p = .233$ ).

*Moderator analyses.* Exploratory analyses were conducted to examine whether the observed relationship between condition and readiness to quit was moderated by demographic or smoking history variables. Evidence for moderation is indicated by the presence of a significant interaction between the independent variable and moderator (Baron & Kenny, 1986). Tested moderators included: age, education, grade point average, cigarettes per week, Fagerström scores, and gender. ANOVA and regression analyses were used to examine these relationships. Results demonstrated that only gender met criteria for moderation. Specifically, the significant interaction term of condition and gender suggested that gender acted as a moderator of condition in predicting change in readiness to quit post-intervention,  $F(2, 209) = 5.90, p = .003$ . This effect was not found one-month following the intervention,  $F(2, 208) = 1.52, p = .22$ . As can be seen in Figure 1, male and females showed differential responding based on condition. Females exhibited the greatest change in readiness to quit when participating in the Exp-Smoke condition as compared to the Standard and Exp-Nutrition conditions. This effect, however, was not found among males.

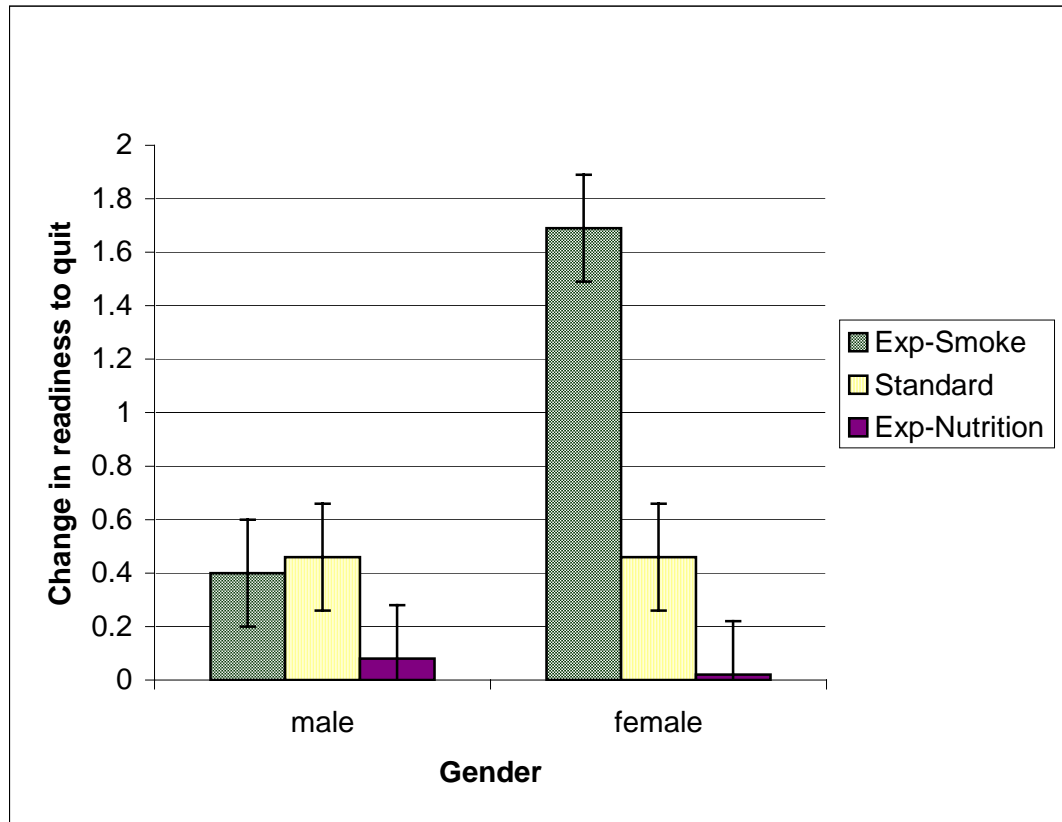


Figure 1. Gender moderates the relationship between condition and readiness to quit post-intervention.

Because of this moderator effect of gender, a series of ANCOVAs was conducted within gender to examine differences across condition in readiness to quit. After controlling for baseline scores, a significant difference in post-intervention contemplation ladder scores was found for females,  $F(2, 132) = 16.45, p < .001$ , but not for males,  $F(2, 75) = 1.09, p = .341$ . Pairwise comparisons indicated that females in the Exp-Smoke condition reported higher intentions to quit smoking following the intervention than females in the Standard,  $M = 7.10$  vs.  $M = 6.12$ ;  $F(1, 88) = 8.60, p = .004$ , and Exp-Nutrition conditions,  $M = 7.08$  vs.  $M = 5.37$ ;  $F(1, 89) = 34.28, p < .001$ . The estimated effect size for the Exp-Smoke condition relative to the Standard condition is  $\eta^2 = .089$ .

The estimated effect size for the Exp-Smoke condition relative to the Exp-Nutrition condition is  $\eta^2 = .278$ . Females in the Standard condition also reported higher post-intervention ladder scores than females in the Exp-Nutrition condition,  $F(1, 86) = 4.11, p = .046$ .

Analyses were also conducted within gender to investigate differences among conditions in readiness to quit at follow-up. One-month following the intervention, after controlling for baseline scores, a significant difference was found for females in contemplation ladder scores,  $F(2, 131) = 15.43, p < .001$ . Similar to findings at post-intervention, ladder scores did not differ for males across conditions,  $F(2, 75) = 1.97, p = .146$ . Pairwise comparisons revealed that at one-month following the intervention, females in the Exp-Smoke and Standard condition continued to report higher intentions to quit as compared to the Exp-Nutrition condition ( $p < .001$ ). Although females in the Exp-Smoke condition also reported higher intentions to quit as compared to the Standard condition ( $M = 7.70$  vs.  $M = 7.24$ ), the difference was no longer significant one-month following the intervention ( $p = .278$ ).

#### *Stage of Change Movement*

Stage of change was assessed at post-intervention and at one-month follow-up. Participants were categorized as having “advanced” if they progressed at least one stage between these assessment points, “regressed” if they moved back at least one stage, or “stayed the same” if there was no movement in stage. As expected, stage movement was significantly different among the three intervention groups, using Kruskal-Wallis,  $\chi^2(2, N = 209) = 17.67, p < .001$ , thus reflecting a change in motivation from post-treatment to follow-up. A greater proportion of participants in the Exp-Smoke group (37.7%)

advanced in their motivation to quit than those in the Exp-Nutrition (10.0%),  $p < .01$  or Standard group (22.9%),  $p < .01$ . No significant difference was observed between the Standard and Exp-Nutrition conditions,  $p > .05$ .

Stage of change movement was also examined by gender. For females, stage distributions were significantly different among the intervention groups, Kruskal-Wallis,  $\chi^2(2, n = 132) = 22.45, p < .001$ ; however, no significant difference was observed for males,  $\chi^2(2, n = 77) = .461, p = .794$ . Pairwise comparisons indicated that more females in the Exp-Smoke group (44.4%) advanced in their motivation to quit than females in the Exp-Nutrition (6.7%),  $p < .001$  or Standard group (21.4%),  $p < .001$ . There were no significant differences in the proportion who advanced, regressed, or stayed in the same stage of change for females in the Standard condition as compared to those in the Exp-Nutrition condition,  $p > .10$ .

### *Pamphlet Measure*

As an immediate behavioral measure of impact, the number of quit smoking pamphlets picked up following each intervention was recorded. As hypothesized, the proportion of pamphlets picked up by participants was significantly different across intervention conditions,  $\chi^2(2, N = 215) = 8.47, p = .01$ . That is, a greater proportion of individuals who participated in the group discussion on smoking picked up a pamphlet about smoking cessation (46%) following the intervention than those who viewed an anti-smoking video, 29%,  $\chi^2(1, n = 144) = 4.27, p = .04$ , or participated in a discussion on nutrition, 24%,  $\chi^2(1, n = 143) = 7.53, p < .01$ . The difference between the Standard and Exp-Nutrition condition was not significant. Due to the nature of this measure, we were unable to examine the genders separately.

