EFFICACY OF AN INTERNET SMOKING CESSATION PROGRAM

FOR COLLEGE STUDENTS

by

NGOC-CAM PHAM ESCOFFERY

(Under the direction of Dr. Laura McCormick)

ABSTRACT

Smoking cigarettes is the leading cause of preventable diseases and death in the United States. It is estimated that 29% of college students had smoked one or more cigarettes in the preceding 30 days. To date, relatively few cessation programs that have been developed for young adults and been evaluated as successful. The purpose of this study is to evaluate the efficacy of a web-based intervention on the reduction and cessation of cigarette smoking, number of quit attempts, self-efficacy in quitting, and attitudes toward smoking among college students.

The study employed a randomized, pretest-posttest experimental design with a 6-months follow-up. Seventy college smokers participated in the study. Participants attended four sessions over two months. The intervention group received a multi-component, stage-matched program. Key components were interactive quizzes, web-based messages and strategies, social support and personalized assessments. The control group received generic smoking cessation messages. ANCOVAS were run to assess post-intervention differences between the groups on number of cigarettes smoked and quit attempts with the baseline measures as the covariate. Chi-square analyses tested the difference between the groups on quit rate and forward stages of

change movement. ANOVAs were used to determine the differences between the groups on self-efficacy and attitudes toward smoking.

Results of the statistical tests found no significant statistical differences between the groups on any of the outcome measures. However, participants in the intervention group did report lower number of cigarettes smoked and quit attempts between posttest and 6-month follow-up after adjusting for baseline scores and a greater quit rate at 6-month follow-up. The effects of quit rate and quitters in action persisted to the 6-month follow-up for the intervention group. They also had greater proportion in the action stage than the control group at 6-month follow-up. Within the intervention group, there were significant differences in self-efficacy and attitudes about adverse effects of smoking between the baseline and posttest. The web-based intervention was generally well-received.

This study may be a test of the feasibility of a web-based smoking intervention. Although the limited sample size may prohibit drawing conclusions on the efficacy of intervention, web-based interventions may hold promise as a medium for behavior change.

INDEX WORDS: College, Smoking cessation, Internet, Transtheoretical Model, Smoking

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DEDICATION

I dedicate this study to the many people who struggle with quitting smoking and all the health professionals who assist smokers in quitting. Hopefully, this study will contribute to new knowledge and methods for health promotion so that smokers are more successful with quitting. Testing the efficacy of new interventions and applications of the knowledge learned will help us build better programs for our communities.

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CHAPTER 1

INTRODUCTION

Smoking cigarettes is the leading cause of preventable diseases and death in the United States, and it contributes to an estimated 430,000 deaths each year (Centers for Disease Control and Prevention [CDC], 1997a). The use of tobacco will cost the United States millions of dollars in health care expenditures, lost productivity, and lives. Over 80% of adolescents who smoke a pack a day or more as high school seniors still will be smoking five to six years later; "in the absence of intervention, adolescent smokers will most likely become adult smokers'" (U.S. Department of Health and Human Services [USDHHS], 1994, p. 230).

Prevalence Smoking among Adolescents

Smoking among adolescents is a significant health problem. Adolescents younger than 18 years old account for approximately 80% of first time tobacco users (USDHHS, 1994). Many adult smokers became regular smokers before 20 years of age; therefore, teen smoking is a precursor to nicotine addiction among adult smokers. Alarmingly, data from the National Household Survey on Drug Abuse (NHSDA) indicate that from 1988 to 1996 the incidence of initiation of first tobacco use increased by 30% and the incidence of first daily used increased by 50% among youth aged 12-17 years (CDC, 1998).

National initiatives have been developed in response to the increase in adolescent smoking. Healthy People 2010 includes as one of its objectives for the nation, 27-7: to increase tobacco use cessation attempts by adolescent smokers (USDHHS, 2000a). In addition, major organizations that fund programs, research, and policy to control youth tobacco use created the National Blueprint 1998. Its goal is to ensure that young smokers aged 12-24 years have access to effective cessation interventions (Youth Tobacco Cessation Collaborative, 2000).

Incidence of Smoking among College Students

According to the Cooperative Institutional Research Program (CIRP), the number of students smoking on college campuses is increasing nationwide. Smoking cigarettes has been on the rise since the late 1980s (Sax, 1997). It was at a 20-year high with 14.6% of 1995 freshmen reporting frequently smoking (Sax, 1997). The 1995 National College Health Risk Behavior Survey found that 75% of college students had ever tried smoking a cigarette and 29% of college students had smoked one or more cigarettes in the preceding 30 days, indicating current cigarette use (CDC, 1997b). Of those who had tried smoking, 42% were current smokers (Everett et al., 1999). Of those who were current cigarette smokers (smoking in the past 30 days), roughly two-thirds (68%) had ever tried to quit (CDC, 1997b). Similarly, from 1993 to 1997, the Harvard School of Public Health College Alcohol Study found that the prevalence of current cigarette smoking rose from 22.3% to 28.5% among the 116 participating colleges (Wechsler, Rigotti, Gledhill-Hoyt, & Lee, 1998). The study found that 28% of current smokers began to smoke regularly at 19 years or older. Half of the

sample of 2,014 students had quit smoking for at least 24 hours in the past year (Wechsler et al., 1998).

Benefits of Smoking Cessation

The risks for smoking-related diseases increase the earlier in life a person begins smoking (CDC, 1989). Short-term effects of smoking in adolescents are increased productive cough and phlegm, increased respiratory problems, slower lung growth, and decreased physical fitness (USDHHS, 1994). In the long term, smoking is the major cause of lung cancer, coronary heart disease, and chronic obstructive pulmonary disease. Smokers also have an increased risk of respiratory infections such as bronchitis, influenza, and pneumonia death (USDHHS, 1990). Billions of dollars each year are spent on treating smoking-related diseases (CDC, 1994). The Centers for Disease Control and Prevention (CDC) reported that every pack of cigarettes sold in the U.S. is associated with approximately $2 in medical costs (CDC, 1994).

These risks are not irreversible, however; quitting smoking reduces the risk of lung cancer, heart attack, stroke, other cancers, and chronic lung disease. Former smokers live longer than people who continue to smoke. Cessation also has immediate and major health benefits to smokers of any age, including decreased blood pressure, diminished coughing, and increased lung capacity. At all ages, smoking cessation reduces the risk of premature death (USDHHS, 1990).

Tobacco use may lead to other risky behaviors and is associated with alcohol use, which places adolescent smokers in more harm. Adolescents who drink alcohol or smoke are more likely to proceed to marijuana use and then other illicit drugs (e.g., cocaine, crack)

(Yamaguchi & Kandel, 1984). Adolescents who drink alcohol are more likely to be sexually active than those who do not drink (Donovan & Jessor, 1985). Millstein et al. (1992) surveyed 563 adolescents from different social, racial, and ethnic backgrounds and found evidence of multiple risk behaviors. Sexually active adolescents were more likely to smoke and/or drink alcohol or use illicit drugs and be driving or riding under the influence of drugs. Brener and Collins (1998) found that engaging in more than one health risk behavior surveyed on the Youth Risk Behavior Survey increased dramatically with age. These risk behaviors included not using a seat belt, carrying a weapon, smoking, using smokeless tobacco, episodic heavy drinking, using marijuana, using cocaine, engaging in sexual intercourse, and not using a condom. By the ages of 14 to17, one-third of adolescents engaged in two or more risk behaviors; half of those ages 18 to 21 did.

Therefore, an intervention to promote smoking cessation for young adults will reduce the burden of morbidity, mortality, and the associated health costs. In addition, quitting smoking at earlier ages will also reduce engagement in other risk behaviors and improve the quality of life for young adults.

Purpose of the Study

The purpose of this study is to evaluate the efficacy of a Transtheoretical Model of Change, web-based intervention on the reduction and cessation of cigarette smoking, number of quit attempts, self-efficacy in quitting, and attitudes toward smoking among college students. The study employs an experimental design with random assignment to treatment and control groups with a pretest, immediate posttest and 6-months follow-up. The control

group received generic quitting messages. Participants are students from the University of Georgia who smoke cigarettes.

Significance of the Study

The study is significant in several respects. First, if the decline in cigarette smoking is due in part to prevention and cessation efforts, it is important to continue to develop interventions to increase cessation and to expand efforts to reach adolescents and young adults. To date, relatively few cessation programs that have been developed for teens and fewer have been evaluated as successful (Sussman, Lichtman, Ritt, & Pallonen, 1999). Second, the study helps determine the feasibility and efficacy of an intervention to promote smoking cessation using an innovative health education medium--Internet web pages. Previous studies using the Transtheoretical Model of Change (TTM) approach have been found to be effective in behavior change with print materials and computer programs (Prochaska et al., 1993; Velicer et al., 1993; Pallonen et al., 1998). This research will add to these studies by examining whether or not an intervention on the Internet is also effective in reducing and stopping cigarette smoking among college students. If the intervention is successful, it may offer another way to deliver interventions that may have the potential to reach many smokers. Third, there is a paucity of research on the evaluation of web-based interventions. There are only a few studies that have tested the efficacy of this medium for behavior change. Finally, this study is important because the college years offer an opportunity for interventions to prevent illnesses and mortality related to tobacco use. Intervening at the college years also may prevent students who smoke occasionally from becoming addicted smokers.

Research Questions and Hypotheses

The following are the research questions and hypotheses for the study.

The first set of hypotheses focuses on differences in outcomes reported by the intervention and control groups for smokers who are moving from the Transtheoretical Model of Change (TTM) stage of preparation to action.

Primary Research Question

Are there differences between the intervention and control groups in number of cigarettes smoked, quit attempts and quitters at the post-intervention assessments for smokers moving from the preparation stage of quitting (thinking about quitting in the next 30 days) to action (quitting)?

Hypothesis 1: Number of cigarettes smoked per day will decrease more in the intervention group than the control group at posttest.

Hypothesis 2: Number of cigarettes smoked per day will decrease more in the intervention group than the control group at 6-month follow-up.

Hypothesis 3: Number of quit attempts will increase more in the intervention group than the control group at posttest.

Hypothesis 4: Number of quit attempts will increase more in the intervention group than the control group at 6-month follow-up.

Hypothesis 5: The intervention group will have a higher proportion of quitters (quit rate) than the control group at posttest.

Hypothesis 6: The intervention group will have a higher proportion of quitters (quit rate) than the control group at 6-month follow-up.

Secondary Research Question

Are there differences between the intervention and control groups in forward stage of quitting movement, self-efficacy, and attitudes toward smoking at posttest? The following hypotheses will test the effects of the intervention on stage movement, self-efficacy, and attitudes. Because this study is a pilot, it is important to measure precursors to smoking cessation. Attitudes can predict intentions to perform behavior (Ajzen, 1988). Similarly, self-efficacy is predictive of behavior change (DiClemente et al., 1995).

Hypothesis 7: The intervention group will have a higher proportion of smokers moving forward in stage of readiness to quit than the control group at posttest.

Hypothesis 8: Smoking abstinence self-efficacy will increase more in the intervention group than the control group at posttest.

Hypothesis 9: The intervention group will more strongly agree to the adverse effects of smoking as compared to the control group.

Hypothesis 10: The intervention group will less strongly agree to the benefits of smoking as compared to the control group.

Hypothesis 11: The intervention group will less strongly agree to the pleasure of smoking as compared to the control group.

Exploratory Research Question

This study tests the efficacy of a new medium to deliver smoking cessation messages and strategies. Therefore, process evaluation questions are included to document the effectiveness of the web-based program. The following questions were asked:

What did the participants consider as strengths and weaknesses of the web-based medium as a method of health education? What changes would participants make to the intervention? How was the intervention used and accepted among the participants?

CHAPTER 2

REVIEW OF THE LITERATURE

This chapter will provide a review of the literature related to adolescent smoking, cessation, and Internet-based interventions. The first section will begin with the risk factors for smoking among adolescents, stages of adolescent smoking, and nicotine addiction among adolescents. The next section will describe measures of cessation and smoking cessation interventions for adolescents. This section will be followed by a description of the Transtheoretical Model, theory of self-efficacy, and theory of social support. The final section of the chapter will discuss the current state of web-based health interventions and online health research.

Smoking and Cessation among Adolescents

Risk factors for smoking among adolescents

There are many risk factors for cigarette smoking among adolescents. Conrad et al. (1992) found that peers, friends, and siblings were significant influences in smoking initiation in reviewing 27 prospective studies about smoking onset. Adolescents who perceived higher social norms of smoking are more likely to be smokers (Chassin et al., 1984b). Smokers are also those who want to appear mature or independent to fit in with peers who smoke (O'Neill et al., 1983). Smoking is also associated with other behaviors such as alcohol and other drug use (Fleming, Leventhal, Glynn, & Ershler, 1989) and rebellious and risk-seeking behaviors (Jessor, 1991; Conrad et al., 1992). Poor academic

achievement also is related to the onset of smoking (Conrad et al., 1992). The lack family bonding in terms of attachment and nurturing may also be a risk factor for cigarette use (Conrad et al., 1992). Smoking is also predicted by adolescents who have low socioeconomic status (Conrad et al., 1992).

Reasons for smoking among college students

There are several reasons for smoking among college students. DeBernardo et al. (1999) found that stress and friends who smoked were two motivators for undergraduate students at a northeastern university to contemplate smoking within the next 12 months. Sciacca and Melby (1992) found that the magnitude of stress symptoms also increased with the frequency of smoking, eating, and drinking among undergraduates of a midwestern university. Emmons, Wechsler, Dowdall, and Abraham (1998) assessed predictors of smoking among college students. They found that the strongest predictor was engagement in other high-risk behaviors such as using marijuana, drinking heavily, and having multiple sex partners. Others predictors were engaging in binge drinking in high school, not participating in athletics, and dissatisfaction with education.

Little is known about what colleges and universities do to address smoking on their campuses. Wechsler et al. (2001) found that most college campuses (81.1%) prohibited smoking in public areas and half (54.5%) allowed smoking in private areas such as residence halls or offices through a survey of 393 health center directors. More than half (55.7%) had smoking cessation programs in their college health centers, 31% offered individual counseling, and 27% offered medical interventions. However, the demand for cessation activities was low; 81% of the schools did not have a waiting list for programs they offered.

Stages of adolescent smoking

Young people progress through stages that lead toward nicotine dependence. In the Preparatory stage, adolescents develop attitudes and beliefs about smoking. They also begin to think about smoking, including "the development of perceptions of what smoking involves, its potential functions, and an increasing awareness of social pressures to smoke" (Mayhew, Flay, & Mott, 2000, p. S63). The Trying stage involves adolescents smoking a few cigarettes, usually through peer influence. During the Experimental stage, adolescents continue to smoke but do it irregularly. Cigarette smoking gradually increases in frequency and occurs across different situations. In the Regular Use stage, adolescents begin to smoke on a routine basis, but they may not smoke every day or at high rates. The final stage is Addiction/dependence, in which adolescents smoke daily or almost daily and have a physiological need for the substance (USDHHS, 1994; Mayhew, Flay, & Mott, 2000).

Nicotine addiction

Nicotine addiction is the most common form of drug addiction (USDHHS, 1988). The primary indicator of drug dependence is compulsive use, psychoactive effects of the drug, and the drug reinforcing behavior. The American Psychiatric Association (APA) recognized two disorders related to nicotine addiction: nicotine dependence and nicotine withdrawal. Nicotine dependence is characterized by a person's having lack of control of nicotine, which is a psychoactive substance, and continuation of its use despite negative consequences. Use of nicotine may be through smoking cigarettes--the most common source, smokeless tobacco, and nicotine gum. Nicotine withdrawal results after the abrupt cessation or reduction of use of substances containing nicotine. The symptoms of

withdrawal may include craving nicotine, anger, irritability, anxiety, restlessness, and increased appetite or weight gain (APA, 1994).

In a study of 10th graders (n=2,197), Rojas, Killen, Haydel, & Robinson (1998) found that adolescent smokers who attempted to quit experienced withdrawal symptoms of craving (45%), restlessness (29%), irritability (29%), hunger (25%), inability to concentrate (22%), sadness (15%), and trouble sleeping (13%). Adolescents reported considerable nicotine dependence as measured by a modified Tolerance Questionnaire (Fagerstrom, 1978; Heatherton et al., 1991). Therefore, adolescents, like adults, experience a range of withdrawal symptoms in trying to quit smoking.

Summary

This section reviewed the literature on adolescent smoking. Adolescents smoke for a variety of reasons related to family and social pressures, risk seeking, stress reduction, and boredom. They may pass through stages of smoking from trying a cigarette to addiction. Finally, like adults, adolescents experience withdrawal from nicotine.

Smoking Cessation

Quitting Measures

Several measures have been used to describe quitting. First, there is the percentage of former smokers. The National Health Interview Survey reported 23.6 % of the 162.6 million adults were former smokers (USDHHS, 1990). Second, the quit ratio divides the number of former smokers by the number of ever smokers; it is also known as the "quit rate" or "cessation rate." In 1987, the quit ratio was 44.8%, meaning that nearly

one half of all adults who ever smoked had stopped (USDHHS, 1990). Finally, the smoking continuum reports on the timing and duration of quit attempts. It includes: (1) current smokers who had never tried to quit; (2) current smokers who had quit previously but not in the past year; (3) current smokers who had quit for less than 7 days in the past year; (4) current smokers who had quit for more than 7 days in the past year; (5) former smokers who had quit with the past 3 months; (6) former smokers who had been abstinent for 3 to 12 months; (7) former smokers who had been abstinent for 1 to 5 years; and (5) former smokers who had quit more than 5 years earlier (USDHHS, 1990).