### *Smoking Cessation and Reduction at One-month Follow-up*

Research suggests that measures of motivation to quit are significantly related to future cessation (Abrams, Herzog, Emmons, & Linnan, 2000). In the current study, intentions to quit post-intervention were correlated with a reduction in smoking at follow-up,  $r = .219, p = .001$ . To further investigate the influence of our intervention on smoking behavior, chi-square analyses were conducted to test differences between intervention groups in the proportion of participants who reportedly quit smoking or reduced their smoking rate one-month following the intervention. Quitting was defined as abstinence from smoking for *at least* the seven consecutive days prior to the one-month telephone follow-up call. Analyses revealed that there was a significant difference among groups in the proportion of those who quit smoking,  $\chi^2 (2, N = 214) = 6.55, p = .04$ . Specifically, at follow-up, a greater proportion of participants in the Exp-Smoke intervention group (9.9%) and Standard group (12.5%) quit smoking as compared to the Exp-Nutrition group (1.4%),  $\chi^2 (1, n = 142) = 4.77, p = .03$  and  $\chi^2 (1, n = 143) = 6.76, p < .01$ , respectively. The Exp-Smoke and Standard conditions did not differ in quit rates (9.9% vs. 12.5%),  $\chi^2 (1, n = 143) = .251, p = .62$ . No gender differences were found in smoking cessation rates across conditions.

We were interested in examining changes in smoking behavior broadly including a reduction in smoking rate. At one-month follow-up, a significant difference was also observed among groups in the proportion of participants who reported that they had either quit smoking or reduced the number of cigarettes smoked,  $\chi^2 (2, N = 214) = 14.96, p = .001$ . Once again, a greater proportion of participants in the Exp-Smoke condition reported quitting or cutting down as compared to the Exp-Nutrition condition (67.6% vs.

35.2%),  $\chi^2 (1, n = 142) = 14.91, p < .001$ . Participants in the Standard condition reported a greater reduction in smoking than those in the Exp-Nutrition condition as well (52.8% vs. 35.2%),  $p = .034$ . The difference in proportions between the Exp-Smoke and Standard condition approached significance (67.6% vs. 52.8%,  $p = .07$ ). Motivation to quit was examined as a mediator of the observed relationship between condition and smoking reduction. Mediation analyses revealed that when controlling for intentions, condition continued to significantly predict a reduction in smoking rate ( $p < .05$ ). Results suggest that motivation to quit failed to mediate the relationship between intervention condition and smoking reduction.

Results were also examined by gender. Among females, but not males, a significant difference was observed among groups in the proportion of participants who reportedly reduced the number of cigarettes smoked,  $\chi^2 (2, n = 135) = 13.66, p = .001$ . Pairwise comparisons indicated that females in the Exp-Smoke and Standard conditions reported a greater reduction in smoking than the Exp-Nutrition condition ( $p < .001, p = .026$ , respectively). Although a greater percentage of females in the Exp-Smoke condition reported a reduction in smoking as compared to the Standard condition (69.6% vs. 54.5%), the difference was not significant ( $p = .142$ ).

### *Process Measures*

In addition to assessing changes in smoking motivation and behavior, we also examined differences among intervention groups on potential mediating variables. In particular, we were interested in post-intervention differences in smoking knowledge retained, smoking-related outcome expectancies, risk perceptions, and dissonance-related affect. A series of one-way ANOVAs were conducted to test for group differences. As

can be seen in Table 4, significant differences were observed across groups in smoking knowledge, negative consequence smoking expectancies, and dissonance. Results for smoking knowledge and the negative consequence expectancies were in the expected direction. That is, compared to participants in both the Exp-Nutrition and Standard condition, participants in the Exp-Smoke condition demonstrated greater smoking knowledge and reported stronger negative consequence expectancies following the intervention ( $ps < .001$ ). In addition, both smoking interventions produced greater levels of dissonance-related affect as compared to the Exp-Nutrition condition ( $ps < .01$ ). No difference was found in risk perception.

Table 4

*Means and Standard Deviations of Process Measures by Experimental Condition*

	Exp-Smoke <i>M (SD)</i>	Standard <i>M (SD)</i>	Exp-Nutrition <i>M (SD)</i>	Overall <i>F</i>
Smoking Knowledge	93.06 (8.98) <sub>a</sub>	81.67 (11.13) <sub>b</sub>	51.97 (14.30) <sub>c</sub>	235.96**
Smoking Consequences (negative consequences subscale)	6.46 (1.36) <sub>a</sub>	5.98 (1.25) <sub>b</sub>	5.58 (1.33) <sub>c</sub>	7.97**
Dissonance	2.43 (1.43) <sub>a</sub>	2.35 (1.12) <sub>a</sub>	1.79(.79) <sub>b</sub>	6.67**
Risk Perceptions	42.94 (9.36) <sub>a</sub>	40.51 (9.88) <sub>a</sub>	39.72 (10.45) <sub>a</sub>	2.06

*Note.* Means with different subscripts are statistically significant at  $p < .05$  in the Least Significant difference comparison.

\* $p < .05$ . \*\*  $p < .01$ .



### *Mediation Analyses*

Using the guidelines outlined by Baron and Kenny (1986), smoking related knowledge, risk perceptions, dissonance, and smoking related outcome expectancies were examined as potential mediators of the relationship between intervention condition and change in readiness to quit post-treatment. Means and standard deviations for potential mediator variables can be found by condition in Table 4. Regression analyses were used to test the requirements of mediation. Experimental condition is a categorical independent variable; therefore, dummy coding was required to construct two vectors for the intervention condition variable (Cohen, Cohen, West, & Aiken, 2003). The reference group, the Exp-Smoke condition, was dummy coded with “0,” and the Standard and Exp-Nutrition comparison groups were assigned a value of “1.” For regression analyses discussed below, D1 represents the comparison between the Exp-Smoke group and Standard condition, while D2 represents the comparison between the Exp-Smoke and Exp-Nutrition condition. Table 5 below depicts correlations between predictor variables and change in readiness to quit.

*Smoking knowledge.* According to Baron and Kenny (1988), the independent variable (intervention condition) must be significantly related to the dependent variable (change in readiness to quit). Regression analyses revealed that this condition was satisfied,  $R^2 = .126$ ,  $F(2, 212) = 15.33$ ,  $p < .001$ . Second, the mediator (smoking knowledge) must be related to the independent (experimental condition), which also was satisfied. Experimental condition predicted performance on a post-intervention test of smoking knowledge,  $R^2 = .690$ ,  $F(2, 212) = 235.96$ ,  $p < .001$ . As seen in Table 4, participants in the Exp-Smoke group obtained a higher percentage of correct responses

than participants in the Standard condition. As would be expected, both groups scored significantly higher than the Exp-Nutrition condition, which was not exposed to the smoking information.

Third, the mediator must be related to the dependent (change in readiness to quit) variable. This relationship was evaluated by regressing change in intentions on smoking knowledge. This association was significant,  $R^2 = .065$ ,  $F(1, 214) = 14.82$ ,  $p < .001$ . Finally, the relationship between the independent variable and dependent variable must be significantly reduced when controlling for the mediator. Examination of partial correlations indicated that, whereas the partial correlation was reduced when controlling for the mediator, the influence of condition on readiness to quit remained strong,  $pr D1$  reduced from  $-.238$  to  $-.231$ ;  $pr D2$  reduced from  $-.350$  to  $-.228$ . That is, experimental condition continued to significantly predict change in readiness to quit,  $R^2 = .127$ ,  $F(1, 214) = 10.22$ ,  $p < .001$ . These results therefore do not support the hypothesis that smoking knowledge mediates the association between experimental condition and change in quitting intentions following the intervention.

*Smoking expectancies.* The Negative Consequences scale was the only factor of the Smoking Consequences Questionnaire significantly related to readiness to quit. Therefore, only this expectancy scale was investigated as a potential mediator. Results revealed that experimental condition predicted scores on the negative consequences scale,  $R^2 = .070$ ,  $F(2, 214) = 7.97$ ,  $p < .001$ . As Table 4 depicts, participants in the Exp-Smoke condition reported significantly higher negative consequences expectancies than both the Standard and Exp-Nutrition groups ( $ps < .001$ ). Because these relationships were all significant, regression analyses were conducted in which negative consequences

and condition were both used to predict change in readiness to quit. Results indicated that, while controlling for negative consequence expectancies, the partial correlation was reduced (*pr* D1 reduced from - .238 to - .229; *pr* D2 reduced from - .350 to - .328); however, condition remained a significant predictor of intentions,  $R^2 = .129$ ,  $F(1, 214) = 10.42$ ,  $p < .001$ . These results suggest that expectancies about the negative consequences of smoking failed to mediate the relationship between intervention condition and readiness to quit.

*Dissonance.* Again following Baron and Kenny's methods, results indicated that experimental condition was related to level of dissonance-related affect experienced,  $F(2, 212) = 6.67$ ,  $p = .002$ . Post hoc tests reveal that, as expected, the Exp-Smoke group exhibited greater levels of dissonance as compared to the Exp-Nutrition control group ( $p = .001$ ). No differences, however, were observed between the Exp-Smoke and Standard conditions in level of dissonance-related affect experienced ( $p = .66$ ). Additional criteria for mediation were not satisfied.

*Risk perception.* Risk perceptions did not satisfy any specific requirements for mediation. Condition was not significantly related to perceived levels of risk ( $p = .13$ ) as measured by the total score of the risk perception scale.

*Additional mediation analyses.* The above described mediation analyses were also conducted separately for females. As described above, a potential mediator must be significantly associated with both experimental condition and readiness to quit. Two of the hypothesized mediators, smoking knowledge and negative consequence expectancies, met these criteria. Thus, further analyses were conducted using the method outlined by Baron and Kenny. As a final step, we tested the relationship of condition to intentions to

quit while controlling for the potential mediator. Similar to analyses conducted with the entire sample, condition continued to be a significant predictor of intentions to quit after controlling for the mediator ( $p < .001$ ). Therefore, for females, smoking knowledge and negative consequence expectancies did not appear to mediate the observed relationship between condition and intentions to quit smoking.

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Table 5

*Correlations Between Change in Readiness to Quit and Study Variables.*

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	1	2	3	4	5
1. Change in Readiness	--	.016	.102	.143*	.255**
2. Risk Perceptions		--	.111	.332*	.116
3. Dissonance			--	.259**	.251**
4. Negative Consequence Expectancies				--	.297**
5. Smoking Knowledge					--

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\*  $p < .05$ . \*\*  $p < .01$

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## Chapter Four

### Discussion

To date, there has been a dearth of smoking cessation interventions designed to assist the alarmingly high number of college student smokers. In fact, a recent review paper on cigarette practices among American college students (Patterson, Lerman, Kaufman, Neuner, & Audrain-McGovern, 2004), noted that a single study had been conducted that addressed smoking cessation among college students. Thus far, the overwhelming majority of research has been epidemiological in nature. Recent longitudinal research indicated that almost 90% of daily smokers and 50% of occasional college student smokers were still smoking four years later (Wetter et. al, 2004). Other research has found that smoking persists through adulthood (Chen & Kandel, 1995). Thus, the college setting clearly represents an untapped and unique “window of opportunity” to target young adult smokers. The current study was designed to address this need by testing an intervention among college student smokers drawing upon research from social psychology and previously effective health-related interventions.

In general, the findings were highly encouraging, at least with regard to female smokers. On every one of the six outcome measures (posttreatment readiness, follow-up readiness, stage change, pamphlet selection, cessation at follow-up, and smoking reduction at follow-up) females in the Experiential Smoking condition outperformed those in the Nutrition control condition. Moreover, on three of these measures (posttreatment readiness, stage change, and pamphlet selection), the Experiential

Smoking condition also produced superior outcomes than the Standard smoking condition. The Standard condition outperformed the Nutrition control on all measures except pamphlet selection. Thus, findings support the efficacy of a standard brief didactic/video intervention, and the added efficacy of a more intensive experiential intervention. Specific findings are further discussed below.

#### *Changes in Smoking Cessation Motivation Post-Intervention and at Follow-up*

A primary aim of this study was to test the efficacy an experiential smoking cessation intervention by comparing it to a traditional educational smoking intervention and a control experiential nutrition group. We hypothesized that the experiential smoking intervention would be most effective in changing cessation motivation compared to both groups. The pattern of findings that emerged demonstrated that the Exp-Smoke condition was indeed more effective in increasing motivation to quit smoking as measured by the contemplation ladder. However, moderator analyses revealed that this effect was found only for females. Specifically, female smokers were more likely to exhibit higher motivation to quit smoking after participating in an experiential, dissonance-enhancing intervention on smoking than if they viewed an anti-smoking video or participated in a group discussion on nutrition. At one-month follow-up, females in the Exp-Smoke and Standard condition continued to express greater motivation to quit as compared to those in the Exp-Nutrition condition. Although the difference between the Exp-Smoke and Standard condition was in the anticipated direction, results were no longer significant at follow-up. Following the discovery of gender as a moderator, subsequent analyses were additionally conducted separately for

males and females. It is noteworthy that within-gender analyses may have been limited by inadequate power due to reduced sample sizes.

As an additional measure of smoking motivation this study also assessed readiness to quit using Prochaska and Diclemente's stages of change model. Participants were asked to indicate their intentions to quit at post-intervention and at the one-month follow-up. As predicted, participants in the Exp-Smoke condition were more likely to advance in their motivation to quit as compared to the Standard and Exp-Nutrition group. Unlike the contemplation ladder, which did not demonstrate significant differences between the smoking conditions at follow-up, data from the stage of change measure indicated greater motivation at follow-up for the Exp-Smoke condition. Similar to results found with the contemplation ladder, when the data was analyzed separately by gender, this effect was only observed for females.

#### *Differential Gender Effects*

The intervention effects found among the female smokers is consistent with prior research demonstrating the successful application of social psychology to health related interventions in areas such as increased condom use and greater fruit and vegetable intake (Eitel & Friend, 1999; Wilson et al., 2002). The current study borrowed from these successful health interventions by inducing hypocrisy and creating dissonance in participants by asking them to advocate attitudes about smoking that are clearly inconsistent with their own behavior (Eitel & Friend, 1999). Additionally, participants were requested to publicly state their thoughts about the negative aspects of smoking (Stone et al., 1994; Dickerson, 1992; Schlenker, Dlugolecki, Doherty, 1994) and to

manipulate the information about the hazards of smoking in a more active and experiential manner (Darkes & Goldman, 1993).

Contrary to expectation, the experiential smoking intervention was ineffective in increasing motivation to quit smoking among males. In fact, neither smoking intervention was found to be effective for the male smokers. Differential gender effects have also been reported in the recent literature in the area of experiential alcohol interventions. The original experiential expectancy challenge (Darkes & Goldman, 1993) used an entirely male sample, whereas current research has investigated the efficacy of the intervention with female and mixed gender samples. The results of these studies have been mixed. Musher-Eizenman and Kulick (2003) evaluated the effectiveness of the expectancy challenge for college women and found that the intervention was not effective. Wiers and Krummeling (2004) tested the experiential alcohol intervention, adapted for females, with a mixed gender sample and found that the intervention was more effective for women than men. Together, the results from the present study and current alcohol intervention research, suggests that interventions among college students may have to be tailored to each gender.

There are several possible explanations regarding why females responded more favorably to the Exp-Smoke intervention. Participants in the Exp-Smoke intervention were asked to discuss the negative consequences of smoking and positive effects of quitting and were encouraged to incorporate their own negative feelings and experiences with smoking. Therefore, the task relied on participants personalizing the information and emphasized self-disclosure. Several studies have found that women are more likely to self-disclose (e.g. Pearson, 1985; Arliss, 1991; Galvin & Brommel, 2002). It is thus



possible that female smokers, as compared to males in the study, may have been more comfortable and more likely to discuss the negative aspects of smoking from their own experience. To evaluate this possibility further future research should measure the degree of self-disclosure by participants. Alternatively, the social aspects of the Exp-Smoke group discussion may have been more relevant to women who tend to be more interpersonally and socially oriented (e.g. Markus & Oyseman, 1989). That is, the positive response to the smoking discussion may reflect women's tendencies to be more socially oriented than men.