Velicer, Prochaska, Rossi, & Snow (1992) classified the outcomes of smoking cessation studies into three measures: point prevalence abstinence (percent of people not smoking at any given point in time), continuous abstinence (percent of people not smoking at all since the onset of the intervention), and prolonged abstinence (percent of people abstinent for some interval). The most common minimum time intervals for point prevalence abstinence are 24 hours, 7 days, and 30 days. The advantages of point prevalence abstinence is that non-smoking may be biochemically validated if it is about one week or less, it includes people who have cycled through the stages of change, and it includes people who delay action and quit at a later time after an intervention. However, point prevalence may overestimate the number of quitters because people may return to smoking at a later time, and smokers who quit within the common point prevalence time frames of 24 hours, 1 week, or 1 month will only experience the immediate health benefits of cessation. Continuous abstinence is more stable over time because for longer periods of abstinence, the likelihood of relapse diminishes, allowing for the evaluation of long-term health effects of smoking cessation. On the other hand, the problems with

continuous abstinence are that there are only a small number of smokers who quit without relapses, it only decreases as more quitters relapse, and it cannot be validated biochemically. Prolonged abstinence means that smokers have been abstinent for a long time period, such as 6 or 12 months. It is more stable than point prevalence, allows smokers who take delayed action to be counted, and can assess the long-term health benefits of cessation. However, it requires a long follow-up period and cannot be validated biochemically (Velicer et al., 1992).

The 1988 Surgeon General's Report presented the typical pattern of relapse after cessation from a group clinic (USDHHS, 1988). An estimated 65% of all quitters relapsed after 3 months of quitting. Another 10% relapsed within 3 to 6 months of cessation. Then, another 3% relapsed from 6 to 12 months after quitting. After 60 months (5 years) of prolonged abstinence, individuals are categorized as former smokers (USDHHS, 1989).

Quit Attempts

Adolescent smokers often make cessation attempts. Almost half of high school seniors who smoked reported that they wanted to quit smoking on the "Monitoring the Future Project" between 1976 and 1984. Thirty percent of current smokers reported trying to quit smoking at least once and having failed (USDHHS, 1994). McKillip & Vierke (1980) found that 78% of student smokers in college had attempted to quit at least once. Stanton et al. (1996) followed a cohort of adolescent smokers and found only 5% of the daily smokers at age 15 had not smoked in the last month at age 18, and only 3% had not smoked in the last year.

Success at quitting is difficult for adolescents (Rose et al., 1996; Stanton, 1995). Twenty-two percent of 98 young people were successful non-smokers at 6 months; 28% returned to smoking within a week of quitting, and 53% returned within a month from a sample of 622 6th through 12th graders (Ershler, Leventhal, Fleming, & Glynn, 1989).

Reasons for Quitting

Tuakli, Smith, and Heaton (1990) examined reasons for quitting among adolescents belonging to a network of family practice physicians. The major reasons for not quitting were stress (33%), peer behavior (26%), boredom (18%), and influence of smoking parents or relatives (18%). Reasons reported for quitting included health concerns (62%), costs of cigarettes (13%), and request of a parent or friend (11%). Similarly, Sussman et al. (1995; 1998a) found that negative health effects, social reasons, and cost were reasons for quitting. Health effects also are a commonly mentioned reason for quitting or wanting to quit (Dozois, Farrow, & Miser 1995; Stone & Kristeller, 1992).

Some studies also reported reasons for quitting among adult smokers. O'Loughlin et al. (1997) studied the impact of a smoking cessation course tailored for 122 low-income women. Women indicated that the reasons for the current quit attempt were physician recommendation (54%), saving money (49%), better self-control (50%), personal illness (8%), and illness of a family member or friend (17%). In a study assessing the effectiveness of a randomized trial of the transdermal nicotine patch among 410 African American cigarette smokers, 99% stated that they wished to quit for health reasons when they get older, 99% wanted to quit so that they would feel better, and 74% stated that they had a current illness that was aggravated by cigarette smoking (Ahluwalia, Resnicow, & Clark, 1998). A few studies have reported on a "Reasons for

Quitting" scale that is comprised of four dimensions of motivation for smoking cessation (Curry, Wagner, & Grothaus, 1990; Curry, Grothaus, & McBride, 1997). The dimensions of motivation are health concerns (e.g., physical symptoms, shorter life), self-control, immediate reinforcement (e.g., save money, won't smell), and social influence (e.g., people nagging, get reward). Therefore, common patterns of health effects, intrapersonal reasons, and social reasons are found in motivation to quit smoking for adolescents and adults.

Predictors of Quitting

There is a small body of research on predictors of smoking cessation. Hansen, Collins, Johnson, and Graham (1985) conducted a prospective study of students from nine high schools at pretest, 3-month follow-up, and 15-month follow-up. Researchers found that one's view of the morality of smoking, an environment of friends non-supportive of smoking, and beliefs about the positive short-term consequences of smoking all predicted cessation. Moreover, beliefs about the negative consequences of smoking, a view of oneself as non-rebellious, and a social family environment that discourages smoking were predictive of long-term maintenance of cessation. Another study found that smokers who smoked at a lower level, younger age of quitting attempt, and less friends smoking were all factors associated with successful quitting (Ershler et al., 1989). Becoming married to a nonsmoker and fewer friends who smoked are also successful predictors of cessation (Chen, White, & Pandina, 2001).

Chassin et al. (1984a) conducted a longitudinal study on the cognitive and social influence factors in smoking cessation. Younger smokers who later quit had parents who discouraged smoking and offered higher levels of emotional support and were less

motivated to comply with their peers. On the other hand, older adolescents who later quit had fewer friends who smoked and had more motivation to comply with those friends. Another prospective study was of 6th to 12th graders from 1980 to 1983, with more data collected in 1987 and 1994 (Rose et al., 1996). The researchers found successful cessation among attempters was associated with achieving some college education, smoking less than a pack a day, seeing oneself as being less likely to smoke a year later, having fewer friends who smoke, valuing health, feeling lower social pressures for quitting, being employed, and not living with children.

Suggestions for promoting successful cessation varied among studies. Stanton et al. (1999) surveyed 440 out-of-school youth. The method of quitting recommended by these smokers to other youth were use of will power (66%), help of a friend (25%), quit book (15%), and nicotine gum or patches (15%). Another study reported having a friend with whom to quit (56%), having health information from peers (34%), and medication to quit (28%) were suggestions from other youth for cessation (Tuakli et al., 1990).

Smoking Cessation Interventions for Adolescents

Efforts to promote smoking cessation generally fall into two categories: behavioral and pharmacological. Pharmacological therapies include nicotine replacement, consisting of gum, patch, inhalers, and nasal spray; and administration of buproprion, an antidepressant. Behavioral approaches range from brief interventions to intensive sessions with specialized counselors (Rennard & Daughton, 2000).

This next section will present smoking cessation interventions that have been developed for adolescents. The interventions are categorized based on their settings and in chronological order of the publication dates.

There are few evaluated smoking cessation programs for adolescents and only a small body of research in this area (Botvin, Epstein, & Botvin, 1998; Myers, 1999; USDHHS, 1996). The Clinical Practice Guidelines for Smoking Cessation stated that "little intervention research involves children and adolescent tobacco users" (USDHHS, 1996, p. 79). Of the studies reviewed here, many are school-based while some employ clinical settings for intervention.

Most of the cessation studies employed schools as the setting of their studies. Loctecka and MacWhinney (1983) evaluated a four-session cognitive-behavioral cessation intervention for high school smokers. The treatment group (n=53) received the following components: discussion of reasons for quitting, goal-setting, role-playing about difficulties of not smoking, testimonies of ex-smoker peers, behavioral substitutes for smoking, deep breathing exercises, feedback on social contingencies, and individual counseling. The control group received “information only,” including popular tips on how to stop smoking from NCI's *Clearing the Air*. At the four-week posttest, there was a significant pre-post test difference in number of cigarettes smoked per week in the cognitive-behavior group from a median of 56.0 to 31.0. At three-month follow-up with roughly half of the students in each group remaining, 78% of students in the cognitive behavioral reported smoking less and 4% reported smoking more as compared to percentages for the information only group of 46% and 31%, respectively. The researchers did not assess complete abstinence and did not include at least a five-month

follow-up as recommended by the Agency for Health Care Policy and Research. In addition, there was no carbon monoxide test of self-reported smoking, and attrition of participants was high.

Perry et al. (1980) conducted a school-based intervention in California schools. Tenth grade students in three high schools (N=477) received an experimental program on social pressures influencing the adoption of smoking and the immediate physiological effects of smoking. The program consisted of four consecutive 45-minute sessions in the health classes in the fall. Tenth grade classes in the two control schools (N=394) received the traditional material on the long-term health effects of smoking. Posttest measures of smoking and carbon monoxide samples were obtained five months later. At posttest, the experimental group had a significantly lower percentage of students who reported smoking in the past week (16 vs. 22 %) and smoking in the past month (24 vs. 30 %) than the control group. The experimental group also scored significantly higher than the control group in knowledge of the immediate physiological effects of smoking, best ways to quit, and ways to prevent others from smoking. Perry et al. (1980) employed a quasi-experimental pretest-posttest design and carbon monoxide breath samples to validate smoking status. However, the study did not have a delayed posttest to estimate the long-term effects of the program.

In a later quasi-experimental study, Perry et al. (1983) compared three different programs in reducing the rate of smoking among high school adolescents. Twenty health classes in four high schools were randomly assigned to the three different programs: one that discussed the social consequences of smoking (n =36), one on the immediate and long-term physiological effects of smoking (n = 31), and one on the long term effects

(n = 15). There were instruction modalities of a teacher versus a college student. The study had a 2-month posttest assessment of smoking and other health behaviors and carbon monoxide breath tests. Twenty-three percent of 82 students who reported weekly smoking at pretest reported no smoking in the week prior to the posttest. These self-report data were validated with low carbon monoxide readings. Teachers were more effective in the classes teaching the traditional curriculum on the long-term health effects of smoking, while college students were more effective in the classes focused on social influences. The differences among programs are difficult to assess because of the small number of participants. Although the study assessed the impact of various interventions with randomized classrooms, the sample size was small. In addition, the researchers did not verify smoking status with biochemical verification.

Prince (1995) compared a six-session peer-led smoking program for high school youth in Ventura and Los Angeles counties to the same program led by adults, and to a control group program. The groups of 93 students were similar in size: 30 in the peer-led group, 31 in the adult-led group, and 32 in the control group. Prince predicted that the students in the peer-led group would reduce adolescent smoking and maintain the reduction more than those in the adult-led group. However, results showed that both the adult-led group and the peer-led group had significant reductions in smoking and maintenance of that reduction over the control group at posttest (peer=-1.70, adult=-2.19, control=.06, $p < .0001$) and at 1-month follow-up (peer=-1.80, adult=-1.84, control=-1.25, $p < .0001$).

In contrast, Weissman et al. (1987) evaluated a school-based contingency-focused program with 15-20 sessions in which students received money for participation and

found a 36% quit rate. Cigarette smoking was measured using carbon monoxide readings. However, there were only 11 teens who participated, and all of the girls later dropped from the study. Four of the six boys were abstinent to the five-month follow-up period.

Pallonen et al. (1998) evaluated the feasibility of on an expert system based on the Transtheoretical Model of Change and an action-oriented clinic program modified for computer presentation. Participants were 10^{th} and 11^{th} grade students. The expert system employed assessment and immediate feedback to the participants as they answered questions, while the action-oriented approach was based on the American Lung Association's *Tobacco-free Teens* program. Both program had three sessions. One hundred and thirty-five smokers reported quit rates of 14 to 20% at posttest (Pallonen et al., 1988). Both of these feasibility studies employed single group designs and had small sample sizes.

Three experimental studies of a smoking cessation intervention have been conducted more recently. Aveyard et al. (1999) conducted a randomized pretest-posttest control group design to examine the effects of an intervention delivered through an expert computer program based on the Transtheoretical model of change. The sample of 8,352 students was in year nine of school. The intervention group received six sessions: three computer sessions and three-class lesson. One of each was delivered for each term of the school year. At 12 months follow-up, the odds ratio for smoking status in the intervention group relative to the control group was 1.08, meaning that the intervention was not significantly more effective than the control. The study employed an

experimental design and had a long-term follow-up. However, the researchers did not confirm smoking status with biochemical validation, and the study had 11% attrition.

Sussman et al. (2001) compared the effects of Project EX on quit rates among three groups. The groups were teen school-based clinic only, clinic plus a school-as-community component, and a standard care control. Project EX was an eight-session program the included motivating activities such as games and talk show format to improve quit rates among high school students across 18 California schools. At posttest, the 30-day abstinence rate was 14% and similar across the two clinic groups. At three-month follow-up, the 30-day abstinence rate of 30% was reported for the combined clinic groups and 16% for the control group, with a significant odds ratio. This study employed a randomized design and biochemical validation. The follow-up period was only three month after the posttest.

Adelman et al. (2001) evaluated the effectiveness of a school-based, smoking cessation program that included eight-sessions over six weeks compared to an informational pamphlet. Seventy-four students were recruited from the health center of a large public high school. At immediate posttest, 59% of the school-based curriculum group compared to 17% of the pamphlet-only group were quitters. This significant intervention effect persists 4 weeks later with 52% of the intervention group compared to 20% of the control group being smoke-free. No group differences on quitting were observed for 10 and 20 weeks post-intervention. Self-efficacy scores were higher for both groups at the end of the program.

There have been few interventions employing pharmacological substances such as the nicotine patch. Smith et al. (1996) provided 24-hour nicotine patch therapy and

behavioral counseling with group support for eight weeks to adolescent smokers who were attempting to stop smoking. Thirty-nine high school smokers were invited to participate and received the nicotine transdermal patch at their schools. The researchers measured expired carbon monoxide levels and blood cotinine levels to determine smoking levels. Nineteen adolescents completed the full patch therapy, three (14%) were quitters at week eight, and one (5%) continued to be a non-smoker at three and six months after the initiation of the patch. This study employed a single group posttest only design and had no follow-up observations of the adolescents.

Another setting that has been employed for cessation intervention was in medical clinics or practices. Townsend, Wilkes, Haines, and Jarvis (1991) evaluated an intervention to reduce smoking among adolescents. Adolescents aged 13, 15, and 17 years were identified from the register from three general practices and invited for a general health check. Four hundred and ninety-one attended a health check. Two-thirds were randomly assigned to a doctor or nurse visit to discuss health problems. In relation to smoking, information on the risks of smoking, attitudes toward smoking, and ways to refuse cigarettes was discussed. In response to counseling, 26 (60 %) of the 43 regular smokers made an agreement to quit, 6 (14 %) said that they might quit, and 10 (23 %) declined. Weaknesses of this study were employing a single group posttest only design and assessing a small sample of smokers.

Myers and Brown (1994) conducted a two-year prospective case study of adolescents from two private hospital-based inpatient substance abuse treatment facilities. The sample included 166 adolescents ages 12 to 18 who met the Diagnostic and Statistical Manual of Mental Disorders' criteria for substance abuse. The researchers

interviewed the adolescents at 12 and 24 months after discharge. The four-week program focused on abstinence from alcohol, marijuana, and other hard drugs. Smoking rates were significantly different between patient intake and 12-month and 24-month follow-up on percentage of smokers, daily smokers, and number of cigarettes smoked. There was 85% smoking at intake compared to 74% at 12-month follow-up and 78% at 24-month follow-up. There were 26 abstainers of 128 smokers (20%) at 12-month follow-up and 19 abstainers of 130 smokers (14%) at 24-month follow-up. Limitations of the study were the lack of a control group, a representative group of adolescents, and confirmation of smoking status by biochemical validation.

Colby et al. (1998) tested the efficacy of a brief smoking intervention for adolescents in a hospital. Forty adolescents were randomized to a motivational interview (MI) or brief advice (BA) group. The motivational interview intervention employed empathic therapy and avoided argumentation. It also tried to develop a perception of discrepancy between the adolescent's goals and behavior. Feedback was given to increase motivation to change. The brief advice intervention consisted of an interventionist distributing a handout to adolescents and encouraging them to stop smoking. At one-week follow-up, 20% of the MI group were abstinent, as compared to 10% of the BA group. There was significant reduction in smoking dependence from baseline across the groups. Seventy-two percent of the MI group made a longer than 24-hour quit attempt, while 60% of the BA made such an attempt. No differences between the groups were found for stage movement. This study had a small sample size, a follow-up period of only three months, and no validation of self-reported data.

These reviewed studies were strong in several respects. Many of the studies applied behavior change theories to inform their content and strategies for cessation. In addition, several of them had follow-up of at least 5 months to assess if cessation was maintained as recommend by the Agency for Health Care Policy and Research (USDHHS, 1996). Some studies were successful in retaining participants through the sessions to posttest measures which is often difficult for the adolescent population (McCormick et al., 1999).

There also are many weaknesses among these few published smoking cessation interventions. Many of the studies did not employ an experimental design, but instead they were single-group or quasi-experimental designs (Sussman et al., 1999; Moolchan, Ernst, & Henningfield, 2000). The lack of a comparison or control group makes causal inferences about the effects of smoking cessation interventions difficult. Lack of randomization also increased the threats to validity of these studies.