*Gender differences and smoking.* In a recent study, gender was the only demographic predictor found to be significantly related to progression of smoking in college among occasional smokers. Specifically, males were more likely than females to progress in their smoking behavior (Wetter et al., 2004). This research suggests that different processes may be involved for male and female college smokers.

Studies on gender differences and smoking further support the idea that gender-specific interventions may be needed. Perkins, Jacobs, Sanders, and Caggiula (2002) found sex differences in the subjective and reinforcing effects of cigarette nicotine dose. Specifically, research indicates males are reinforced to a greater extent by nicotine effects than females. Women, on the other hand, appear to be motivated more by contextual social smoking cues (i.e. social interaction) than men (Perkins, 2001). Research conducted by Gilpin, Pierce, Goodman, Burns, and Shopland (1992) is in line with the finding that women are more affected by social influences. Gilpin et al. (1992) suggest that women experience greater social pressure to quit smoking and may be more likely to respond to that pressure. Furthermore, research conducted by Fiore and colleagues

(1990) found that a group format for smoking cessation is preferred more by women than men. Taken together, this research is consistent with the finding that a more socially based intervention, such as the Exp-Smoke intervention, would be more effective with female smokers.

In a review of gender differences in tobacco treatment, Piper, Fox, Welsch, Fiore, and Baker (2001) concluded that sex differences in negative affect, withdrawal, coping styles, and reinforcement properties of tobacco suggest that different treatments for each gender may be required for optimal outcomes. Unfortunately, Mermelstein and Borrelli's (1995) analysis of the literature revealed that few studies report whether they examined main effects for gender or gender by treatment interactions. Although thorough examination of these gender differences was beyond the scope of the current study, future research that is adequately powered to test these gender effects is clearly warranted.

#### *Changes in Smoking Behavior*

We predicted that the experiential smoking intervention would be most effective in influencing smoking behavior as compared to the Standard and Exp-Nutrition groups. Despite significant increases in motivation to quit smoking, weaker support was revealed for the Exp-Smoke condition in eliciting self-reported behavior change as compared to the Standard condition. Importantly, both smoking conditions reported greater quitting rates as compared to the Exp-Nutrition condition. The failure to find stronger behavior changes for the Exp-Smoke Condition may be due in part to the length and intensity of the intervention. The current intervention featured a single intervention session; whereas other successful health-related interventions among college students have employed multi-session paradigms (Darkes & Goldman, 1993; Darkes & Goldman, 1998; Weirs &

Krummling, 2004). This explanation is also consistent with research that reports that increasing the length and number of smoking intervention sessions leads to greater cessation success (USDHHS, 2000). Thus, stronger effects may have emerged if we had utilized a multi-session format. Of course, using a multi-session format would introduce additional challenges in terms of recruitment and implementation (Wiers & Kummling, 2004). Future research would benefit from investigating the utility and cost-effectiveness of multiple intervention sessions.

A promising finding in the present study was the decline in cigarette consumption. In particular, as expected, those smokers who participated in the smoking discussion were more likely to reduce their smoking rate as compared to the nutrition discussion group. The difference between the Exp-Smoke and Standard group was in the expected direction and approached significance ( $p = .07$ ). Given this encouraging decrease in smoking, it is plausible that strengthening the social psychological components of the intervention may lead to greater behavioral change. For instance, the hypocrisy paradigm could be enhanced by asking college student smokers to speak to high school students about the dangers of smoking. Importantly, an immediate behavioral measure of the intervention impact was demonstrated in the current study. That is, compared to the Standard and Exp-Nutrition groups, a greater proportion of participants in the Exp-Smoke group picked up quit smoking pamphlets following the intervention.

In contrast to a typical cessation program, participants in the current study were not seeking assistance to quit; therefore we would expect smaller effects in immediate cessation. As we would expect, we found significant differences in cessation motivation

as measured by a self-report (i.e., contemplation ladder) and behavioral measure (i.e., pamphlet). In addition, we observed a reduction in smoking consumption. Together, these results indicate that participants in the Exp-Smoke condition are moving closer to quitting as compared to both conditions. It is possible that differences in quitting may be more apparent later in time and thus future research should extend the follow-up assessment to capture these differences. Overall, these findings highlight the potential utility of this intervention in making behavioral change.

#### *Potential Mechanisms of Change*

A secondary goal of the present study was to explore potential mediators of the relationship between condition and change in readiness to quit. Differences among groups on these potential mediating variables were examined. Group differences were discovered for smoking knowledge, negative consequence smoking expectancies, and dissonance-related affect. As expected, following participation in the Exp-Smoke intervention, participants were more likely to increase their smoking knowledge and to endorse stronger negative consequence expectancies than if they were in the Exp-Nutrition or Standard groups. Both smoking groups were found to exhibit higher levels of dissonance-related affect as compared to the Exp-Nutrition group. The current study employed a self-report measure of psychological discomfort that may not have been sensitive enough to capture group differences in dissonance. Future research would benefit from the addition of a physiological measure of arousal, such as galvanic skin responses (Elliot & Devine, 1994). Given the limitation of our dissonance measure, the current study is unable to conclude that the intervention effects are the result of processes attributable to cognitive dissonance theory. That is, perhaps our underlying theory was

flawed and cognitive dissonance did not play a role in the increased efficacy of the experiential smoking condition in increasing intentions to quit. Alternatively, the active involvement of participants in the Exp-Smoke condition may have influenced information processing such that the smoking information was processed at a deeper level, which in turn influenced their intentions. Future research is warranted to investigate the mechanisms by which the intervention was effective.

In the present study, four potential mediators were examined; however, none of the tested mediators satisfied criteria for mediation. Analyses were also conducted separately for females and similarly failed to meet mediation requirements. This study failed to find support for any of the proposed mediators. The lack of findings with respect to mediation may be attributable to several factors. It is possible that our mediation measures lacked sensitivity. Future mediation analyses could be strengthened by including baseline measures of potential mediators to provide a more direct and stringent test of mediation. Findings from the current study suggest that the observed changes in readiness to quit did not occur through our proposed variables. Thus, the change may have occurred through alternative mechanisms that deserve further investigation. For example, the process of persuading others to quit smoking may in fact increase a smokers' self-efficacy or may make them less likely to employ denial rationalizations.

#### *Limitations and Future Research*

The limitations of this study should be acknowledged. This study relied on self-report measures of smoking motivation and behavior. Although there is support for the veracity and validity of self-reported tobacco use in research (Velicer, Prochaska, Rossi,

& Snow, 1992), it would have strengthened the study to have a more objective measure of smoking behavior such as biochemical verification. A potential weakness of the self-report method is that demand effects may influence participants to misreport that they had quit or reduced the amount smoked. It is important to note that because smoking has a negative stigma, all groups should have been affected to some degree by demand characteristics; however the social intervention might produce greater demand. In addition, both smoking interventions would produce greater demand than the nutrition group. Of course, to minimize demand characteristics, all assessors were blind to the participants' condition when making follow-up calls. A measure of social desirability could also be included in future research to control for this effect.

Due to the focus of the study and time constraints, we did not employ a multiple-session intervention and we were unable to assess all aspects of interest. For instance, the study design did not include measures of individual and group processes occurring during the group discussion. The inclusion of such measures would allow for further investigation into possible mechanisms underlying the positive effect of the intervention. Such measures might include quantifying the contribution and amount of self-disclosure made by each group participant. These types of measures would allow us to assess the quantity and quality of individual participation. Overall measures of group participation and cohesiveness would also be an interesting aspect to examine. In addition, future studies would benefit from the measurement of variables hypothesized to contribute to the observed differential gender effect.

This study conducted exploratory analyses regarding moderating variables and found gender to be a moderator of the relationship between condition and readiness to

quit. Future research could benefit from investigating additional theoretically-driven moderators. For example, researchers could examine the influence of individual difference variables such as a smokers' self-concept. A smoker's self-concept, defined as "the degree to which cigarette smoking is perceived to be defining characteristic of current self-concept," has affected treatment outcome (Shadel & Mermelstein, 1996; Falomir & Invernizzi, 1999; Freeman, Hennessy, & Marzullo, 2001). This may be a particularly interesting variable to investigate among college students because college is often a transition period during which their self-concept is further defined.

#### *Implications for Intervention and Final Conclusions*

In conclusion, the current study is the first to demonstrate the efficacy of an experiential smoking intervention in increasing intentions to quit and modifying smoking behavior among college students. Of particular interest is the outcome that gender moderated the relationship between condition and readiness to quit smoking. The results of this study, along with the literature, suggest that a future direction of research may lie in the development of gender specific smoking interventions for college students.

The focus of this study was to test the efficacy of an experiential smoking intervention and the findings suggest that this intervention is highly promising among females. However, it is noteworthy that among females the Standard condition was also effective in increasing motivation and changing smoking behavior as compared to the Exp-Nutrition condition. Given the lack of research in the area of smoking interventions for college students, and the fact that participants were not eliciting quitting assistance, it is encouraging that an easy-to-administer and inexpensive intervention was efficacious.

Smoking cessation interventions for college students have received relatively little attention. Findings from this study advance the general literature on smoking interventions for college students, and provide encouragement that this population is receptive and malleable to secondary prevention efforts.



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## Appendices

## Appendix A: Demographic Questionnaire

The following questions are about you and your life situation. You are under no obligation to answer any question that you find objectionable. However, we would appreciate your answering as many questions as possible. All answers will be kept confidential.

Participant #: \_\_\_\_\_ Date: \_\_\_\_\_

1. What is your age? \_\_\_\_\_
2. Date of Birth: \_\_\_\_\_
3. What is your current year in school?  
 Freshman  
 Sophomore  
 Junior  
 Senior  
 Other  
(Please explain) \_\_\_\_\_
4. What level of education did your mother complete?  
 Elementary School  
 Junior High School  
 Partial High School  
 High School  
 Business or Technical Training  
 Some College (no degree)  
 University Degree, Bachelor level or equivalent  
 Post-graduate Degree
5. What level of education did your father complete?  
 Elementary School  
 Junior High School  
 Partial High School  
 High School  
 Business or Technical Training  
 Some College (no degree)  
 University Degree, Bachelor level or equivalent  
 Post-graduate Degree
6. What is your GPA? \_\_\_\_\_
7. What is your marital status?  
 Single                                       Separated                                       Widowed  
 Married                                         Divorced

Appendix A: (Continued)

8. With which ethnic/racial group do you most identify yourself? (please check one)
- Oriental/Asian American/Pacific Islander
  - Black/African American
  - Native American
  - White/Caucasian
  - Other
- 8a. Are you Hispanic?     Yes     No
9. How many servings of fruits and vegetables do you typically eat in a week?
- 0-5       6-10       11-14       15-20       >20
10. Have you had a cigarette in the past 30 days?     Yes     No
11. How many books have you read for leisure in the past year?
- 0       1-5       6-12       13-20       >20
12. How many times do you exercise per week?
- 0       1-3       3-5       5-7       >7



Appendix B: Smoking Status Questionnaire

1. Sex: (check one)     Male     Female
2. Do you smoke cigarettes every day?     Yes     No

*If you answered YES to #2, please skip to question #7 and answer all remaining questions.*

*If you answered No to #2, please answer **ONLY** questions 3 –6.*

3. Have you ever smoked a cigarette:     Yes     No
4. Have you had a cigarette in the past month?     Yes     No
5. Did you ever smoke every day?     Yes     No

*If YES,*

a. How many did you smoke? \_\_\_\_\_

b. How long has it been since you stopped? \_\_\_\_\_

6. Do you ever smoke now?     Yes     No

*If Yes, I smoke an average of \_\_\_\_ cigarettes per week*

7. How many years have you been smoking daily? \_\_\_\_\_

8. How many cigarettes per day do you smoke? \_\_\_\_\_

9. Do you inhale?    NEVER    SOMETIMES    ALWAYS

10. Do you smoke more during the first two hours of the day than during the rest of the day?

Yes     No

11. How soon after you wake up do you smoke your first cigarette?

- Within 5 minutes
- 6 - 30 minutes
- 31 - 60 minutes
- After 60 minutes

Appendix B: (Continued)

12. Which of all the cigarettes you smoke in a day would you most hate to give up?

- The first one in the morning
- The one with breakfast
- The one with lunch
- The one with dinner
- The last cigarette before going to bed
- Other: \_\_\_\_\_

13. Do you find it difficult to refrain from smoking in places where it is forbidden,  
e.g., in church, at the library, theatre, etc.?

- Yes       No

14. Do you smoke if you are so ill that you are in bed most of the day?

- Yes       No

15. How confident are you that you will not be smoking one year from now?  
(Please circle one)

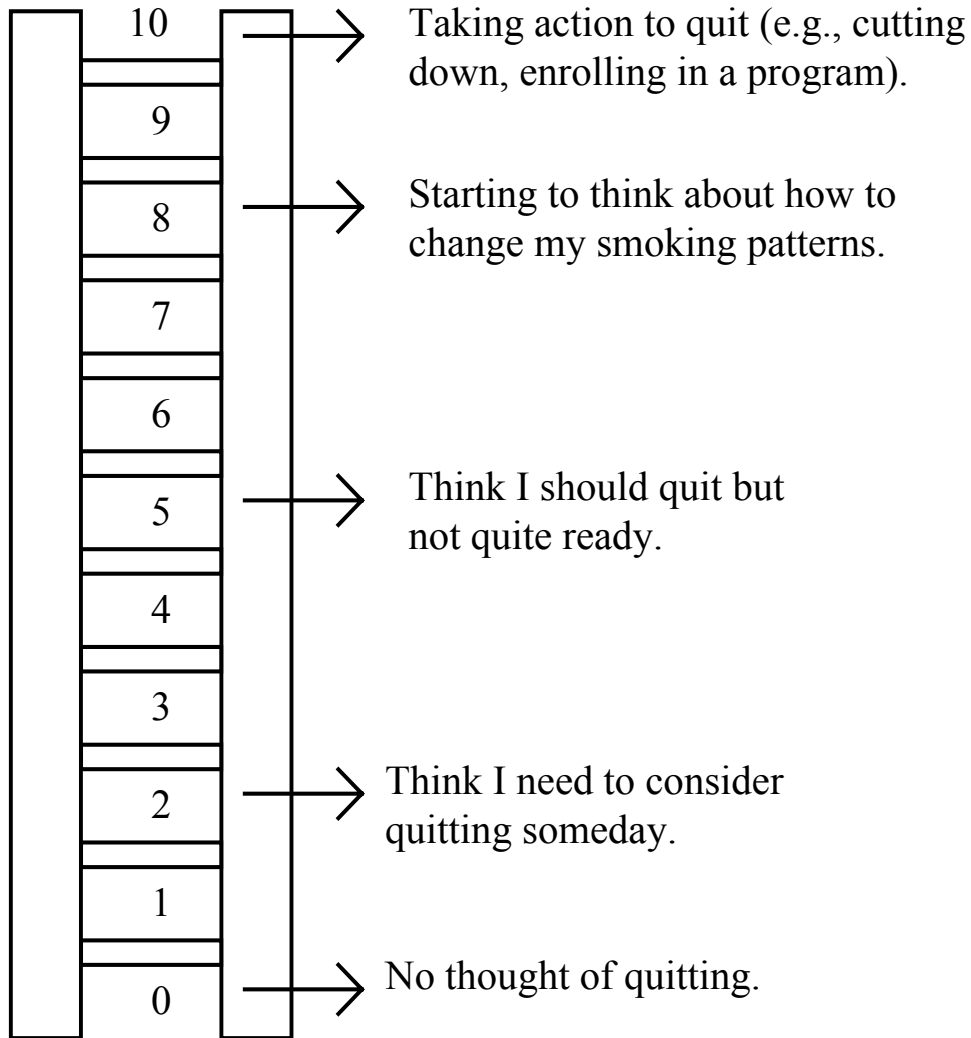
0	10	20	30	40	50	60	70	80	90	100
Not at all confident					Moderately confident					Extremely confident

Appendix C: Contemplation Ladder

Participant #: \_\_\_\_\_

Date: \_\_\_\_\_

Please answer the following questions if you have smoked in the past month. Each rung on this ladder represents where various smokers are in their thinking about quitting. If you have smoked in the last month, please circle the number that indicates where you are now.