Another methodological weakness across the studies is the lack of consistent outcome indicators of smoking cessation. The reported measures included number of cigarettes smoked (Loctecka & MacWhinney, 1983; Myers & Brown, 1994); percentage of smoking in the past week (Perry et al, 1980, Perry et al., 1983); number of smokers who agreed to quit (Townsend et al., 1991); percentage of smokers (Myers & Brown, 1994); reduction in smoking (Prince, 1995); quit rates (Weissman et al., 1987; Smith et al., 1996; Pallonen et al., 1998; Adelman et al., 2001; Sussman et al., 2001); and quit attempts (Pallonen et al., 1998). The outcome measure also varied, with quit rate being the most common measure. The quit rate ranged from 0% to 59%.

The literature in the area of smoking cessation interventions lacks consistency or a rationale for the number of sessions. The number of sessions in the reviewed studies ranged from 3 to 20. Researchers did not provide adequate information for the final decision on the contact time and dosage of the intervention.

Similarly, none of the studies addressed the issue of statistical power. Power in experiments is the ability to reject a null hypothesis when it is false (Ary, Jacobs, & Razavieh, 1996). All of these studies had small samples or small numbers of smokers in the experimental and control groups, which may reduce the power for detecting the effects of the treatment. Many of these studies had less than 100 study participants. Reaching and recruiting adolescents is a problem for researchers and practitioners (Gillespie, Prochaska, Rossi, & Snow, 1995; Sussman et al, 1999; McCormick et al., 1999). In addition, some of the studies had high attrition of study participants.

A final methodological weakness in this review of smoking cessation interventions is that many of the studies did not address validation of smoking or quitting status. Although there may be controversy around the applicability of biochemical validation to adolescent smokers, several studies relied exclusively on participants' self-reporting of smoking. Only a small number of the studies employed biochemical validation to verify smoking status, including cotinine measurement (Smith et al., 1996) and carbon monoxide testing (Perry et al., 1980; Weissman et al., 1987; Smith et al., 1996; Adelman et al., 2001; Sussman et al., 2001). Sussman et al. (1995) found higher reporting of cessation rates among studies that utilized biochemical validation procedures.

Smoking Cessation Programs through Health Organizations

The next section presents smoking cessation programs targeted at teens offered through voluntary health organizations or other health agencies. Some of these organizations include the American Cancer Society and American Lung Association.

There are a number of popular adolescent cessation programs produced by health organizations, although many of them have not formally been evaluated. The American Lung Association's *Not on Tobacco* (N-O-T) is a school-based ten-session program with four booster sessions. A pilot evaluation found that 28% of those in the N-O-T intervention group reported quitting smoking compared to 5% in a brief control group (American Cancer Society [ACS], 1998). *Tobacco Free Teens* is another American Lung Association program that offers an eight-session program for teens. The clinic quit rate for the program was 13.5% based on an initial evaluation of participating students from Kentucky, Minnesota, Wisconsin, and Western Missouri (ACS, 1998). *Smoke Free Teens* from the American Cancer Society consists of seven 40-50 minute sessions. No formal evaluation of the program's effectiveness has been reported. The Utah Department of Health has an 8-module program, *Ending Nicotine Dependence* (END), designed to help adolescents decrease or quit tobacco use. Of 251 students who completed the program in Utah, 16% quit smoking (American Cancer Society, 1998). Tobacco Education Group (TEG) and Tobacco Awareness Program (TAP) both include eight sessions of 30-50 minutes. Evaluations of these programs found a 15% quit rate in the TAP program and 15% in the TEG program (Coleman-Wallace et al., 1999).

Length of Sessions for Smoking Interventions

In developing an intervention, it is important to consider the duration of the educational intervention. There is no consensus on the ideal number of sessions for an adolescent smoking cessation program. The following section will discuss the current state of knowledge regarding the length of cessation programs.

In general, research on duration of intervention and intervention effectiveness is scarce in health promotion. Schapira et al. (1991) compared two brief dietary interventions that had four hours of mandatory participation with a longer-term intervention of twenty-six weeks. All three programs significantly reduced calories, fat, fiber intake and weight. Black et al. (1998) reviewed 120 peer-led drug prevention programs for middle schoolers and found that 60% of them were only six hours in length. In addition, they found that longer programs of 18 hours performed only slightly better. However, meta-analyses conducted on smoking cessation in the clinical setting indicate that quit rates will rise with an increasing intensity of the intervention, and that several sessions over ten minutes will help achieve better outcomes (USDHHS, 1996). The Agency for Health Care Policy and Research recommended that more intensive treatment of four to seven sessions is more effective at achieving long-term abstinence for clinical settings.

The number of sessions for known adolescent cessation programs is inconsistent. The aforementioned smoking cessation interventions ranged from 4 to 20 sessions. Programs produced by health organizations also vary, although many programs contain eight sessions. The American Lung Association's *Not on Tobacco* (N-O-T) is a school-based ten-session program with four booster sessions. *Tobacco Free Teens* is another

American Lung Association program in Minnesota and the Utah Department of Health has an eight-module program, *Ending Nicotine Dependence* (END), that offer an 8-session program for teens. *Smoke Free Teens* from the American Cancer Society consists of seven 40-50 minute sessions.

Existing studies and programs on adolescent smoking cessation offer little information on the sufficient number of sessions to provide significant changes in quitting among adolescents. The number of quitters at the end of the program varies by the number of sessions. In addition, studies with a greater number of sessions do not report a consistently greater percentage of quitters at posttest (Sussman et al., 1999). Of note, many standard adolescent programs developed for the community consist of eight sessions. However, the amount of contact time from the reviewed studies in Sussman et al. (1999) is difficult to determine because only the number of sessions is reported. Stanton et al. (1996) suggested that there are two dose issues: what was the duration of the program (number of sessions and length of each session) and were boosters provided? Future research is needed on the effect of intervention dose on cessation of smoking, particularly studies consisting of interventions with large sample sizes, rigorous experimental designs, and reported quitting measures.

Technology-based Health Interventions

Research on interventions employing the Internet is in its infancy. Most studies employed a treatment control group design. Winzelberg et al. (2000) evaluated an Internet-based program to reduce risk factors for the development of eating disorders among college females. The intervention was an 8-week course that included textual

information, a discussion board, audio/video components, behavior change exercises, and online self-monitoring journals. Post-intervention results found significant differences between intervention and control groups on body image indices. In addition, Celio et al. (2000) compared the effects of the Internet Student Bodies and a classroom-delivered program with a wait list control group on attitudinal outcomes. There were significant differences between the Internet and the control groups on changes in weight/shape concerns scales, eating concerns, restraint, and drive for thinness subscales. Harvey-Berino (2002) tested the feasibility and acceptability of a weight maintenance program over the Internet to an in-person therapist lead group and no-treatment control group. No differences between the groups on weight loss and preference for the in-person group were found.

In a single-group study, Woodruff et al. (2001) found that an internet-based virtual chat significantly changed quitting, amount of cigarettes smokes, and intentions to quit among its participants. McKay et al. (2001) compared an interactive, tailored diabetes web program with an internet information-only program. Participants reported an increase in moderate-to-vigorous physical activity and walking, although there were no significant intervention effects. Significant differences in awareness and intention to change to low fat and high fruit and vegetable diets were found between a web-based computer-tailored nutrition intervention and a control group (Oenema, Brug, & Lechner, 2001). These studies all add to the feasibility of web-based interventions to affect attitudinal and behavior change.

Theories Guiding the Intervention

Three theories guide the messages and strategies for the smoking cessation intervention: self-efficacy, social support, and the Transtheoretical Model of Change (TTM). The TTM serves as the primary theory for the intervention. The next section describes each of these theories.

Self-efficacy

Self-efficacy is one's personal confidence in performing a behavior by overcoming the demands of the situation to produce the desired outcomes (Bandura, 1977a). It represents a personal belief and relates to beliefs about capabilities of conducting specific behaviors in particular situations (Strecher, DeVellis, Becker, & Rosenstock, 1986). It is an important mediator between knowledge and behavioral action, and it allows individuals to regulate their individual behavior (Bandura, 1997a). Efficacy outcomes, or beliefs about personal capabilities of performing a behavior, are derived from personal experience, vicarious experience, verbal persuasion, and a person's psychological state (Strecher et al., 1986).

Self-efficacy theory has been applied to numerous disciplines, including smoking, exercise, HIV, and nutrition. The following studies demonstrate that there is evidence that interventions including components of self-efficacy and outcome expectations may impact behavior change, with self-efficacy as the single most important factor. Strecher et al. (1986) reviewed 21 studies employing self-efficacy. They reported that outcome and efficacy expectations were predictors in smoking cessation and self-efficacy was predictive of initial and long-term weight loss, maintenance of alcohol abstinence, and exercise maintenance. In children's dietary research, Parcel et al. (1995) found that self-

efficacy accounted for 34% of the variance in diet of third and fourth graders. Domel (1996) found significant correlations between fruit and vegetable (F&V) intake and self-efficacy (for breakfast and lunch F&V, paying for F&V) and outcome expectations (social and health/physical ability); however, fruit and vegetable preferences was the only significant predictor of intake in multivariate analyses. Maibach and Murphy (1995) reported on health interventions for exercise and weight loss that enhanced self-efficacy to encourage health behaviors. Dzewaltowski (1994) similarly reported the relationship between higher personal efficacy and physical activity among asymptomatic adults and diseased people.

Self-efficacy within the Transtheoretical Model has been divided into situational confidence in changing a problem behavior and situational temptations to perform the behavior (Velicer, DiClemente, Rossi, & Prochaska, 1990). Situational confidence is operationalized by the level of confidence individuals have to avoid smoking in each specific situation, while situational temptation is the level of temptations individuals have to smoke in each specific situation (Velicer, DiClemente, Rossi, & Prochaska, 1990). These researchers labeled the situations into three constructs: positive social (e.g., at a party, friend who is smoking); negative/affective (e.g., when one is frustrated, when one is angry and stressed); and habit/addictive (e.g., when one is craving a cigarette, when one gets up in the morning). Individuals in the Preparation stage have more confidence to stop smoking (DiClemente et al., 1991). For temptation to smoke, precontemplators are the most tempted, followed by people in the contemplation and preparation stages (DiClemente et al., 1991). Studies employing self efficacy have found that it predictive of changes in smoking behavior (Prochaska, DiClemente, Velicer, Ginpil, & Norcross,

1985; DiClemente, 1986), associated with progress across stages of smoking cessation (Prochaska & DiClemente, 1984), related to greater smoking reduction (Chambliss & Murray, 1979), and associated with highest abstinence (Nicki et al., 1985).

Social support

Social support is defined as the relationships among individuals within a person's social system. Dimensions of social support may include structural characteristics, such as size and density; interactional characteristics, such as duration and durability; functional characteristics, such as love; instrumental support, such as help and services; and social outreach, defined as access to new social contacts (Heaney & Israel, 1997). House (1981) categorized social support into four behaviors: emotional support (provision of love and caring), instrumental support (provision of tangible help and services), informational support (provision of advice and information), and appraisal support (provision of self-evaluative information).

Social support influences health. Cassel (1976) found that social relationships are protective factors for health in that they may moderate or buffer the effects of stress. Research also suggests that lack of social relationships is a major risk factor for mortality (Berkman, 1984; House, Umberson, & Landis, 1988).

Social relationships appear to assist smokers with cessation. Myers (1999) proposed that nonsmoking peers play a significant role in encouraging and assisting in the quitting process for adolescents. Stanton et al. (1999) found that 35% of 440 out-of-school youth recommended the help of supportive friends as a method of quitting. Many standard smoking cessation curricula also include components on finding a friend during

the period when smokers are trying to quit (American Cancer Society, 1998). Social support may also increase long-term cessation (USDHHS, 1994; USDHHS, 2000).

Social support represents one of the behavioral processes of change, helping relationships. It consists of caring relationships and support for behavioral change. Helping relationships may be demonstrated through counselor sessions, buddy systems, or support by friends and family. They are employed for people in the action stage of change (Prochaska, DiClemente, and Norcross, 1992).

In summary, the theories of self-efficacy and social support help provide theoretically-based strategies for smoking cessation among college students. Both are incorporated into the Transtheoretical Model of Change, which will be the method of matching the college students to the correct intervention messages.

Transtheoretical Model of Change

The primary theoretical approach chosen to guide the study is the Transtheoretical Model of Change (TTM). The intervention was stage-matched to participants' stage of change.

To help understand how people change addictive behaviors, such as cigarette smoking, Prochaska and DiClemente (1983) developed this model, which describes the progression that smokers go through before the termination of their addiction. The primary organizing constructs of the model are the stages of change, processes of change, and levels of change.

Stages of change. Smokers often cycle through various stages of change several times before they quit smoking. The model identifies five stages of readiness for changing smoking behavior: precontemplation, contemplation, preparation, action, and

maintenance (Prochaska & DiClemente, 1983). The following provides a description of the stages in relation to smoking. In precontemplation, smokers are not thinking about quitting or intending to quit in the next 6 months. People in this stage may be uninformed about the consequences of smoking, demoralized in their ability to make a behavior change. They may be resistant or unmotivated for behavior change (Prochaska & Velicer, 1997). The next stage is contemplation, in which individuals are considering quitting in the next 6 months. People in this stage are more cognizant of the pros of quitting than the cons. In preparation, smokers are intending on quitting smoking in the next 30 days. These smokers may have taken action in the past by reducing smoking or making a quit attempt. They also have a plan for action (Prochaska & Velicer, 1997). Action is the stage in which smokers have quit during the past 6 months. The maintenance stage consists of smokers who have quit for more than 6 months (Prochaska, DiClemente, & Norcross, 1992). The TTM recognizes a continuum of stages for readiness to quit. The stage model is not a linear progression of change. People move through the stages in a spiral pattern in which some people progress through the stages and relapse. Velicer et al. (1995) established the distribution of the stages of change across several different adult populations. About 40% of smokers belong to the precontemplation state, 40% to the contemplation stage, and 20% to the preparation stage (Velicer et al, 1995). The literature indicates that interventions that apply the model may move smokers from earlier stages of readiness to later stages (Emmons et al., 1999; Leed-Kelly, Russell, Bobo, & McIlvain, 1996).

Processes of Change. The Transtheoretical Model also proposes ten processes of change that are strategies that may assist people to move forward to later stages of

readiness (Prochaska, Velicer, DiClemente, & Fava, 1988). The processes are activities that people may perform to change behavior, thoughts or emotions (Joseph, Breslin, & Skinner, 1999). The experiential processes are cognitive-oriented, while the behavioral processes are more action-oriented (Prochaska et al., 1992). The five experiential processes include cognitive and emotional activities: consciousness raising, self-reevaluation, dramatic relief, environmental reevaluation, and social liberation. The five behavioral processes involve actions or cognitive labeling of behaviors: counter-conditioning, stimulus control, helping relationships, self-liberation, and reinforcement management (Prochaska, Redding, & Evers, 1997). These processes are described in Table 2.1. To insure progression through the stages, one employs the experiential processes during the early stages of change and the behavioral processes during the later changes (Prochaska & DiClemente, 1983).

Prochaska et al. (1992) determined that certain processes are important to the transitioning to a later stage (see Table 2.2). Between the precontemplation and contemplation stage, consciousness raising, dramatic relief, and environmental reevaluation are employed the most. Self-reevaluation was prominent from contemplation to preparation, while self-liberation was from preparation to action. Reinforcement management, helping relationships, counterconditioning, and stimulus control were used the most during the movement from action to maintenance.

Table 2.1

Processes of Change

Construct	Definition
Experiential	
Consciousness raising	Learning new facts and information to support the behavior change
Dramatic relief	Emotional experiences that follow a behavior
Social liberation	Increase social opportunities for healthy behaviors
Environmental re-evaluation	Cognitive assessment of the impact of the behavior on one's social and physical surroundings
Self re-evaluation	Cognitive assessment of oneself with and without the behavior
Behavioral	
Counter-conditioning	Substitute healthier behaviors for unhealthy ones
Stimulus control	Removal cues for unhealthy behaviors and addition of cues for healthier ones
Self- liberation	Belief that one can make a change
Helping relationships	Support for behavior change
Contingency management	Consequences for behavior change

Note. Adapted from: Prochaska, J. O., Redding, C. A., & Evers, K. E. The Transtheoretical Model and Stages of Change. In Glanz, K., Lewis, F. M., Rimer, B. K. (1997*). Health behavior and health education: Theory, research, and practice*, 2nd ed. San Francisco: Jossey-Bass.

Table 2.2

Processes of Change within Stages of Change

Precontemplation	Contemplation	Preparation	Action	Maintenance
Conscious raising				
Dramatic relief				
Environmental reevaluation				
	Self-reevaluation			
		Self-liberation		
		Social reevaluation		
			Reinforcement	
			Management	
			Helping relationships	
			Counterconditioning	
			Stimulus control	

Note. Adapted from Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change: Applications to addictive behaviors. *American Psychologist, 47(9),* 1102-1114.

Levels of Change. Individuals often have more than one problem behavior such as smoking. Levels of change recognize that individuals are at "different stages of change with respect to problem areas" (DiClemente & Prochaska, 1998, p. 4). The five levels of change are: symptom/situational, maladaptive cognitions, interpersonal conflicts, family/systems problems, and intrapersonal conflicts (DiClemente & Prochaska, 1998). The construct of levels is the least studied of the basic constructs of the TTM. However, the levels of change suggested that addiction treatment must have services that address multiple problems that smokers may be facing.

Decisional Balance. This measure assesses the pros and cons of smoking. That is, what is the level of importance that an individual places on the advantages (pros) and disadvantages (cons) of performing a behavior? Individuals, therefore, take these factors into consideration in their decision-making process. This measure is derived from a Pros and Cons scale developed for adult smokers (Velicer, DiClemente, Prochaska, & Brandenburg, 1985). The two scales can differentiate between the five stages of change in quitting. Prochaska et al. (1994) found predictable patterns in the relationship between pros and cons and the stages of change. The cons of changing a problem behavior outweighed the pros for participants in the precontemplation stage, whereas the opposite was found for those in the action stage.

Confidence Not to Smoke. This construct is similar to Bandura's concept of self-efficacy, or confidence to not smoke in different situations, including when an individual is with people who are smoking, when one is stressed, or when one is angry at someone.

Critique of the Transtheoretical Model. Despite the strengths of the model, there have been critiques of the Transtheoretical Model. Bandura (1997b) has argued that the TTM is not a true stage model based on criteria of qualitative transformations across stages, invariant sequence of change, and nonreversibility. Davidson (1998) argued that "human behavioral and attitudinal change is too complex to be simplified into discrete phases, stages, or categories" (p. 26). Precontemplation, contemplation, and preparation are arbitrary divisions on an intention continuum while action and maintenance are arbitrary points on a behavioral continuum (Davidson, 1998; Pierce et al., 1998). Similarly, Joseph, Breslin, and Skinner (1999) noted that some researchers have found participants to straddle stages, meaning that progression of stage may be fluctuating at

any point in time. Studies that have applied the TTM have found an inconsistent number of stages (Joseph et al., 1999) and a large variation in the distribution of samples across stages (Whitelaw et al., 2000). Pierce et al. (1998) proposed an eight-level quitting continuum, employing addiction, quitting history, and intention to quit as measures of a smoker's status in quitting, as opposed to the stages of change.

Bandura (1997b) also emphasized that prediction of the model is circular. The stages of change are defined in terms of the behavior that is to be explained. Therefore, prediction of behavior is difficult because of this "circularity of explanation and prediction" (Bandura, 1997b, p. 10). Joseph et al. (1999) concluded that the entire model is more descriptive than explanatory in terms of behavior change.

In reviewing the literature on Stages of Change, few studies focus on outcome measures such as quit rates (Joseph et al., 1999; Whitelaw et al., 2000). Rather than assessing behavior change, many studies have employed other measures of behavioral determinants such as increased knowledge, recall of the intervention, or stage progression instead of assessing behavioral change (Campbell et al., 1994; Leed-Kelly et al., 1996). Whitelaw et al. (2000) stated that much of the published literature on the TTM has been cross sectional, has contained no control group, and has employed self-selected or limited samples. Consequently, additional research should be conducted to evaluate the model in construct validation and randomized controlled interventions. Joseph et al. (1999) noted that although the model has been applied to different types of behaviors such as alcohol abuse and overeating, the empirical evidence is mostly concentrated in working with smoking cessation. In addition, components of the model such as the levels of change

have not been extensively studied, and the model ignores personal history, demographics, and the social context of the smoker trying to quit (Joseph et al., 1999).

Transtheoretical Model Interventions for Adolescents Smokers. There are limited studies on the TTM measures among adolescent smokers. Pallonen (1998) found that adults and adolescents were similar in the TTM measures. Among current and former adolescent smokers, 40% were in the precontemplation stage, 20% to 30% were in the contemplation stage, and up to 20% were in the preparation stage. The processes of change have a similar factor structure and were significant discriminators in each stage transition, similar to adults. In addition, the pros and cons of smoking (decisional balance) have the same trend in both adolescents and adults with the pro scores high in the precontemplation stage and declining through the maintenance stage, while the opposite is true for the cons scores.

Description of Technological Smoking Cessation Intervention based on the TTM. Despite these criticisms, the TTM is an appropriate model for smoking cessation interventions. Several studies have employed computer-based interventions to reduce cigarette smoking. Velicer et al. (1993) developed an expert system, or a computer-based decision making system, designed to utilize information regarding participants to produce unique, matched information and interventions. They assessed the effectiveness of four interventions: an American Lung Association manual; individualized Transtheoretical manuals; Transtheoretical manuals and interactive computer reports through an expert system; and Transtheoretical manuals, interactive computer reports, and telephone calls from counselors. At 6, 12, and 18-month follow-ups, the interactive computer reports and the Transtheoretical manual group had the highest point prevalence

of abstinence when compared to the other conditions. The effectiveness of other computer expert systems has been demonstrated for adults (Prochaska , DiClemente, Velicer, & Rossi, 1993). Pallonen et al. (1998) employed a modified version of the adult Transtheoretical model of change expert system for smoking cessation among 10th and 11th grade students in three Rhode Island high schools. They found that the expert system employing the Transtheoretical model had quit rates of 14% to 20% among the high school students at posttest and a decreased rate of 6% at the 6-month follow-up. The results of the above studies suggest that computer-based interventions may be effective in promoting cessation among smokers. Aveyard et al. (1999) conducted an intervention with 3 sessions using an expert computer program and three class lessons to reduce the prevalence of smoking among teens. They found only a 2% reduction in smoking prevalence.

The literature on applications of the Transtheoretical Model to smoking cessation interventions by computerized technology suggests that this model may be effective in changing smoking behavior.

Tailoring. Many studies have employed the method of tailoring messages and strategies to TTM stages of change. Tailoring is the use of materials or messages that are designed to "reach one specific person, are based on characteristics that are unique to that person, are related to the outcome of interests, and have been derived from an individual assessment" (Kretuer, Strecher, & Glassman, 1999, p. 276). It differs from targeted materials that are designed to reach a subgroup of the population. Tailored messages are more likely to be saved, read, discussed with others, and perceived to be personally relevant (Brug, Steenhaus, Van Assema, & de Vries, 1996).

Strecher et al., (1994) conducted two studies assessing the effectiveness of tailored materials (a newsletter and a letter) for patients of family practitioners. Study 1 compared tailored to non-tailored newsletters from the participant's physician. Study 2 compared a tailored letter to a control group. There was an intervention effect for light-to-moderate smokers for the 2 studies; however, no main effects were found at six-months posttest. In both studies, the quit rate for smokers in the tailored group was higher than the comparison group. Prochaska et al. (1993) compared the effects of a self-help manual, a stage-matched manual, a computer-tailored report, and a stage-matched manual plus a tailored report. After 18 months, the tailored report and manual had the highest point prevalence and prolonged abstinence. Tailoring messages to an individual's demographic characteristics or constructs of the Transtheoretical Model of Change does impact behavioral outcomes.

Internet as a Health Education Medium

The Internet provides a source of health information and patient education. It provides online health information and service delivery through a variety of different methods: text-based health information, e-mails, chatrooms, and listservs (Oravec, 2000). Almost 25-40% of Internet searches are seeking health information or advice (Ferguson, 1997). Computerized technology offers the ability to: assess health status and beliefs; tailor messages to individual needs; monitor progress of behavior change; clarify values; generate options for solving behavior problems; and simulate the application of new health skills (Deardorff, 1986; Gustafson, Bosworth, Chewning, & Hawkins, 1987; Skinner, Siegfried, Kegler, & Strecher, 1993).

The Scientific Panel on Interactive Communication and Health (1999) presented the advantages of this medium include: improved access to individualized health information; broader choices for consumers; potential improved anonymity; greater access to health information and support on demand; greater ability to promote social support between consumers and health professionals; and enhanced ability to provide widespread dissemination (Eng et al., 1998).

Using the computer allows people to receive information when they want it, and they can repeat the computer sessions as many times as they wish (Bosworth, Espelage, DuBay, Dahlberg, & Daytner, 1996). Wilkins (1999) noted that use of the Internet has great potential for consumer health education in that reading information or interacting with others may lead consumers to improve their ability to manage their own care.

Fulop and Varzandeh (1996) recommended that computer-based resources such as the Internet serve as a delivery tool for both primary information on health promotion and secondary intervention materials for college students. In the several past years, Internet access has increased among college campuses. According to *Yahoo! Internet Life*, the trend is for universities and colleges to build their network and Internet infrastructure for student access to online campus services and distance learning classes. In their 1999 survey of the 100 most wired colleges, 82% reported that students could register online and 54% reported offering distance learning classes (Zdnet, 2000). Thus, the medium of the Internet may be an accessible tool for college students in health education.

Computer or web-based technology offers a potential channel for health promotion among young adults. Many adolescents have accessed the Internet for health

information and have found it to be a valuable resource (Borzekowski & Rickert, 2001). Most reported being fairly or extremely comfortable with the medium. One study of 176 adolescent girls found that 44% have tried to get health information on the Internet. The topics for which at least 20% of the adolescents wanted information included diet and nutrition, exercise, sex, alcohol and drugs, and mental health; 7% wanted information on smoking and tobacco (Borzekowski & Rickert, 2000). Adolescents prefer less structured and convenient support for tobacco cessation (Black & Babrow, 1991); thus, the Internet may provide that channel for helping them quit.

Web-based Learning

The next section will discuss the development principles of online instruction and methods and issues related to conducting online surveys. These topics are important to discuss because they address the method for delivery of this intervention study and assessment of the participants.

In order to meet the learning needs of individuals online, an educational designer must consider the following issues: leaner needs, learner motivation, learning style, adult learning principles, instructional design, technological issues, technical support, and evaluation. Each of these components, when acknowledged and addressed, helps build a more effective learning experience.

Addressing the nature of the distance learners' busy lives is crucial. One of the benefits of web-based instruction is "asynchronous learning," in which learners may learn at their own time after the instructional session (Threlkeld, & Brzoska, 1994). Tools such as web pages, email, and discussion boards may all be accessed at the convenience of the

learner. This allows learners to work at their own pace. Distance learning may also contribute to feelings of isolation. To alleviate this problem, strategies are necessary to empower the learner, such as cooperative work and interaction (Schrum, 2000). For example, students can problem-solve together.

Another important factor is motivating students to learn. Keller (1983) developed a model for designing motivational materials. The model defines four categories to address in instructional design, including interest (building learner arousal), relevance (linking the learning to the learners' needs), expectancy (causes attributed to behavior and likelihood of repeating it) and satisfaction (continuing the motivation). Motivation should be embedded throughout the design process.

A designer should address the learning style preferences of her audience. Lee & Owens (2000) stressed the importance of engaging the learners' modalities, including visual (graphics, text, and video), auditory (tapes, sound effects), tactile or kinesthetic (models, demonstrations), and olfactory. The web offers a variety of tools that permit learners to match their learning preferences such as video, audio, chatrooms, listservs, and discussion boards, which designers may choose to incorporate.

For online learning to be successful, learners need technical support services (Feasley, 1983). Teachers may employ a variety of technological media online that may be new to some learners. Methods such as training on tools or very explicit instructions may help the learner. In addition, technological glitches may occur, interrupting learning; therefore, the availability of quick help eases the frustration associated with these problems. A help hot line or email address may assist learners in solving technical problems. Rasmusssen, Northrup, and Lee (1997) also recommend these types of learner

support: orientation, paper materials, and helpline. The availability of technical assistance may often alleviate the challenge of fear of technology or technical difficulties for learners.

Online Data Collection

The Internet is often used in academia for information retrieval such as bibliographic searches, online journals and newsletters, and correspondence. It also has great potential for conducting empirical research. This section will describe demographics of Internet users, the role of Internet surveys in research, benefits and disadvantages of their use.

Demographics of Internet users

Before discussing research and the Internet, it is appropriate to describe the demographics of people who have access to the Internet and the World Wide Web (WWW). The number of individuals who have access to the Internet is constantly growing. The Graphics Visualization and Usability Center of Georgia Institute of Technology (1999) conducted a continuous survey of the average WWW user. According to their Ten World Wide Web User Survey, the respondents representing Internet users are predominantly highly educated with at least some college education (88%), White (87%), male (66%), and averaging 35 years in age. The 2000 Census found that more than four-in-five households with computers had at least one member using the Internet at home (44 million households) (US Census Bureau, 2001).

Brief History of Internet Research

The Internet is a medium that is increasingly being used by universities, businesses, government agencies and individuals to develop and distribute surveys. With the wide availability of email and the Internet, researchers may send out mass questionnaires or target specific groups of individuals. Online surveys may be used for customer feedback surveys, customer preference surveys, public opinion polls, and university experiments (Dillman, 2000). Stanton (1998) also enumerated several applications of Internet research, including online surveys for distance learning projects such as assessments or evaluations, special interest discussion groups, testing and evaluation of programs, and, more recently, research studies.

Benefits and Disadvantages of Internet Research

Conducting Internet surveys offers many benefits to researchers. First, the researchers may be able to access a large number of participants from pools of people who have Internet connections or subscribe to online groups such as listservs and newsgroups (Buchanan & Smith, 1999; Schmidt, 1997; Gaddis, 1998). Researchers may send the surveys to a mass of people, or they may choose the more targeted approach by sending it to specialized individuals, such as people who belong to a listserv for breast cancer patients. Because participants for Internet surveys may be geographically distant from the researcher, this connectivity expands the scope of surveys outside of regions and nations so that more cross-cultural research may be conducted (Schmidt, 1997; Smith & Leigh, 1997).

Second, surveys conducted on the Internet are received faster and may be completed in a shorter period of time than traditional paper surveys (Allie, 1995; Gaddis,

1998; Szabo & Frenkl, 1996). Once participants have the web address on paper or from an email, they may access the online survey immediately through the Internet.

Third, the implementation of a survey over the Internet may be less expensive than using postal mail. Once the survey is set up, no costs are incurred for photocopying, postage for distribution, or survey collection (Allie, 1995; Schmidt, 1997). Fourth, the Internet allows a degree of interactivity and multimedia that is unavailable with other more traditional forms of research. Online surveys may incorporate text, graphics, sounds, and live interaction (Smith & Leigh, 1997). They also may provide feedback tailored to the responses of the user such as feedback about his own results, summary statistics of the user to the current section of the survey, or additional questions based on his responses (Schmidt, 1997). Finally, online surveys may be developed for automated data collection and even analysis (Buchanan & Smith, 1999). Once participants submit their responses, the data are transmitted directly into a database where it may be stored and analyzed after data collection is completed.

While the Internet has numerous advantages as a research tool, it has several disadvantages as well. Some of the major disadvantages are: sampling of participants, general access to the survey, and lack of control over the participant environment. Sampling for participants may pose several problems. First, because access to the Internet is not universal and tends to be more accessible for males and college educated individuals, there may be a limit to the generalizability of the research data. Another area that may pose problems for researchers is controlling the access to online surveys. To insure the respondents' anonymity and confidentiality, researchers must employ techniques to distribute passwords or special access codes to each individual respondent

(Stanton, 1998). If the online survey is not password or access restricted, anyone with a web browser can take the survey. Finally, researchers who use online surveys cannot control the time and setting in which the survey is taken. The web respondent controls when they will complete the survey. This variability of frame of mind may lead to non-participation, missing data, and/or response biases in the collected data (Stanton, 1998).

Internet Research Issues

Much more research is needed in the area of online data collection. There are many issues to address such as the validity of Internet-based instrumentation, threats to reliability and validity of web-based tests, and generalizability of results.

Several potential threats to reliability and validity exist when conducting Internet research. First, the nature of the sample recruited and tested over the Internet may lead to selection bias. Participants may greatly differ from those who do not wish to, or are incapable of, participating. Second, the testing environment may interfere with the quality and the return of results of online surveys. For example, researchers have no control over states of the respondents, such as fatigue or intoxication, or the testing environment (e.g., noisy dorm room, crowded computer space). Third, the online survey may appear different on different web browsers or platforms, meaning that the instrument may not be equivalent across the browsers or platforms. Fourth, the assumptions of independence of observations or tests may be violated if respondents complete the survey more than once, either unintentionally or intentionally. All of these factors may affect the true construct that the researcher is attempting to measure (Buchanan & Smith, 1999).

Additionally, questions arise as to the generalizability of results of Internet surveys. Smith and Leigh (1997) conducted a study to compare an Internet survey with a

pencil-and-paper version that assessed the nature and frequency of people's sexual fantasies. They concluded that Internet samples are as representative of the general population as student samples because the two groups of a psychology newsgroup and introductory psychology students did not differ significantly in terms of marital status, ethnicity, education, religiosity, and sexual orientation.

Swoboda et al. (1997) sent out a structured email questionnaire on primary problems for the next decade to 8,859 randomly selected people from newsgroups. The number of responses was 1,713 (20.4%) with 90% responding within 4 days. The researchers commented that this rate of 20% is less than half of the response rate usually obtained by mail and phone surveys, concluding that online surveys are susceptible to selection bias because only certain individuals participate, which limits the generalizability of the results.

Equivalence of measurement between Internet and traditional paper-and-pencil surveys also has been explored. Stanton (1998) showed that surveys administered over the WWW results had fewer missing values than the paper version results, but the results of both surveys had comparable item variability and a similar factor structure of sets of items. Similarly, Buchanan and Smith (1999) investigated the equivalence of web-based and traditional test formats with a self-monitoring personality scale. The researchers found that the reliabilities and item loadings were similar in the two samples. Therefore, there is some evidence that suggests that, psychometrically, the results from Internet-based surveys compare favorably with those of traditional paper-and-pencil surveys.