Please check box if this questionnaire is not applicable to you (i.e., you have NOT had a cigarette in the past month).

## Appendix D: Stages of Change Questionnaire

If you have had a cigarette in the past 30 days, please answer the following questions.

1. Are you seriously considering quitting smoking within the next six months?
  - A. No
  - B. Yes
  - C. I do not smoke
  
2. Are you planning to quit smoking within the next 30 days?
  - A. No
  - B. Yes
  - C. I do not smoke
  
3. In the last year how many times have you quit smoking for at least 24 hours?  
(If more than 9 times, put 9)
  - 0
  - 1
  - 2
  - 3
  - 4
  - 5
  - 6
  - 7**
  - 8
  - 9

## Appendix E: Risk Perception Questionnaire

Instructions: The questions below ask about your perceptions of smoking-related health risks. For each question below, please circle the response that best matches the way you feel **right now, at this moment**.

If you are not a smoker, imagine that you are a smoker and that you typically smoke between 5 and 15 cigarettes per day. Respond to each item while imagining that you currently smoke cigarettes.

1. How likely do you think you are to develop a smoking-related disease as a result of smoking?

<i>Extremely Unlikely</i>	<i>Unlikely</i>	<i>Somewhat Unlikely</i>	<i>Neither Likely Nor Unlikely</i>	<i>Somewhat Likely</i>	<i>Likely</i>	<i>Extremely Likely</i>
1	2	3	4	5	6	7

2. How likely do you think you are to develop lung cancer as a result of smoking?

<i>Extremely Unlikely</i>	<i>Unlikely</i>	<i>Somewhat Unlikely</i>	<i>Neither Likely Nor Unlikely</i>	<i>Somewhat Likely</i>	<i>Likely</i>	<i>Extremely Likely</i>	<i>Please mark an X below if you have been diagnosed with the condition</i>
1	2	3	4	5	6	7	_____

3. How likely do you think you are to develop other types of cancer as a result of smoking?

<i>Extremely Unlikely</i>	<i>Unlikely</i>	<i>Somewhat Unlikely</i>	<i>Neither Likely Nor Unlikely</i>	<i>Somewhat Likely</i>	<i>Likely</i>	<i>Extremely Likely</i>	<i>Please mark an X below if you have been diagnosed with the condition</i>
1	2	3	4	5	6	7	_____

4. How likely do you think you are to develop heart disease as a result of smoking?

<i>Extremely Unlikely</i>	<i>Unlikely</i>	<i>Somewhat Unlikely</i>	<i>Neither Likely Nor Unlikely</i>	<i>Somewhat Likely</i>	<i>Likely</i>	<i>Extremely Likely</i>	<i>Please mark an X below if you have been diagnosed with the condition</i>
1	2	3	4	5	6	7	_____

Appendix E: (Continued)

5. How likely do you think you are to develop circulatory problems as a result of smoking?

<i>Extremely Unlikely</i>	<i>Unlikely</i>	<i>Somewhat Unlikely</i>	<i>Neither Likely Nor Unlikely</i>	<i>Somewhat Likely</i>	<i>Likely</i>	<i>Extremely Likely</i>	<i>Please mark an X below if you have been diagnosed with the condition</i>
-------------------------------	-----------------	------------------------------	--	----------------------------	---------------	-----------------------------	---

1            2            3            4            5            6            7            \_\_\_\_\_

6. How likely do you think you are to develop emphysema as a result of smoking?

<i>Extremely Unlikely</i>	<i>Unlikely</i>	<i>Somewhat Unlikely</i>	<i>Neither Likely Nor Unlikely</i>	<i>Somewhat Likely</i>	<i>Likely</i>	<i>Extremely Likely</i>	<i>Please mark an X below if you have been diagnosed with the condition</i>
-------------------------------	-----------------	------------------------------	--	----------------------------	---------------	-----------------------------	---

1            2            3            4            5            6            7            \_\_\_\_\_

7. How likely do you think you are to experience a stroke as a result of smoking?

<i>Extremely Unlikely</i>	<i>Unlikely</i>	<i>Somewhat Unlikely</i>	<i>Neither Likely Nor Unlikely</i>	<i>Somewhat Likely</i>	<i>Likely</i>	<i>Extremely Likely</i>	<i>Please mark an X below if you have been diagnosed with the condition</i>
-------------------------------	-----------------	------------------------------	--	----------------------------	---------------	-----------------------------	---

1            2            3            4            5            6            7            \_\_\_\_\_

8. What do you believe are your overall chances of developing an illness due to your smoking behavior?

<i>Extremely Unlikely</i>	<i>Unlikely</i>	<i>Somewhat Unlikely</i>	<i>Neither Likely Nor Unlikely</i>	<i>Somewhat Likely</i>	<i>Likely</i>	<i>Extremely Likely</i>
-------------------------------	-----------------	------------------------------	--	----------------------------	---------------	-----------------------------

1            2            3            4            5            6            7

## Appendix F: Smoking Consequences Questionnaire

Instructions: This questionnaire is designed to assess beliefs people have about the consequences of smoking a cigarette. Below is a list of statements about smoking. We would like you to rate how **LIKELY** or **UNLIKELY** you believe each consequence is for you when you smoke. If the consequence seems **UNLIKELY** to you, circle a number from 0-4. If the consequence seems **LIKELY** to you, circle a number from 5-9. That is if you believe the consequence would never happen, circle 0; if you believe a consequence would happen every time you smoke, circle 9. Use the guide below to aid you further. For example, if a consequence seems completely likely to you, you would circle 9. If it seems a little unlikely to you, you would circle 4.

	0	1	2	3	4	5	6	7	8	9	
	Completely	Extremely	Very	Somewhat	A little	A little	Somewhat	Very	Extremely	Completely	
	Unlikely						Likely				
1. Cigarettes taste good.	0	1	2	3	4	5	6	7	8	9	
2. Smoking controls my appetite.	0	1	2	3	4	5	6	7	8	9	
3. Smoking reduces my anger.	0	1	2	3	4	5	6	7	8	9	
4. Cigarettes help me concentrate	0	1	2	3	4	5	6	7	8	9	
5. My throat burns after smoking.	0	1	2	3	4	5	6	7	8	9	
6. Cigarettes help me deal with anxiety or worry.	0	1	2	3	4	5	6	7	8	9	
7. I enjoy the taste sensations while smoking.	0	1	2	3	4	5	6	7	8	9	
8. Smoking helps me deal with depression.	0	1	2	3	4	5	6	7	8	9	
9. I become more addicted the more I smoke.	0	1	2	3	4	5	6	7	8	9	
10. If I'm tense, a cigarette helps me to relax.	0	1	2	3	4	5	6	7	8	9	
11. Cigarettes keep me from overeating.	0	1	2	3	4	5	6	7	8	9	
12. Cigarettes help me deal with anger.	0	1	2	3	4	5	6	7	8	9	
13. When I smoke the taste is pleasant.	0	1	2	3	4	5	6	7	8	9	
14. Cigarettes make my lungs hurt.	0	1	2	3	4	5	6	7	8	9	
15. If I'm dissapointed in myself, a good smoke can help.	0	1	2	3	4	5	6	7	8	9	
16. I will probably die earlier if I continue to smoke.	0	1	2	3	4	5	6	7	8	9	
17. I will enjoy the flavor of a cigarette.	0	1	2	3	4	5	6	7	8	9	
18. Smoking makes me seem less attractive.	0	1	2	3	4	5	6	7	8	9	
19. I will enjoy feeling a cigarette on my tongue.	0	1	2	3	4	5	6	7	8	9	
20. Smoking will make me cough.	0	1	2	3	4	5	6	7	8	9	