Although the Internet has many advantages over other data collection methods, it also has disadvantages that need to be addressed. Human subjects and ethical issues also

should be considered when conducting Internet data collection. From all of these resources, it appears that more formal research needs to be conducted on the use of the Internet for data collection.

Significance of the Study

The previous research indicates that there is a paucity of information on successful quitting in adolescents and evaluated smoking cessation interventions for adolescents. The literature has identified several smoking cessation interventions; however, methodological weaknesses exist, including non-experimental designs, small samples, inconsistent quitting measures, attrition of participants, and lack of verification of self-reported cessation. More research in the area of evaluating smoking cessation programs for adolescents is needed. Identifying successful strategies for assisting adolescents to quit smoking will result in more healthy adults, a reduced burden of medical costs associated with tobacco-related illnesses, and a decrease mortality from those illnesses. This study employs the theoretical concepts of the Transtheoretical Model of Change, social support and self-efficacy delivered through Internet web pages to test the efficacy of the stage-matched intervention. It incorporates research on web-based learning and online surveying methods to inform the implementation of the intervention.

CHAPTER 3

METHODS

This chapter provides a discussion of the methods for conducting this study. The chapter discusses the study design, study context, description of the intervention, instruments and data collection procedures.

Study Design

To assess the efficacy of the smoking cessation intervention, the *Kick It!* program was designed and implemented with college students. Students were evaluated at three points: pretest, posttest, and 6-months posttest. The researcher randomly assigned the students into intervention and control groups. Therefore, a randomized pretest posttest and control group design was employed in this study (Campbell & Stanley, 1963). There was a follow-up posttest that occurred 6 months after the completion of the intervention. The intervention group received interactive web-based activities, stage-matched messages, social support and strategies for quitting smoking, and the control group received web-based, generic messages for quitting smoking. Table 3.1 presents the study design, and Figure 3.1 for a diagram of the intervention.

Table 3.1

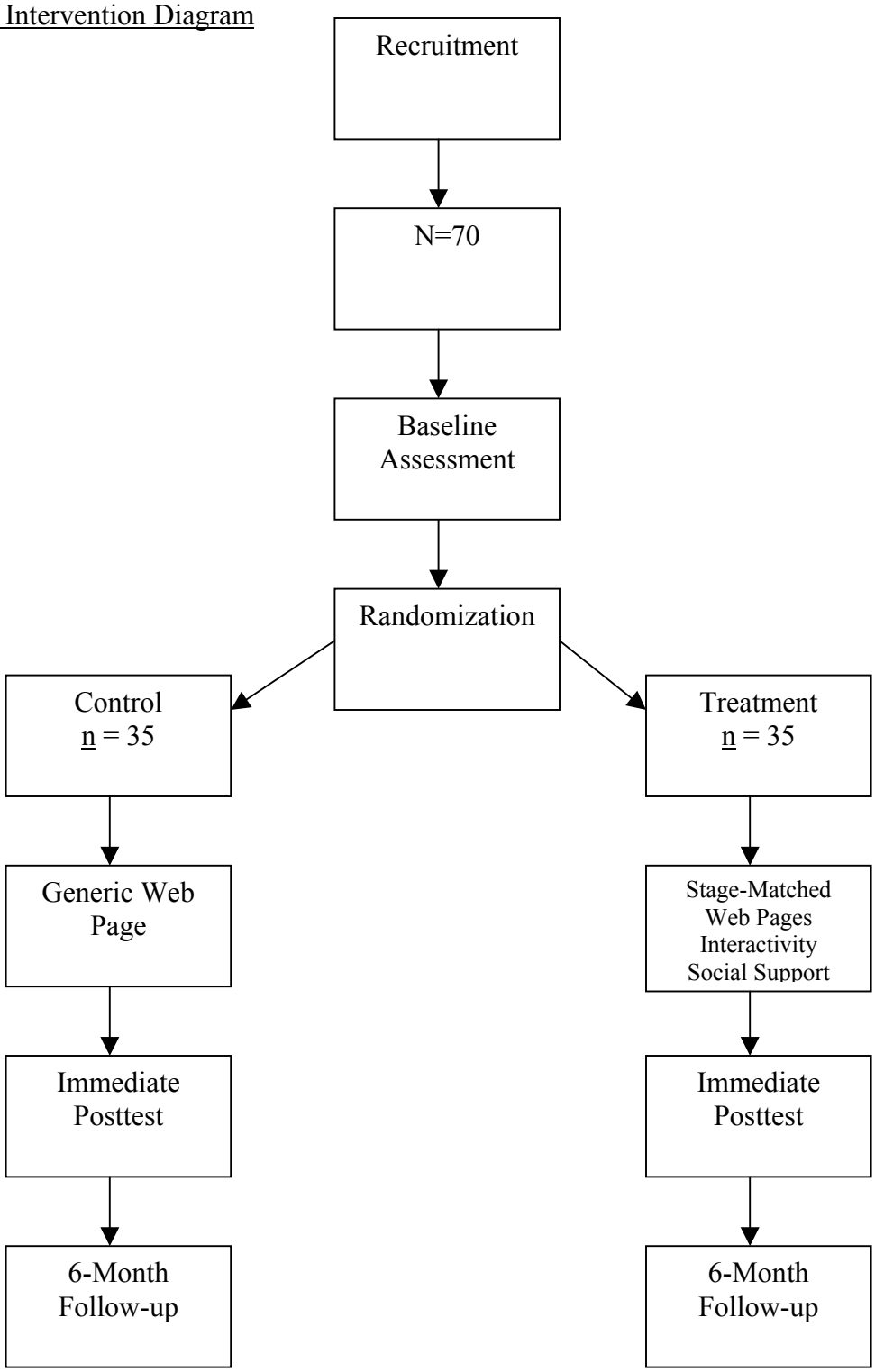
Study Design

Randomization	Condition	Participants	Baseline	Treatment	Posttest	6-Months
R	Treatment	35	0_1	X	0_2	0_3
R	Control	35	0_1		0_2	0_3

Note. 0_1-Baseline survey, X-Stage-tailored web-based intervention, 0_2 –Posttest, 0_3-6-month follow survey.

Figure 3.1

Kick It! Intervention Diagram



Study Context

Site

The study site was the University of Georgia (UGA). It is a state-funded university located in Athens, Georgia. Based on data from the Institutional Research and Planning Office of the University of Georgia, there were 24,040 undergraduates enrolled for the 1999-2000 school year, and approximately 30,000 undergraduate and graduate students attend UGA (UGA, 2000a). The student profile for fall semester 1999 reported that students primarily were 17 to 24 years of age with most reported being 18-20 years old. Approximately 84% were White, 7% were Black, 4% were Asian, and 5% were of other minorities or multiracial (UGA, 2000b). They were 57 % female and 43 % male. The 2000 American College Health assessment was administered at the University of Georgia. Based on its data, 58% of 440 students had never used cigarettes, 15.4% had not smoked in the last 30 days, and 27% had smoked in the past 1 to 30 days. The percent of students who smoked from 1 to 30 days at UGA is consistent with the 28.5% of students reporting current cigarette smoking among 116 colleges (Wechsler et al., 1998). With the prevalence of smoking among college students averaging at 27%, then there were potentially 6,491 smokers at UGA for the intervention.

Sample

Participants were University of Georgia students who volunteered and who met the eligibility criteria for the study. Recruitment occurred from late August to mid-October 2001. Participants were recruited by a variety of methods, including 1) advertisements in the student paper; 2) fliers around campus dining facilities, student center, and lecture halls (see Appendix A); 3) bus cards (or posters) on university buses;

4) mailings to large student organizations; and 5) word-of-mouth. Fliers were displayed with information about the *Kick It!* program around high volume areas such as the Ramsey Center (student physical activity center), residence halls, Tate Student Center, and lecture halls at the beginning of the recruitment period. Larger posters of the same flier were posted in strategic location such as the Tate Student Center and some lecture halls. Three weeks later, the researcher and the graduate student posted more fliers in these locations to replace any that were removed. Fliers were posted at the University Health Center through posters, and the health center staff also distributed fliers to interested students. A banner was made promoting the study and displayed for one week in front of the Tate Student Center. Bus cards advertising the program were displayed for one and a half month during the recruitment period on the bus shuttle that transports students around campus. An announcement was placed in the student newspaper, *The Red & the Black,* for one and a half month prior to the start of the intervention.

Due to low registration for the program, the researcher extended recruitment into October. Other recruitment strategies were employed to try to increase program enrollment. The researcher mailed fliers to the key representatives of large campus organizations with a letter explaining the program and asking them to inform their members of the program. An announcement advertising the study was also emailed to all students of the College of Education through its listserv. Similarly, an announcement about the study was sent to College of Education faculty through their listserv to inform them of the study and to encourage them to tell students about it. In addition, other student smokers may be recruited by word-of-mouth by Health Promotion and Behavior faculty and students. The researcher also promoted the program through manning a table

in front of the Tate Student Center four times over two weeks during the recruitment period. In mid-October 2001, she decided to proceed with randomization with the enrolled participants to insure that the immediate posttest would not be administered during the winter break.

Interested students were told to call a program number or email the program for information. Once they contacted the program, they were told to complete a registration form in order to be eligible to participate (see Appendix B). A list of interested students was made for the researcher to contact if they had not registered within a week of contacting the program. Students who were interested in the *Kick It!* program were sent to the web page to complete the online registration form. They read information about the program and completed a registration form either in hardcopy or online, with contact information including: student box number/address, telephone number, email address, questions related to their eligibility, and the telephone number and address of someone who would always know where they are as their consent to participate. Students were told that they could join a program that would help them quit smoking and that they would be paid a small incentive for participating.

The criteria for inclusion were assessed as part of the registration form (see Appendix B). Those criteria were students must be 18 years of age, be cigarette smokers (smoke one cigarette or more per week), be willing to complete multiple assessments, not currently be using any form of nicotine replacement therapy (NRT), and have access to the Internet. Students using NRT were excluded because the outcome measures could be confounded by the presence of this intervention to stop cigarette smoking. Students were then sent emails about the program timeline and their roles (see Appendix C).

Seventy undergraduate and graduate students were recruited through the University of Georgia in August and October 2001. Thirty-five were randomly assigned to the group receiving the *Kick It!* program and thirty-five students were randomly assigned to the group receiving the stop smoking information from the American Cancer Society. The principal investigator drew names of eligible students from a bowl and assigned them alternately into each group.

Participation in the study was voluntary. All students gave passive consent to participate in the program by completing the registration form which served as the informed consent form. They also received a copy of the form via email. The Institutional Review Board (IRB) at the University of Georgia approved the study for human subjects research.

Sample Size

The sample size estimates were based on the analysis plan for the outcome measures. The analyses included chi-square analyses to assess differences in proportion of quitters among the intervention and control group and ANCOVA to assess differences in the group means on number of cigarettes smoked and quit attempts. Power analysis was conducted with Power and Precision (Borenstein, Rothstein, & Cohen, 1997). The primary outcome for the intervention was quit rate. A power analysis for differences in proportions with two groups should provide sufficient participants for the other hypotheses. Sussman et al. (1999) reported the mean quit rate for posttest of the 12 reviewed cessation studies was 20.7%, ranging from 0 to 36%. The natural occurring quit rate was found to be 0 to 11% across several studies (Sussman et al., 1998). The power analysis for the 2 X 2 chi square was conducted with alpha = .05, power = .804, a

one-tailed test, and an effect size of 0.14 with the differences in proportions being 0.20 versus 0.06. With two groups, the sample size required was 142 with 71 cases in each group.

Kick It! Intervention

Prior to the actual implementation of the *Kick It!* program, two focus groups and two interviews were conducted with college students to learn about their smoking habits and receive feedback about program components for the web-based intervention. Following this data collection, the researcher made minor revisions to the intervention materials according to the results of the findings from these data.

The independent variable was the receipt of the multicomponent, stage-matched intervention for smoking cessation. The theoretical framework for the study was the Transtheoretical Model and theory of social support. The program was designed to increase participants' self-efficacy and skills to quit smoking, affect their attitudes toward smoking, and change smoking behavior. The *Kick It!* program addressed smoking cessation through interactive, web-based messages, strategies, social support and personalized assessments.

The *Kick It!* program consisted of four 20-30 minute web-based sessions over a period of 2 months. Each session was available for 2 weeks during which time the participants could visit the intervention web materials at their own convenience. They were allowed to visit the site as often as they liked over that time period. At the end of 2 weeks, the session was replaced with the next session. This allowed the researcher to

track participation and usage. In addition, students entered the web sessions through an assigned user name and password to facilitate tracking of use of each activity.

The researcher informed students of special considerations on the web site. Participants were reminded that their activities would be tracked and there is no guarantee of total safety of entered data because of difficulties of web security. They were also told that the program information was for educational purposes and not meant to be medical counseling. In the event that participants wanted that type of assistance, they would be referred to a smoking cessation counselor at UGA's Student Health Center. However, questions that required in-depth knowledge of cessation were forwarded to a cessation counselor for advice on how to respond.

Students were sent an email reminder about each session and its web address. Students then logged onto the site with unique login identification and passwords to begin each session. If the student had not attended a session after a week had past, the researcher sent out another reminder. Finally, the last reminder was an email sent about the start of the next session and to complete the previous session if they had not done so already.

The researcher chose four sessions because college students prefer minimal intervention and because higher dosage of sessions does not significantly increase intervention results in health promotion. Sussman et al. (1999) identified only 13 adolescent cessation studies with the number of sessions varying from 1 to 20. In addition, the number of sessions for known adolescent cessation programs produced by health organizations also varies, although many programs contain 8 sessions.

Intervention

The four sessions for the intervention group contained similar stage-matched elements. Each web session consisted of 2 to 7 screens of information and was available for 2 weeks.

Stage-Matched Framework. The major component of the program was based on Prochaska and DiClemente's (1982) Transtheoretical Model of Change (TTM). These researchers proposed that smoking cessation occurs over several stages of readiness to quit smoking: precontemplation, contemplation, preparation, action, and maintenance. They recommended that for interventions to be successful, the intervention messages and strategies must match the individual smoker's stage of change (DiClemente et al., 1991; Prochaska, Norcross, & DiClemente, 1994).

As part of the program, students received Transtheoretical Model stage-matched messages and could enter personal smoking information through interactive personalized assessment. Unlike other studies that employed tailoring, students received tailored messages based on a staging question at each intervention session, so the information was user-driven (see Figure 3.2). They clicked on a link as a response to the staging question to open a web page with information in the following areas: (1) current stage of change, (2) stage-matched messages designed to facilitate change or prevent relapse, (3) information on approaches to manage temptation, and (4) alternatives to smoking (see Appendix D for a complete session). Through the personalized assessments, students could enter (1) pros and cons of smoking, (2) reasons for quitting smoking, (3) goals related to quitting, and (4) individuals who can offer support in their decision to quit. After they submitted the assessments, they received immediate feedback as a web-based

form with their individual information (including pros, cons, goals, and people who can assist them in smoking) and strategies based on their readiness to quit smoking. The feedback form was also emailed to them so that they could review it at a later time. Because of the complexity of developing individualized messages and time for the intervention development, the researcher developed broad messages of encouragement in response to submissions of participant's goals rather than individualized ones. In addition, the researcher did not build the program to follow the progress of the individual participants from beginning to end.

Participants remaining in the same stage over the four sessions received similar web materials but not the exact same materials all four times. Self-efficacy, processes of change, and decisional balance also were utilized as messages and strategies as part of the intervention. The experiential process were used in the intervention content for students moving to the contemplation and preparation stages. The behavioral processes were used moving to the action stage (Perz, DiClemente, & Carbonari, 1996).

Figure 3.2

Stages of Change Option in the Program

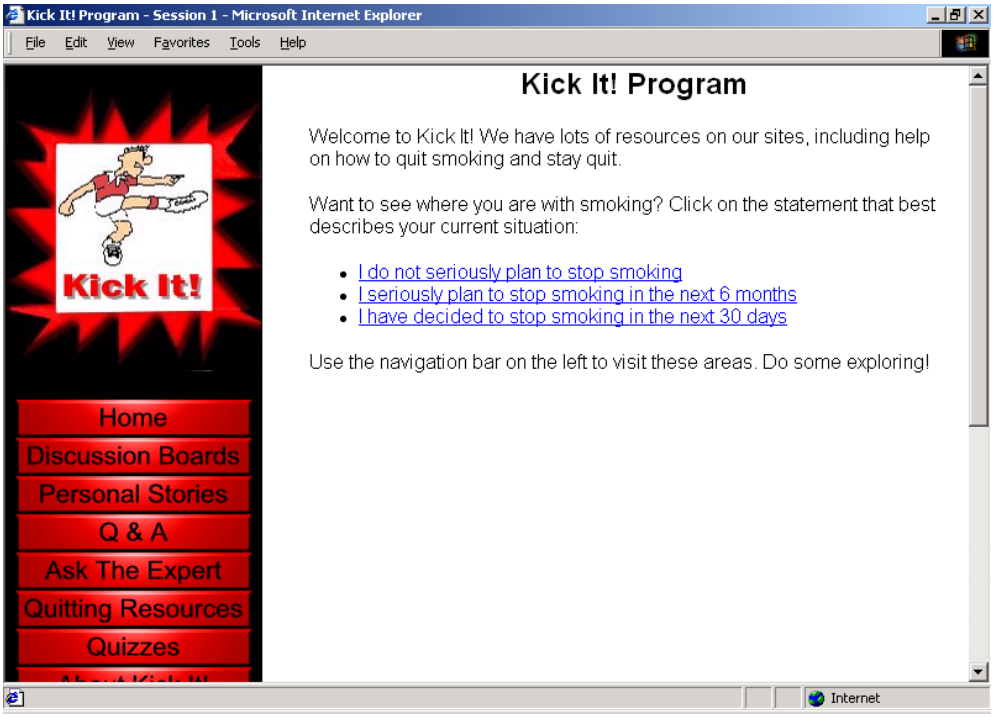


Table 3.2 presents the type of strategies in the program that applies the Transtheoretical Model of Change.

Table 3.2

Stage-matched Components of the Intervention

Stage	Intervention Strategy	Processes of Change	Components
Precontemplation (not thinking about change)	encourage thinking about quitting	consciousness raising, dramatic relief,	explore reasons for wanting to quit, discuss the assess their awareness and knowledge about effects of smoking, elicit their personal pros and cons of smoking and discuss other pros and cons, identify reasons for usage, discuss immediate and long-term benefits of quitting, and advise of the need to quit smoking
Contemplation (proposed change)	encourage making small steps	self reevaluation, social liberation	good and bad reasons for smoking, discuss reasons and benefits of quitting, review barriers to quitting, review resources and support systems for quitting, discuss strategies for quitting, and set small steps to increase self-efficacy and a date to think about quitting
Preparation (making small changes)	encourage moving from attempts	self liberation social reevaluation	review reasons for quitting, develop a quit plan, set a quit date, discuss past quit attempts and potential quitting strategies, motivate efforts for change, and give positive messages on quitting
Action (taking definitive action)	encourage to maintain cessation	contingency management, stimulus control, helping relationships, counterconditioning	review reasons for quitting, explore successful quitting strategies, review relapse triggers, troubleshoot barriers or obstacles, review coping strategies to deal with urges and withdrawal, motivate persons to continue with their efforts, and focus on their progress

Staged-matched messages were developed for precontemplation to action. Although there were no participants in the precontemplation stage at the beginning of the program, the stage was included because participants may regress to this stage later. However, information in the precontemplation was minimal because these participants are not likely to be considering quitting.

Contemplation. The purpose of this material was to encourage smokers to evaluate the reasons they smoke and reasons to quit. Individuals are prompted to consider quitting more by information emphasizing the immediate and long-term benefits of cessation and questions asking them to consider their life without smoking.

Preparation. The purpose of this material was to encourage smokers to move from quit attempts to actual cessation. Individuals in preparation are getting ready to quit smoking in the next 30 days. The processes that were employed in the contemplation or preparation stages included: consciousness raising (increasing awareness of smoking as a problem); dramatic relief (expressing feelings about smoking and benefits of quitting); self-reevaluation (assessing how they perceive themselves as smokers and as quitters); social reevaluation (assessing how their smoking impacts others); and social liberation (creating alternatives in the environment to help smokers quit). Individuals were given strategies to increase self-efficacy by identifying small steps that they could take toward cessation and encourage to practice alternative to smoking to help them from lighting up when they want a cigarette.

Action. The purpose of this material was to encourage smokers to maintain their cessation. Individuals in action are in the process of quitting or have quit in the past 6 months or less. The processes that were used in the action stage involved: self-liberation

(making a commitment to quit smoking); counterconditioning (substituting alternative behaviors for smoking); stimulus control (avoiding cues that lead to smoking); contingency management (rewarding themselves for making a change; reinforcing decision to quit); and helping relationships (enlisting the help of others who care to support quitting).

Theory of Social Support. Smoking cessation interventions typically incorporate components of social support to aid smokers in quitting and to maintain cessation. Technology may facilitate social support in a variety of ways. Computers allow for networkability, e.g., the connection of users to other users and health providers. Email allows people to increase communication with others and retrieve the latest information in news, entertainment, and health through Internet service providers. For example, patients may email their healthcare providers to get information about their health status or information about their disease. People may offer to share their personal experiences with specific illnesses to others with similar health conditions. In addition, some individuals may also discuss their medical choices and consequences with others who are in this decision-making process (Rimal & Flora, 1997). Scheerhorn (1997) reported on illness-related communities. For example, HIGHNET is a network for hemophiliacs where they can communicate among members, receive access to education, and advocate for their illness. The Cleveland Freenet similarly offered persons with AIDS a network that reduces social isolation, offers health information, improves decision-making skills, and provides peer support.

Many health web sites have a component where a consumer may ask a doctor or health care professional questions (Ovarec, 2000). Personal emails or online

conversations with a health professional facilitated an efficient, accessible method of support and consultation for these college smokers. The *Kick It!* program incorporated social support components. Students had the opportunity to Ask-the-Expert questions by emailing a question which was answered by a health educator or smoking cessation counselor (Figure 3.3). The intervention offered an opportunity for students to share their smoking stories through a Personal Story area in which they completed a form that immediately posted their story in that area (Figure 3.4). Students could also talk to other participants through stage-matched discussion boards (Figure 3.5). The researcher submitted up to two postings as a fake participant to the discussion boards to encourage other participants to post messages.

Figure 3.3

Ask the Expert Component of Program

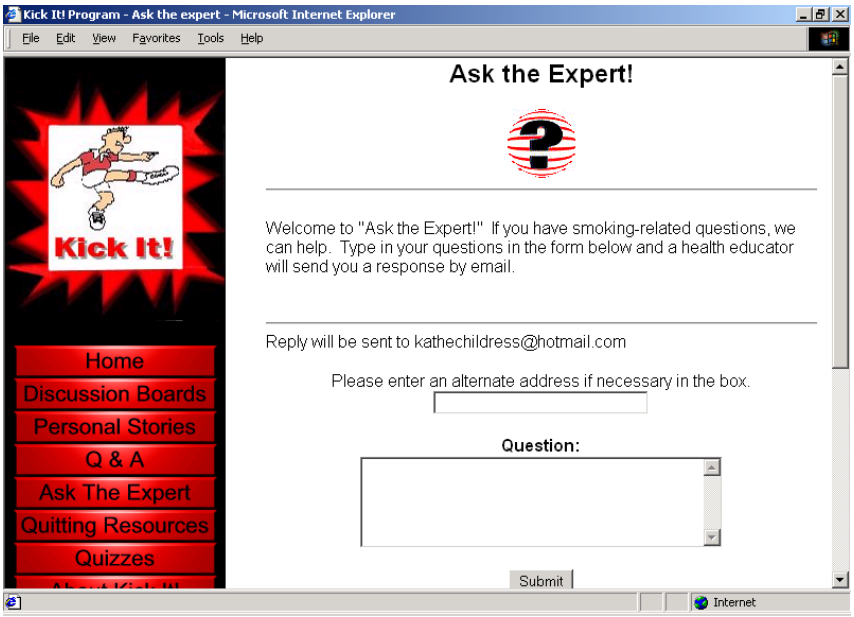


Figure 3.4

Personal Stories Component of Program

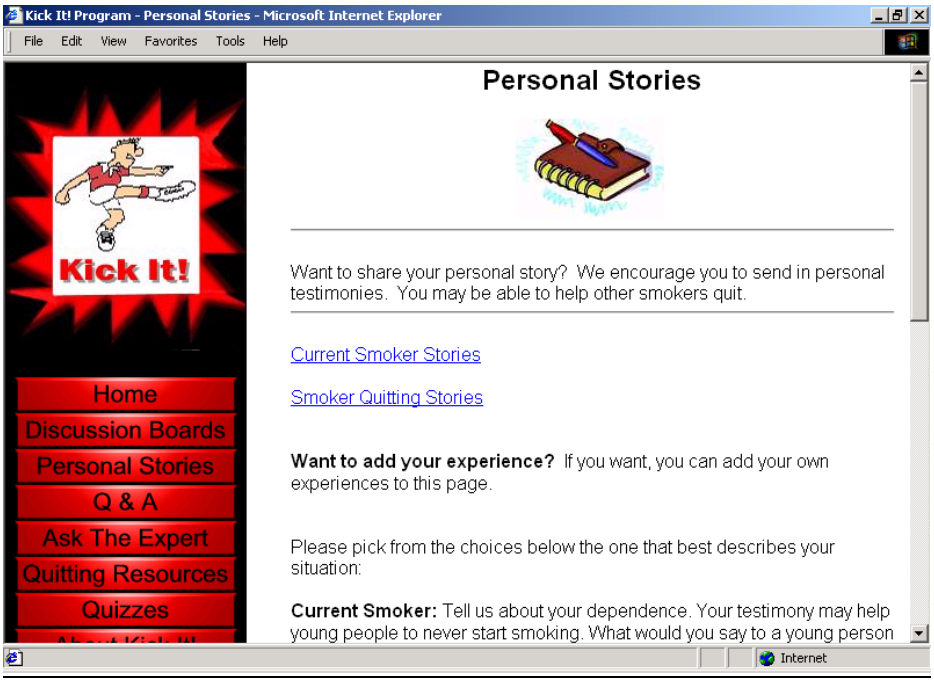


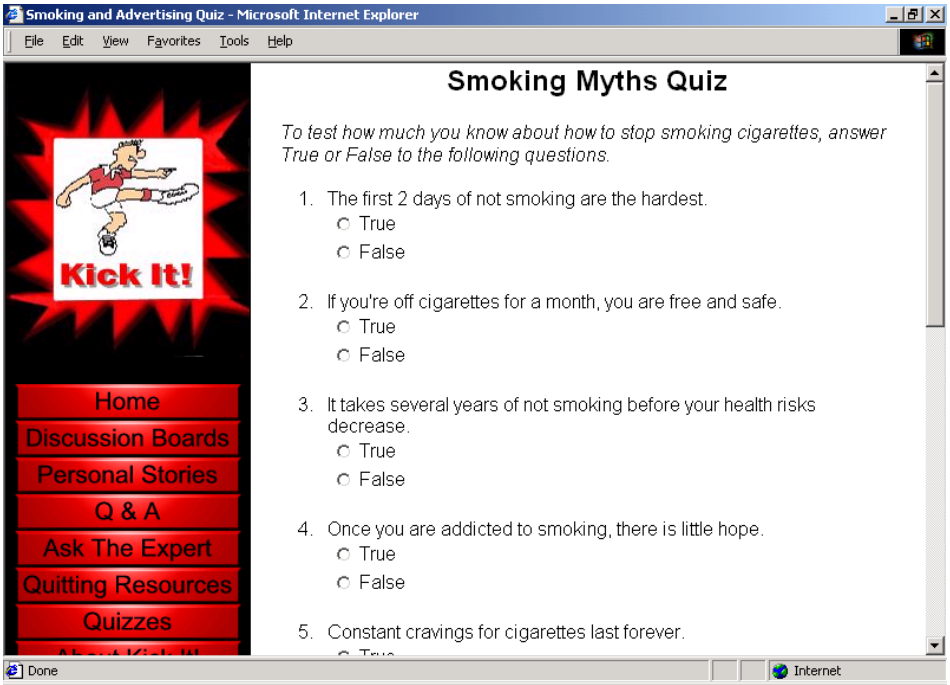
Figure 3.5

Discussion Board Component of Program

Other *Kick It!* Components. As an extra incentive for participation, students could submit entries for a Top Ten Reasons to Quit Contest. They could receive $20 if their reason was chosen as a finalist. Other intervention components were short interactive quizzes about the effects of smoking or cessation and links to 3 authoritative websites were available to students (see Figure 3.6). In addition, smokers in all stages could assess their reasons for smoking using a Why I Smoke? quiz that identified the main reasons (e.g., habit, craving, stimulation, relaxation) and provided alternatives to smoking based those reasons. They could also monitor their smoking and assess their mood and level of craving by printing out a log form. Smokers in the contemplation and preparation stage could respond to questions about pros and cons of quitting, list people who could support them in quitting, and set personal goals.

Figure 3.6

Quiz Component of the Program



Control Condition

The participants in the control condition also received up to four web-based sessions over a period of four-months. They read web pages that provided generic information about quitting smoking based on materials for adolescents from the American Lung Association and National Cancer Institute (see Appendix E for a session). For example, information was presented on the benefits of quitting, what to do on the day before and the day of quitting, and how to handle withdrawal symptoms. Information was presented as short bulleted lists. The web pages were much shorter in length than the intervention group for each session. No individualized, stage-matched information, self-assessments, social support, or components of interactivity were provided. Sessions 3 and 4 repeated the same information from sessions 1 and 2. Participants basically read text messages about quitting. They were reminded to attend each session by email.

Table 3.3 shows the program components for intervention and control groups.

Table 3.3

Program Components for Intervention and Control Groups

Intervention	Control
TTM stage-matched messages	Reasons for quitting messages
Self assessment for reasons for smoking	Quit tips
Self assessment for level of addiction	
Analysis of pros and cons of smoking	
Strategies for increasing self-efficacy not to smoke	
Goal setting for quitting	
Interactive quizzes about smoking and quitting facts	
Stage-matched discussion board	
Sharing of personal stories	
Ask-the-expert question	

Data Collection Procedures

Consent Procedures

Students gave their consent by completing the participation registration form (see Appendix B). A copy of the registration form was also sent electronically to them for their records. Students were told that the program was voluntary, that they could refuse to participate at any time during the study, and that all collected information is confidential. They were informed that their participation in the web sessions would be tracked and that they also could contact the researcher or program staff with any questions. Students who met the inclusion requirements were enrolled in the study.

Once participants were enrolled, all contact was made through email or by telephone. Data were collected three times via online surveys. Data collection occurred at pre-intervention, immediate post-intervention, and 6-months post-intervention. Each data collection period lasted for 2 weeks. In addition, all participants were asked to provide process evaluation data at the immediate posttest.

After completing the consent and contact information forms, participants received an email message about the project (see Appendix C). The email explained the requirements of the students and their incentive for participation. It also provided the web addresses for the study's baseline survey and the login and password for all web activities for the study.

The baseline survey took about 20 minutes to complete (Appendix F). After participants completed the pretest survey, the researcher randomly assigned them to the treatment or control conditions. This was performed by randomly pulling names from a

bowl of students who completed the registration form and met the eligibility requirements.

The researcher notified the participants about a survey 1 day in advance. To reduce non-response rates, students who did not attend the web sessions were reminded by email to participate (Dillman & Bowker, 2001). If participants did not take the online survey within a week, they were notified by email twice. If participants still did not take the survey, they were coded as a "non-respondent." A telephone hotline on the project flier and a project email address on the project web page were made available throughout the whole study in case students ran into any technical problems or had any questions.

Students received financial incentives for participating in the *Kick It!* program. They received $5 for each session and $10 for the pretest and posttest surveys. After the end of the immediate posttest and the 6-month posttest, the researcher asked students for their social security numbers and current mailing addresses to submit honorarium requests for checks for participating students. Students received the checks in the mail two weeks to a month after completing the surveys.

Measurement Instrument

The following section presents a description of the measures for data collection. Participants provided self-report measures through online surveys. The pretest and posttest surveys were identical except for the process evaluation questions. The following measures were collected from the participants.

Demographic Measures. Participant characteristics were assessed to offer a detailed description of the study sample. The following demographic characteristics were measured:

- age as a continuous variable
- gender
- race/ethnicity including White/Caucasian, Black/American-American, Hispanic, Asian/Pacific Islander, or other. Ethnicity was measured to help assess if the sample population was representative of the total student population of the University of Georgia
- year in college (freshman, sophomore, junior, senior, or other)
- full-time or part-time status

Smoking History. Greater numbers of years of smoking and number of cigarettes smoked have been identified in the literature as associated with less likelihood of quitting (Kviz et al., 1994; Sargent, 1998; Moolchan, 2000). In terms of trying to assist participants to quit smoking, smoking history is important in determining if it has potential barriers to cessation. Smoking history measures included age of initiation, number of cigarettes smoked in the last 30 days, week, and 24 hours as continuous variable, and number of peers smoking.

Independent Variable. Because this study employed a pretest-posttest control group design, the primary independent variable was condition assigned to the smokers: treatment or control.

Dependent Variables

Several measures of quitting behaviors were employed in this study. The primary outcome was the quit rate of smokers in the intervention. For smoking moving from preparation to action (defined as moving from readiness to quit in the next 30 days and having at least one serious quit attempt during the past 6 months to stopping smoking in

the last 6 months), some of the measures addressed more immediate goals of motivating action among smokers to quit, such as reduction of the number of cigarette smoked per day and 24-hour abstinence. Differences between intervention and control group were examined in the percentage of smokers moving forward in their stage of readiness, mean self-efficacy scores, and mean attitude scores.

Number of quitters/quit rate. A common reported measure of cessation is the quit rate that describes the magnitude of quitting in a population (USDHHS, 1990). Students were asked to define their smoking status by answering the question, "Are you currently a smoker?" (DiClemente, Prochaska, Fairhurst, Velicer, Rossi, & Velasquez, 1991). Responses were "Yes, I currently smoke;" "No, I quit within the last 6 months;" and "No, I quit more than 6 months ago." For smokers, quitters were assessed by defining themselves as not currently smoking. The quit rate was determined by number of quitters/(number of quitters and number of current smokers).