## Appendix F: (Continued)

21. If I have nothing to do, a smoke can help kill time.	0	1	2	3	4	5	6	7	8	9
22. By smoking I risk heart disease and lung cancer.	0	1	2	3	4	5	6	7	8	9
23. Cigarettes help me reduce or handle tension.	0	1	2	3	4	5	6	7	8	9
24. I enjoy parties more when I'm smoking.	0	1	2	3	4	5	6	7	8	9
25. People think less of me if they see me smoking.	0	1	2	3	4	5	6	7	8	9
26. When I am sad, smoking makes me feel better.	0	1	2	3	4	5	6	7	8	9
27. Cigarettes control me more and more the longer I smoke.	0	1	2	3	4	5	6	7	8	9
28. If I'm feeling irritable, a smoke will help me relax.	0	1	2	3	4	5	6	7	8	9
29. My mouth tastes bad after smoking.	0	1	2	3	4	5	6	7	8	9
30. I like to watch the smoke from my cigarette.	0	1	2	3	4	5	6	7	8	9
31. I will become more dependent on cigarettes if I smoke.	0	1	2	3	4	5	6	7	8	9
32. Smoking helps me control my weight.	0	1	2	3	4	5	6	7	8	9
33. I really enjoy a cigarette when relaxed and feeling good.	0	1	2	3	4	5	6	7	8	9
34. Cigarettes give me something to do with my hands.	0	1	2	3	4	5	6	7	8	9
35. When I'm upset with someone, a cigarette helps me cope.	0	1	2	3	4	5	6	7	8	9
36. The more I smoke, the more I risk my health.	0	1	2	3	4	5	6	7	8	9
37. Each cigarette I smoke maintains my addiction.	0	1	2	3	4	5	6	7	8	9
38. Cigarettes keep me from eating more than I should.	0	1	2	3	4	5	6	7	8	9
39. I look ridiculous while smoking.	0	1	2	3	4	5	6	7	8	9
40. Smoking keeps my weight down.	0	1	2	3	4	5	6	7	8	9
41. The longer I smoke, the harder it will be to quit.	0	1	2	3	4	5	6	7	8	9
42. Smoking is hazardous to my health.	0	1	2	3	4	5	6	7	8	9
43. I enjoy the feeling of the smoke hitting my mouth and the back of my throat.	0	1	2	3	4	5	6	7	8	9
44. Smoking calms me down when I feel nervous.	0	1	2	3	4	5	6	7	8	9
45. Smoking irritates my mouth and throat.	0	1	2	3	4	5	6	7	8	9
46. Smoking temporarily reduces repeated urges for cigarettes.	0	1	2	3	4	5	6	7	8	9
47. When I'm angry a cigarette can calm me down.	0	1	2	3	4	5	6	7	8	9
48. I feel more at ease with other people if I have a cigarette.	0	1	2	3	4	5	6	7	8	9
49. Cigarettes are good for boredom.	0	1	2	3	4	5	6	7	8	9
50. Smoking is taking years off my life.	0	1	2	3	4	5	6	7	8	9



## Appendix G: Dissonance Thermometer

Instructions: Below are words that can describe different types of feelings. For each word, please indicate how much it describes *how you are feeling right now* by circling a number on the scale. "1" means "does not apply at all" and "7" means "applies very much" to how you are feeling *right now*. Don't spend much time thinking about each word. Just give a quick, gut-level response.

	Does not apply at all							Applies very much
1. Uncomfortable	1	2	3	4	5	6	7	
2. Angry at myself	1	2	3	4	5	6	7	
3. Shame	1	2	3	4	5	6	7	
4. Uneasy	1	2	3	4	5	6	7	
5. Friendly	1	2	3	4	5	6	7	
6. Disgusted with myself	1	2	3	4	5	6	7	
7. Embarrassed	1	2	3	4	5	6	7	
8. Bothered	1	2	3	4	5	6	7	
9. Optimistic	1	2	3	4	5	6	7	
10. Annoyed at myself	1	2	3	4	5	6	7	
11. Disappointed with myself	1	2	3	4	5	6	7	
12. Happy	1	2	3	4	5	6	7	
13. Energetic	1	2	3	4	5	6	7	
14. Good	1	2	3	4	5	6	7	

## Appendix H: Test of Smoking Knowledge

1. How long after you inhale does it take for the nicotine in a cigarette to reach your brain?
  - a. 2 seconds
  - b. 7 seconds
  - c. 30 seconds
  - d. 60 seconds
  
2. How many Americans die each year from smoking?
  - a. under 50,000
  - b. 100,000
  - c. 200,000
  - d. over 350,000
  
3. How many Americans have already quit smoking?
  - a. 40-50 million
  - b. 20-30 million
  - c. 5-10 million
  - d. 500,000 – 1 million
  
4. Withdrawal symptoms from quitting smoking will have ceased by:
  - a. 5-10 hours
  - b. 24 hours
  - c. 2 weeks
  - d. one month
  
5. Smokers have a \_\_\_\_\_ times greater risk of developing lung cancer than non-smokers:
  - a. 2
  - b. 5
  - c. 10
  - d. 100
  
6. Which of the following substances are *not* found in cigarettes
  - a. arsenic
  - b. sawdust
  - c. ammonia
  - d. acetone

Appendix H: (Continued)

7. Nicotine is as addictive as \_\_\_\_\_ :
- a. caffeine
  - b. marijuana
  - c. heroin
  - d. LSD
8. The symptoms of nicotine withdrawal include all of the following *except* :
- a. headaches
  - b. anxiety
  - c. sleep problems
  - d. fever
9. How long does nicotine cravings usually last?
- a. 3-5 minutes
  - b. 5-10 minutes
  - c. 10-12 minutes
  - d. 12-15 minutes
10. Common triggers for smoking urges include the following *except*:
- a. talking on the phone
  - b. drinking alcohol
  - c. eating
  - d. exercise

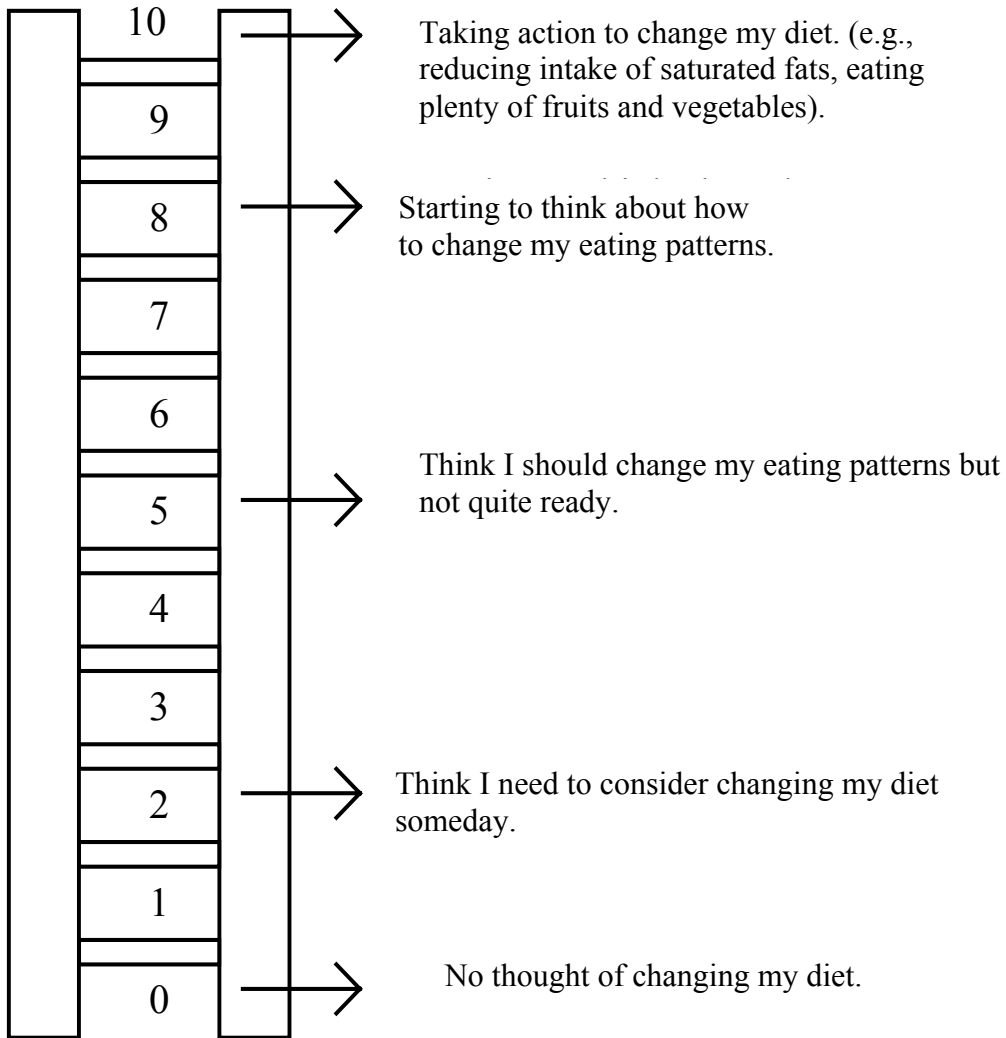
Appendix I: Comparable Nutrition Measures