Number of cigarettes smoked per day. Cutting down the amount of cigarettes gradually is a common strategy for quitting (Gillespie, Stanton, Lowe, & Hunter, 1995). Reduction of cigarette use is an example of harm reduction, which encourages movement toward decreased harm as a potential step in the right direction even though abstinence is an ideal outcome (Erickson, 1997; Marlatt, 1996). Smokers who cannot quit may decrease adverse health effects by using the nicotine patch or smoking a lighter brand of cigarettes (Cheung, 2000). Smokers were asked, "How many cigarettes have you smoked in the last 24 hours?" This information was used to compare the amount of smoking between intervention and control students. It was important to assess if college

smokers were reducing their risks of cancer by smoking less. This information has implications for helping them choose less harmful options.

Number of 24-hour quit attempt. Quit attempts were assessed by 24-hour abstinence. The 24-hour abstinence measures an initial outcome that indicates that a smoker has taken "minimal action" (Velicer, Prochaska, Rossi, & Snow, 1992). After the last computer session and at 6-month follow-up, quit attempts were assessed by asking participants if they had 24-hour quit attempt.

Transtheoretical Model stage movement. The Transtheoretical Model of Change was the framework for the intervention in this study. Questions assessed the participants' stage of readiness to quit smoking. The Stage of change was measured as dichotomous questions (Yes/No) through a series of questions. These stages have been assessed in adults (Prochaska & DiClemente, 1983; Prochaska et al., 1993) and adolescents (Pallonen, Rossi, Smith, Prochaska, & Almeida, 1993; Pallonen et al., 1998). Precontemplators are smokers who were not thinking about quitting smoking in the next 6 months. Contemplators are smokers who were thinking about quitting within the next 6 months. Smokers in Preparation are ready to quit in the next 30 days and had at least one serious quit attempt during the past 6 months (In the past 6 months, how many times have you quit smoking for at least 24 hours?). Students in action are those who had quit smoking within the past 6 months. Students in maintenance include ex-smokers who had quit more than 6 months ago. Stage movements were coded as forward or no movement for the data analysis. The proportion of smokers who moved forward one or more stages toward quitting will be compared between treatment and control groups.

Smoking Abstinence Self-Efficacy (SASE). The SASE measures the smoker's level of confidence that he or she would not smoke in 20 challenging situations. The level of confidence was a 5-point Likert scale from 1) not at all to 5) extremely confident. DiClemente (1981) developed the 12-item scale, which was later expanded to 31 items, and then reduced to 20 items (Ding et al., 1994). The short form of this scale was used with 9 items. The scores of the scale have demonstrated good internal consistency across studies (Cronbach alpha = .88-.92).

Attitudes toward Smoking Scale (ATS-18). The ATS-18 is an 18-item scale that measures perceptions of adverse effects of smoking (10 items), psychoactive benefits (four items), and pleasure of smoking (4 items) (Etter, Humair, Bergman, & Perneger, 2000). Examples of the adverse effects of smoking are "bad for my skin," "gives me very bad breath," and "ruining my health." Examples of the benefits of smoking include "a cigarette calms me down when I am stressed" or "when I am upset." Pleasure of smoking examples are "I love smoking" and "it feels good to smoke." The scores of the scale have high reported internal consistency (.85, .88, .81) and test-retest correlations (.90, .75, .89) (Etter, Humair, Bergman, & Perneger, 2000).

Process Evaluation. The immediate posttest had additional process evaluation questions for the intervention group (see Appendix G). The questions were open-ended and included, "What was helpful about the *Kick it!* program?," "What were the weaknesses of the *Kick it!* program?," and "What changes would participants make to the intervention?"

In-depth interviews were conducted with six participants in the intervention group to further explore their use of the program, perceptions of its strengths and weaknesses,

and recommendations for changes in the program. All participants in the intervention group were invited to participate in the interviews by e-mail or phone. Six students responded in February and March 2002. Students gave written consent for participating in the interviews (see Appendix H). Five students were interviewed by the researcher in the project office. One student was interviewed over the phone due to schedule conflicts. His written consent was mailed to the researcher before he was interviewed. At each interview session, the researcher told the interviewees that their information would be confidential, not be associated with their names in any way, and be reported in aggregate with other interviewees' responses. The researcher asked the interviewees open-ended questions about what program components they used, what the participants like about the program, what they did not like, what changes they would recommend, and other comments about the program (see Appendix I for the interview protocol). She took brief notes during the interviews. The interviews lasted from 20 to 30 minutes and were also taped to insure that the discussion was recorded accurately. The tapes were transcribed verbatim by the research assistant or researcher. Brief notes were also taken at each interview. After the interviews, the participants completed honorarium forms to receive $20 for their participation. Honorarium checks were mailed within a month of the interview.

Data Management and Data Entry

The researcher tracked program participation and data through a secure system on the Internet. The survey data were collected into a database and then imported into the Statistical Package for the Social Sciences (SPSS) after each survey assessment period. Following data collection, all data were stored in a password protected file.

Data Cleaning and Quality Assurance

The data were collected by an online survey in which data were directly entered into a database by the respondents. This process eliminated data entry errors that may occur with manual data entry. The data were screened for outliers and missing data. Participants were examined for a large percentage of missing information. The data on all seventy participants were retained because all or the majority of data were not missing.

The process evaluation interview data were transcribed verbatim by the researcher or research assistant to insure comprehensiveness and accuracy of the information. The transcripts and interview notes were reviewed by the researcher before data analysis.

Statistical Analyses

The statistical program SPSS version 10.0 was used in all data analyses (SPSS Inc., 1999). Descriptive statistics for all study and demographic variables were computed. For the Transtheoretical Model scales of self-efficacy and ATS-18, internal consistency reliability coefficients were calculated to examine the average correlation among the items for this sample of college students (Nunnally & Bernstein, 1994, p. 251-2) to compare to published coefficients for adults (Velicer, DiClemente, Rossi, & Prochaska, 1990; Etter, Humair, Bergman, & Perneger, 2000) and other adolescent sample scores (Pallonen et al., 1998).

The research design to test the hypotheses was a randomized treatment and control group pretest-posttest design (Campbell & Stanley, 1963) with one treatment and one control group. At the two follow-up assessments, comparison tests of analysis of the covariance, chi-square analyses, and analysis of the variance were conducted to compare

the treatment and control group on each of the outcome variables. The data were evaluated to assess if the assumptions for statistical tests were met. For all ANCOVA and ANOVA tests, descriptive statistics were run and histograms examined to determine if normality was met. If the distribution of an outcome variable was non-normal, non-parametric statistical tests were run. The homogeneity of regression slope assumption was tested for the ANCOVA analyses. Levene's tests for equality of variance were run for the ANOVAs to test the assumption of equal variance.

For the process evaluation questions on the online posttest survey, descriptive statistics were run on the quantitative process evaluation data which included participation, percentage of materials read, use of different intervention components, value of the components, and willingness to participate in other web-based health programs.

Qualitative Analyses

In reporting the results to the open-ended questions, including what participants liked or did not like about the program, on the online posttest survey, the researcher listed the responses as verbatim quotes based on categories of strengths, weaknesses, and other comments about the program. In analyzing the data from in-depth interviews with six intervention participants, the researcher read the verbatim transcripts at least 2 times over three settings and drew themes from the same categories used for the open-ended questions on the online posttest survey. The salient themes were summarized and are reported in the results section.

Table 3.4 presents the data analyses for the research hypotheses.

Table 3.4

Outcome Measures for the Study

Outcome Variable	Level of Measurement	Scale	Data Analysis
Number of cigarettes smoked	Interval		Separate ANCOVAs were used to compare groups at posttest and 6-month follow-up. The within subject factors were condition and time and the dependent variable was the mean number of cigarettes smoked at posttest and at 6-month follow-up. The covariate was the baseline score.
Number of 24-hour quit attempts	Interval		Separate ANCOVAs were used to compare groups at posttest and 6-month follow-up. The within subject factors were condition and time and the dependent variable was the mean number of 24-hour quit attempts at posttest and at 6-month follow-up. The covariate was the baseline score.
Quit rate	Nominal		2 X 2 contingency table analyses were used to test this hypothesis with the alpha level at .05. The two variables of proportions of quitters and group (intervention and control group) were compared at posttest and 6-month follow-up.
Stage of Change Movement	Nominal	Pallonen et al., 1998	A 2 X 2 (Stage movement X Group) Chi-square analysis of differences between proportions were run at posttest and at 6-month follow-up.
Self-efficacy	Interval	Ding, Pallonen, Migneault, & Velicer, 1994	A one-way ANOVA was used to test this hypothesis with the alpha level at .05. The independent variable was condition and the dependent variable was self-efficacy score.
Attitudes toward Smoking	Interval	Etter, Humair, Bergman, & Perneger, 2000	A one-way ANOVA was used to test this hypothesis with the alpha level at .05. The independent variable was condition and the dependent variable was attitudes score.

Study Timeline

A timeline for the study follows.

Figure 3.7

Study Timeline

	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Development													
Develop intervention													
Pilot test													
Conduct pilot surveys													
Modifcations to Study													
Implementation													
Recruitment of students													
Pretest													
Web Sessions													
Immediate Posttest													
Data Cleaning/Preliminary Analysis													
6-Month Follow-up													

Participant Tracking. The researcher had an online system that tracked whether participants logged on. The tracking system indicated the date in which the participant attended the session. Due to the complexity of the interactivity within the web sessions, the researcher could not incorporate a more sophisticated tracking program to measure dosage of the intervention in terms of numbers of time participants attended a session and time spent within the session. The tracking system was a database which could only be accessed by program staff, the researcher and graduate assistant, with the use of a special login and password. This information was not known by anyone else besides the web developer who created the database.

Data Storage. All project staff signed statements of confidentiality of participants' information at the beginning of the study. The survey data were stored in databases on a server during the intervention. A back-up was made after each assessment period to insure no loss of data. Only program staff, including the researcher and research assistant, had access to the databases through a specific login and password. Within the databases, only the login identification of the participant was listed so that the name of an individual participant could not be identified. The list of login identification associated with participant's name was kept in a locked project office in the Department of Health Promotion and Behavior. At the end of the study, the databases were removed from the server.

The tapes from the in-depth interviews were labeled with the date of the interview and the last name of the interviewee. The transcripts from the in-depth interviews and the notes did not have any individual identifiers on them. The qualitative data and tapes were stored in a locked project office and the tapes will be destroyed after the end of the study.

Participant Retention in the Study. Several of the primary research questions for this study examined the long-term effects of the intervention. Therefore, it was important to include a 6-month follow-up to evaluate lasting post-intervention effects. One of the difficulties with long-term follow-up is participant retention. In the study, the researcher took several steps to prevent attrition of the participants because it may impact the generalizability of the findings. First, students were told of the importance of participating in all sessions. Second, students were paid incentives of $5 for each of the assessments and web-based intervention sessions. Participants were also reminded about each survey and session via email. If the participant did not take the survey or attend the

session after the first email, the researcher sent them up to two additional email reminders. Lastly, information on students who remained and who dropped out of the study was retained so the researcher could compare them on key demographic characteristics.

CHAPTER 4

ANALYSIS OF THE DATA

This chapter presents the results from the statistical analyses. Descriptive statistics of the study variables and psychometric properties of the measures for the sample will be presented first. The results of the hypotheses and additional test are presented next. The primary outcome variable was the quit rate. The secondary outcome variables were number of cigarettes smoked per day, number of 24-hour quit attempts, stages of quitting movement, self-efficacy to quit smoking, and attitudes towards smoking (ATS-18). The independent variable was study group status: intervention or control group. A secondary aim of the study was to conduct a process evaluation of the smoking cessation intervention in terms of its use, acceptability, strengths, and weaknesses. Quantitative data regarding the use and acceptability of the web-based intervention will be reported. Qualitative data of participants' opinions of the program are discussed last.

Response Rate

The study started in August and ended December 2001. There were 123 students who called about the study. Of the 77 students who completed the registration form with informed consent, 70 actually completed the baseline survey. The overall participation rate for students completing the registration form and baseline survey was 91%. Table 4.1 shows the participation rate of the students. Overall, participation rates were higher for students who were Juniors and Seniors. A similar trend also was found when examining participation rates within the intervention and control group.

Table 4.1

Participation Rates by College Grade Level and Study Group

		Group	
Grade	Total	Intervention	Control
Freshman	9 (12.9%)	5 (14.3%)	4 (11.4%)
Sophomore	8 (11.4%)	4 (11.4%)	4 (11.4%)
Junior	21 (30.0%)	12 (34.3%)	9 (25.7%)
Senior	24 (34.3%)	11 (31.4%)	13 (37.1%)
Other	8 (11.4%)	3 (8.6%)	5 (14.3%)
Total	70 (100%)	35 (100%)	35 (100%)

As expected, the participation at posttest and 6-month follow-up was lower. Nineteen of the 35 participants (54.3%) in the intervention group and twenty-four of the 35 participants (68.6%) in the control group completed the posttest. At 6-month follow-up, 22 participants (64.7%) in the intervention group responded, while 25 participants (71.4%) of the control group responded. At both times, more participants in the control group completed the surveys. The attrition rates were 38.6% at posttest and 31.4% at 6-month follow-up. The participation rates are presented in Table 4.2.

Table 4.2

Participation at Posttest and 6-Month Follow-up

		Group	
	Total n (%)	Intervention n (%)	Control n (%)
Posttest			
Participation	43 (61.4%)	19 (54.3%)	24 (68.6%)
Attrition	27 (38.6%)	16 (45.7%)	11 (31.4%)
6-Month follow-up			
Participation	48 (68.6%)	23 (65.7%)	25 (71.4%)
Attrition	22 (31.4%)	12 (34.3%)	10 (28.6%)

To determine if there were possible bias in the data collected due to self-selection for participation, analyses were conducted to compare the baseline measures of respondents to non-respondents at posttest and 6-month follow-up. Chi-square tests of independence were run to assess differences on the categorical, demographic variables of gender, college grade level, and ethnicity. Independent sample t-tests were run to assess differences on age and the outcome measures of number of cigarettes smoked per day, number of quit attempts, self-efficacy, and the attitudes toward smoking constructs. There were no differences between respondents and non-respondents at posttest on their baseline measures except for non-respondents reported being older and agreeing more to the adverse effects of smoking than respondents (see Appendix J). No major differences

were also found on their baseline measures at 6 month follow-up except for respondents reported higher self-efficacy than non-respondents.

Participant Characteristics

The study sample was comprised of 70 University of Georgia undergraduate and graduate students. All participants met the inclusion criteria of having Internet access, being a current smoker, and not being on nicotine replacement therapy. Most used the Internet daily (65.7%), 30.0% used it almost every day, and 4.3% used it a few times a week. The majority of the participants were full-time students (95.7%), White (92.9%), female (62.9%), and Juniors or Seniors (64.3%). The age of participants ranged from 18 to 28 years, with an average of 21.2 years (SD = 2.24). The demographic characteristics of the study participants are presented in Table 4.3. The study sample had a greater percentage of female participants (62.9% versus 57.0%) and White participants (92.9% versus 84.0%) than does the undergraduate population of UGA. Only 1.0% of the participants were Black compared to the 7.0% for the undergraduate population. The primary way of learning about the program was an advertisement in *The Red & The Black* newspaper (72.9%). Others methods of how participants learned about the program were teachers or others who told them about the program (12.9%) and word of mouth (7.1%).

Table 4.3

Participant Characteristics (n=70)

Characteristic (n, %)	Total	Group	
		Intervention	Control
Gender			
Female	44 (62.9%)	20 (57.1%)	24 (68.6%)
Male	26 (37.1%)	15 (42.9%)	11 (31.4%)
Full-time status			
Full-time	67 (95.7%)	35 (100.0%)	32 (91.4%)
Part-time	3 (4.3%)	0	3 (8.6%)
Ethnicity			
White (non-Hispanic)	65 (92.9%)	33 (94.3%)	32 (91.4%)
Black (non-Hispanic)	1 (1.4%)	0	1 (2.9%)
Hispanic	1 (1.4%)	1 (2.9%)	0
Asian/Pacific Islander	1 (1.4%)	1 (2.9%)	0
Other	2 (2.9%)	0	2 (5.7%)
Grade			
Freshman	9 (12.9%)	5 (14.3%)	4 (11.4%)
Sophomore	8 (11.4%)	4 (11.4%)	4 (11.4%)
Junior	21 (30.0%)	12 (34.3%)	9 (25.7%)
Senior	24 (34.3%)	11 (31.4%)	13 (37.1%)
Other	8 (11.4%)	3 (8.6%)	5 (14.3%)
Age (mean, SD)	21.2 (2.2)	21.1 (2.2)	21.3 (2.3)

Smoking History

Descriptive statistics about the participants' smoking history is shown in Table 4.4. The variables are the primary interval level outcome measures at baseline except for the age of first smoked a cigarette. Number of quit attempts in the past year was an open-ended response where the participants typed the number of attempts. Self-efficacy was comprised with nine items scored from 1 (not at all confident) to 5 (extremely confident), with a higher score indicating greater self-efficacy to not smoke in certain situations. The attitudes toward smoking scale (ATS-18) is comprised of three constructs: 1) adverse effects of smoking, 2) psychoactive benefits of smoking, and 3) pleasure of smoking. Adverse effects of smoking were measured with a 10-item scale from 1 (totally disagree) to 5 (fully agree), a higher score indicates greater agreement. Psychoactive benefits of smoking and pleasure of smoking were measured with 4-item scale from 1 (totally disagree) to 5 (fully agree), a higher score indicates greater agreement.