Nutrition Contemplation Ladder

Participant #: \_\_\_\_\_

Date: \_\_\_\_\_

Please answer the following questions if your current diet could be modified to make it more healthy/well-balanced. Each rung on this ladder represents where various individuals are in their thinking about changing their diet. If your current diet is in need of at least some modification, please circle the number that indicates where you are now.



Please check box if this questionnaire is not applicable to you (i.e. you are eating a well-balanced diet that does not require

Appendix I: (Continued)

Nutrition Stages of Change Questionnaire

Date \_\_\_\_\_

Participant # \_\_\_\_\_

If your current diet has at least some need for change, please answer the following questions.

1. Are you seriously considering changing your diet within the next six months?
  - A. No
  - B. Yes
  
2. Are you planning to change your diet within the next 30 days?
  - A. No
  - B. Yes
  
3. In the last year how many times have you dieted for at least 24 hours?  
(If more than 9 times, put 9)
  - 0
  - 1
  - 2
  - 3
  - 4
  - 5
  - 6
  - 7
  - 8

Appendix I: (Continued)

Nutrition Risk Perception Questionnaire

Instructions: The questions below ask about your perceptions of smoking-related health risks. For each question below, please circle the response that best matches the way you feel **right now, at this moment**.

If you are not a smoker, imagine that you are a smoker and that you typically smoke between 5 and 15 cigarettes per day. Respond to each item while imagining that you currently smoke cigarettes.

1. How likely do you think you are to develop a smoking-related disease as a result of smoking?

<i>Extremely Unlikely</i>	<i>Unlikely</i>	<i>Somewhat Unlikely</i>	<i>Neither Likely Nor Unlikely</i>	<i>Somewhat Likely</i>	<i>Likely</i>	<i>Extremely Likely</i>
1	2	3	4	5	6	7

2. How likely do you think you are to develop lung cancer as a result of smoking?

<i>Extremely Unlikely</i>	<i>Unlikely</i>	<i>Somewhat Unlikely</i>	<i>Neither Likely Nor Unlikely</i>	<i>Somewhat Likely</i>	<i>Likely</i>	<i>Extremely Likely</i>	<i>Please mark an X below if you have been diagnosed with the condition</i>
1	2	3	4	5	6	7	_____

3. How likely do you think you are to develop other types of cancer as a result of smoking?

<i>Extremely Unlikely</i>	<i>Unlikely</i>	<i>Somewhat Unlikely</i>	<i>Neither Likely Nor Unlikely</i>	<i>Somewhat Likely</i>	<i>Likely</i>	<i>Extremely Likely</i>	<i>Please mark an X below if you have been diagnosed with the condition</i>
1	2	3	4	5	6	7	_____

4. How likely do you think you are to develop heart disease as a result of smoking?

<i>Extremely Unlikely</i>	<i>Unlikely</i>	<i>Somewhat Unlikely</i>	<i>Neither Likely Nor Unlikely</i>	<i>Somewhat Likely</i>	<i>Likely</i>	<i>Extremely Likely</i>	<i>Please mark an X below if you have been diagnosed with the condition</i>
1	2	3	4	5	6	7	_____

Appendix I: (Continued)

5. How likely do you think you are to develop circulatory problems as a result of smoking?

<i>Extremely Unlikely</i>	<i>Unlikely</i>	<i>Somewhat Unlikely</i>	<i>Neither Likely Nor Unlikely</i>	<i>Somewhat Likely</i>	<i>Likely</i>	<i>Extremely Likely</i>	<i>Please mark an X below if you have been diagnosed with the condition</i>
1	2	3	4	5	6	7	_____

6. How likely do you think you are to develop emphysema as a result of smoking?

<i>Extremely Unlikely</i>	<i>Unlikely</i>	<i>Somewhat Unlikely</i>	<i>Neither Likely Nor Unlikely</i>	<i>Somewhat Likely</i>	<i>Likely</i>	<i>Extremely Likely</i>	<i>Please mark an X below if you have been diagnosed with the condition</i>
1	2	3	4	5	6	7	_____

7. How likely do you think you are to experience a stroke as a result of smoking?

<i>Extremely Unlikely</i>	<i>Unlikely</i>	<i>Somewhat Unlikely</i>	<i>Neither Likely Nor Unlikely</i>	<i>Somewhat Likely</i>	<i>Likely</i>	<i>Extremely Likely</i>	<i>Please mark an X below if you have been diagnosed with the condition</i>
1	2	3	4	5	6	7	_____

8. What do you believe are your overall chances of developing an illness due to your smoking behavior?

<i>Extremely Unlikely</i>	<i>Unlikely</i>	<i>Somewhat Unlikely</i>	<i>Neither Likely Nor Unlikely</i>	<i>Somewhat Likely</i>	<i>Likely</i>	<i>Extremely Likely</i>
1	2	3	4	5	6	7

## Appendix J: Follow-up Telephone Interview

Date: \_\_\_\_\_

ID# \_\_\_\_\_

Interviewer: \_\_\_\_\_

*Use Time-line follow-back procedure to recreate the participants smoking over the past month. Fill in calendar with daily smoking rates for the past month. The following questions are to be used as prompts to assist participants in recalling their smoking behavior. Indicate abstinent days as well.*

- Have you smoked at all in the last month?

1. Yes (use calendar)
2. No

- If yes, how much do you currently smoke ? \_\_\_\_\_

- Please tell me about your smoking over the past month

- In the past month, have you changed your smoking behavior at all? Have you cut down or increased the number of cigarettes you smoke?

1. Are you seriously considering quitting smoking cigarettes within the next six months?

- A. No
- B. Yes

2. Are you planning to quit smoking cigarettes in the next 30 days?

- A. No
- B. Yes

3. How many times have you quit smoking in the past month for at least 24 hours?

4. \_\_\_\_\_  
Image a ladder with ten rungs, where would you say you are in thinking about quitting? (read over contemplation ladder to them)

\_\_\_\_\_ (indicate a number from 0-10)



Appendix J: (Continued)

5. How confident are you that you will not be smoking a year from now?

1. Extremely confident
2. Very confident
3. Somewhat confident
4. Slightly confident
5. Not confident

6. How determined are you that you will not be smoking a year from now?

1. Extremely determined
2. Very determined
3. Somewhat determined
4. Slightly determined
5. Not determined

### About the Author

Vani N. Simmons received a Bachelor's Degree in Psychology from the University of Michigan in 1998 and a Master's Degree in Clinical Psychology in 2001 from the University of South Florida.

While in the Ph.D. program at the University of South Florida, Ms. Simmons presented her work at national meeting and coauthored several publications in peer-reviewed journals. She completed her internship at the James A. Haley VA Medical Center and looks forward to beginning a postdoctoral fellowship in Behavioral Oncology at the H. Lee Moffitt Cancer Center & Research Institute.