The participants started smoking on average at age 15.0 years (SD = 2.3). The range of age for first smoking a cigarette was from 10 to 21 years. Approximately 83.0% of the participants had smoked their first cigarette before coming to college. The number of cigarettes smoked per day ranged from 0 to 30, with an average of 9.1 (SD = 7.8). Participants had on average 6.8 quit attempts (SD = 8.5) in the past year with a range of 0 to 50 times.

They reported being not very confident of their ability to not smoke across various situations with a score of 2.36 on a scale of 1 to 5. The self-efficacy scores ranged from 9 to 43 with a mean of 21.2 (SD = 7.4). Attitudes toward smoking were measured with 3 subscales. Generally, participants agreed that smoking had adverse

effects (mean = 40.5, SD = 6.5, 4.05 on a 1 to 5 scale), about the benefits of smoking (mean = 15.8, SD = 2.7, 3.95 on a 1 to 5 scale) and about the pleasure of smoking (mean = 14.7, SD = 3.1, 3.68 on a 1 to 5 scale).

By definition of the eligibility criteria, participants were mostly in contemplation (thinking about quitting in the next 6 months) or preparation (thinking about quitting in the next 30 days). Twenty-two participants (31.4%) were in the preparation stage of for quitting smoking, while 48 (68.6%) were in the contemplation stage (see Table 4.5).

Table 4.4

Participants' Smoking History at Baseline

Characteristic (mean, SD)	Actual Range	Total for Scales	Group	
			Intervention (n = 35)	Control (n = 35)
Age of 1st cigarette	10-21	15.0 (2.3)	14.9 (1.9)	15.0 (2.6)
Number of cigarette smoked in last 24 hours	0-30	9.1 (7.8)	9.2 (7.7)	9.1 (8.0)
Self-efficacy toward quitting (9 items)	9-43	21.2 (7.4)	21.2 (7.4)	21.2 (7.5)
Attitudes to Smoking				
Adverse effects (10 items)	10-50	40.5 (6.5)	41.5 (4.7)	39.4 (7.9)
Benefits (4 items)	9-20	15.8 (2.7)	15.7 (2.3)	15.8 (3.1)
Pleasure (4 items)	9-20	14.7 (3.1)	14.8 (2.5)	14.6 (3.7)

Note: The response categories for self efficacy were not all confident to extremely confident (1 to 5), with a higher score indicating higher confidence.
The response categories for attitudes toward smoking ranged from totally disagree to fully agree (1 to 5), with higher scores indicating more agreement.

Table 4.5

Participants' Stage of Change at Baseline

Stage of Change (n, %)	Total	Group	
		Intervention	Control
Contemplation	48 (68.6%)	25 (71.4%)	23 (65.7%)
Preparation	22 (31.4%)	10 (28.6%)	12 (34.3%)

Group Comparisons at Baseline

Each participant was randomly assigned to the intervention or control group. Comparisons of the groups at baseline on participant characteristics, smoking history, and outcome measures were conducted. The following analyses tested for differences between the groups at the .05 level of significance, unless otherwise stated. Chi-square tests for homogeneity were run to assess differences between the groups on the participant characteristics. No statistically significant differences at the .05 level of significance were found at baseline for gender χ^2 (1) = .98, $\underline{p}$ = .32, full-time or part-time enrollment status χ^2 (1) = 3.13, $\underline{p}$ = .08, ethnicity χ^2 (4) = 5.0, $\underline{p}$ = .29, or grade χ^2 (4) = 1.2 , $\underline{p}$ = . 87, between the intervention and control groups.

One-way ANOVAs were conducted to assess the difference between groups on the age participants first smoked a cigarette, number of cigarettes smoked in the past 24 hours and self-efficacy. The assumption of homogeneous variances between the groups was met for the smoking history variables with a significance level at .10. No significant

differences were found on age of first smoking (F (1, 68) = .01, p = .92), number of cigarettes smoked (F(1,68) = .00, p = .98) and self-efficacy (F (1, 68) = .00, p = 1.00) between the groups. No statistically significant differences were found on the attitudes toward smoking constructs of adverse effects (F(1, 68) = 1.9, p = .18), benefits of smoking (F(1, 68) = .00, p = .93), and pleasure of smoking (F(1, 68) = .10, p = .79) between the two groups. The Chi-square test for homogeneity was used to assess differences between the intervention and control group on the Transtheoretical Model stage of change (see Table 4.5). The groups did not differ on participants' baseline stage of change grade χ^2 (1) = .27, p = .61.

Descriptive statistics for the interval level outcome measures at baseline for each of the groups are presented in Table 4.4. One-way ANOVAs were conducted to assess differences between the groups on the outcome measures except for stage movement and quitting. The assumption of homogeneous variance between the groups was met for all of the outcome measures except for attitudinal variables of adverse effects of smoking (1, 68) Levene's statistic = 5.1, $p < .05$, and pleasures of smoking (1, 68) Levene's statistic = 6.1, $p < .05$. The differences in the variances between the groups on these measures were not a concern due to the equal sample sizes. There were no significant differences between the intervention and control group at baseline on the primary outcome variables of number of cigarettes smoked, quit attempts, self-efficacy, and attitudes toward smoking as seen in Table 4.6.

The differences between the two groups were minimal. Therefore, randomization of participants did result in equivalent groups.

Table 4.6

Analysis of Variance of Primary Outcome Measures Comparing Intervention and Control Group at Baseline

Measure	Source	df	Mean Square	F	p-value
Cigs. smoked	Between groups	1	27.7	.00	.98
	Within groups	68	61.6		
Quit attempts	Between groups	1	27.7	.38	.54
	Within groups	68	73.0		
Self-efficacy	Between groups	1	0.0	.00	1.00
	Within groups	68	55.6		
Attitudes toward smoking (ATS-18)					
Adverse effects	Between groups	1	78.2	1.9	.18
	Within groups	68	42.3		
Attitudes toward Smoking (ATS-18)					
Benefits	Between groups	1	.06	.00	.93
	Within groups	68	7.4		
Attitudes toward Smoking (ATS-18)					
Pleasure of	Between groups	1	0.7	.10	.79
	Within groups	68	10.0		

Due to attrition of participants at posttest and 6 month follow-up, analyses were run to determine group differences on all baseline outcome variables except for quitting and forward TTM stage movement. There were no significant differences between the respondents for the intervention and control groups on the baseline measures (Appendix K).

Psychometric Properties of the Outcome Measures

This section discusses the estimates of reliability that were obtained from the study sample scores for the primary outcome measures of self-efficacy and Attitudes towards Smoking (ATS) scale at baseline.

The self-efficacy scale measures how confident participants felt in particular situations not to smoke (Velicer, DiClemente, Rossi, & Prochaska, 1990). Based on the 70 participants' scores at baseline, the standardized Cronbach's alpha coefficient was .85, which was within a satisfactory range.

The attitudes toward smoking (ATS-18) scales measured adverse effects of smoking, psychoactive benefits of smoking, and pleasure of smoking. The scale was recently created by Etter et al. (2000), so exploratory factor analysis was created to assess whether this study resulted in the same 3 factors. Exploratory factor analysis using principal axis factoring with varimax rotation was conducted on the 70 participants' scores. Extraction was set for 3 factors. The complete factor loading for the 3 factors are found in Table 4.7. The scree plot and criterion of a minimum eigenvalue of 1 indicated four possible factors. This may indicate that the attitudes towards smoking scale may have a fourth dimension; however, it had few items. Only the results for the extraction of

three factors were examined. The three factors accounted for 78.0% of the total variance with the adverse effects of smoking subscale contributing 28.2% to the total variance.

Traditionally, scale items should load at a level of .50 or greater to be part of a factor (DeVillis, 1991). From the exploratory factor analysis findings, two scales had items loading on a factor below .50. Within the adverse effects of smoking factor, the items that loaded lower were "bothers me to be dependent on cigarettes" and "would have more energy." It may be that college smokers do not consider that they are dependent on smoking because they perceive themselves as light or social smokers. Having more energy due to smoking was probably perceived as a desired effect versus an adverse effect for these college smokers. Therefore, this item loaded higher on the pleasure of smoking factor. The item "able to concentrate better" loaded at a very low level (.30) on the benefits of smoking factor and higher on the pleasure of smoking factor (.62). The ATS-18 scale was originally developed for adults 18 to 70 years old. It may be some of the items may not fit into the primary factors as well for the college population. The researcher decided to remove the items that loaded less than .50 on the factors. Consequently, the adverse effects of smoking had 8 of the original 10 items and the benefits of smoking had 3 of the original 4 items. All analysis in this study were conducted with these revised scales.

Table 4.8 presents the summary measures and reliability (standardized Cronbach's alpha) for the scales. The alpha coefficients were for .84 for adverse effects of smoking, .83 for psychoactive benefits of smoking, and .72 for pleasure of smoking. The self-efficacy scale and subscales of the attitudes toward smoking (ATS-18) all met the recommended criterion of coefficient alpha $\geq .70$ (Nunnally & Bernstein, 1994).

Table 4.7

Factor Loadings for the Three Factors of the Attitudes toward Smoking (ATS-18) Scale

	Factors		
	Adverse Effects	Benefits	Pleasure
Adverse effects of smoking			
Dangerous to health	*.73*	.08	.23
Ruining my health	*.63*	-.09	.36
Leaves an unpleasant smell	*.77*	.18	.02
Gives me very bad breath	*.71*	.11	-.09
Spend too much money on cigarettes	*.58*	.24	.29
Bothers other people	*.59*	.23	-.26
Is dangerous to those around me	*.65*	-.33	-.13
Is bad for my skin	*.70*	.06	.00
Bothers me to be dependent on cigarettes	.48	.14	.37
Would have more energy	.42	.11	.55
Psychoactive benefits of smoking			
Calms me down when I am stressed	.03	*.90*	.06
Calms me down when I get upset	.27	*.87*	.07
Helps me deal with difficult situations	.14	*.64*	.43
Able to concentrate better	-.11	.30	.62
Pleasure of smoking			
Like the motions of smoking	.26	-.08	*.68*
Feels so good to smoke	-.17	.27	*.76*
Love smoking	-.12	.06	*.73*
Like to hold a cigarette	.44	-.04	*.54*

Table 4.8

Reliability Estimates of Self-efficacy and the Attitudes Toward Smoking Subscales

Measure	Number of Items	Reliability Cronbach's α
Self-efficacy	9	.85
Attitudes towards smoking (ATS-18)		
Adverse effects of smoking	8	.84
Psychoactive benefits of smoking	3	.83
Pleasure of smoking	4	.72

Hypothesis Testing

The following section will discuss the statistical analyses conducted for each of the research questions. The outcome measures for baseline, posttest, and six month follow-up are presented in Table 4.9. Participants in the intervention groups reported fewer mean number of cigarettes smoked at posttest (5.58 vs. 8.25) and 6-month follow-up (3.83 vs. 6.00) when compared to the control group. Participants in the control group had more 24-hour quit attempts than those in the intervention group at posttest and 6-month follow-up. The intervention group had a lower a quit rate than the control group at posttest (14.3% versus 22.9%); however, the intervention group reported a higher quit rate at 6-month follow-up (25.7% versus 17.1%). At posttest, participants in the control group (42.9%) had more forward movement in their stage of change than the intervention

group (28.6%). The results for self-efficacy and attitudes toward smoking were similar across the groups at posttest and 6-month follow-up.

ANCOVAs were used to test the hypotheses regarding the effects of the intervention on the number of cigarettes smoked and number of 24-hour quit attempts. Use of the ANCOVA instead of the ANOVA was employed to statistically decrease the error variance, increase power, and control for the baseline measures (Keppel, 1991). Chi-square tests for independence assessed differences between the groups on Transtheoretical Model stage of change and quit rate at posttest and at 6-month follow-up. One-way ANOVAs were used to assess the differences on self-efficacy and attitudes towards smoking between the groups at and posttest.

Assumptions of the Statistical Tests

The four assumptions for performing an analysis of covariance (ANCOVA) are: the dependent variable is normally distributed in the population, 2) the variances of the population are equal, 3) the independences of the observations, and 4) relationship between the covariate and dependent variable is the same for both groups (homogeneity-of-slopes).

The two assumptions of the Chi-Square test are 1) the observations are independent of each other, and 2) the test statistic is approximately distributed as a chi-square when the sample size is relative large.

The three assumptions of the analysis of variance (ANOVA) are: 1) the dependent variable is normally distributed in the population, 2) the variances of the population are equal, 3) the independence of the observations.

Table 4.9

Descriptive Statistics for the Outcome Measures at Baseline, Posttest, and 6-Month Follow-up

	Intervention Group			Control Group		
Measure	N	Mean (S.D.)	Range	N	Mean (S.D.)	Range
Cigarettes smoked per day						
Baseline	35	9.17 (7.68)	0-25	35	9.11 (8.02)	0-30
Posttest	19	5.58 (6.00)	0-15	24	4.30 (5.83)	0-20
6-month follow-up	23	3.83 (5.86)	0-20	25	6.00 (7.07)	0-20
24-hour quit attempts						
Baseline	35	7.40 (9.57)	0-50	35	6.14 (7.38)	0-30
Posttest	19	8.58 (7.04)	1-20	24	13.08 (22.01)	1-99
6-month follow-up	23	15.13 (40.74)	1-20	25	16.96 (33.70)	1-150
Quit rate, n (%)						
Posttest	19	5 (14.3%)		24	8 (22.9%)	
6-month follow-up	23	9 (25.7%)		25	6 (17.1%)	
Stage of change movement, n (%)						
Posttest	19	10 (28.6%)		24	15 (42.9%)	
Self-efficacy (9 items, 0-45)						
Baseline	35	21.2 (7.4)	9-40	35	21.2 (7.5)	9-43
Posttest	19	28.2 (10.4)	13-45	24	28.0 (8.3)	9-45
Attitudes toward smoking						
Adverse effects (8 items, 0-40)						
Baseline	35	33.2 (3.9)	19-39	35	31.8 (6.6)	8-40
Posttest	19	35.7 (2.8)	29-40	24	35.8 (4.6)	24-40
Benefits of smoking (3 items, 0-15)						
Baseline	35	12.6 (1.9)	7-15	35	12.4 (2.5)	7-15
Posttest	19	12.8 (2.0)	9-15	24	12.0 (2.9)	6-15
Pleasure of smoking (4 items, 0-20)						
Baseline	35	14.8 (2.5)	11-20	35	14.6 (3.7)	9-20
Posttest	19	14.1 (3.1)	8-20	24	14.8 (4.3)	5-20

Normality. The assumption of normality appeared to be met for numbers of cigarette smoked, quit rate, and stage of change by examination of the descriptive statistics, histograms, and box plots of the outcome measures between the two groups at baseline, given the limitation of the sample size. The outcome measures of number of quit attempts, self-efficacy and attitudes toward smoking constructs were non-normal. For quit attempts (Hypotheses 3 and 4), the values of the dependent variable were ranked because the data were non-normal. For self-efficacy and the attitudes toward smoking constructs (Hypotheses 8 through 11), Kruskal-Wallis tests were run because the assumption of normality was not met.

Homogeneity of variance. This assumption was tested using Levene's test for the equality of variance for the ANOVA analyses of Hypotheses 8 (self-efficacy) and Hypotheses 9-11 (attitudes toward smoking constructs). For self-efficacy, Levene's test for the equality of variance indicated that the assumption of homogeneity of variance was not met ($p = .01$). When heterogeneity of variance exists for a variable, there is likely some non-normality. Kruskal-Wallis H tests were conducted to compare the mean differences on self-efficacy and the attitudes toward smoking constructs between the intervention and control groups because the assumption of homogeneity of variance was not met.

Independence. Independence means that there is no relationship between observations. This assumption is met when participants within and between groups do not influence each other responses. The surveys were collected via the Internet at each participant's convenience. Therefore, it is unlikely that participants collaborated on responses. The participants were also randomized into different groups.

Outliers. Examination of descriptive statistics and scatter plots was used to detect outliers on the outcome measures. Only one extreme value was found in the measures. One participant reported smoking 99 cigarettes in the last 24-hours at posttest. This value may be the result of an entry error or over-reporting of smoking. The individual was removed from the ANCOVA analysis testing for group differences in number of cigarettes smoked with a covariate of the baseline measure. Except for this one analysis, all of the data were analyzed in subsequent statistical test.

Research Question 1

The purpose of research question 1 was to assess differences between the intervention and control groups in number of cigarettes smoked in the past 24 hours, quit attempts, and proportion of quitters at the posttest assessments for smokers moving from preparation to action stage of quitting. Due to the small sample size of only 35 participants per group, reducing the sample to only participants in the preparation stage would results in small numbers for statistical tests. Therefore, the analyses were run with all smokers from both stages (e.g., Contemplation, Preparation).

Hypothesis 1: Number of cigarettes smoked per day will decrease more in the intervention group than the control group at posttest. Hypothesis 2: Number of cigarettes smoked per day will decrease more in the intervention group than the control group at 6-month follow-up. Two one-way ANCOVAs were performed to address these hypotheses. The significance level was set at $\alpha = .05$.

Analyses were conducted to test the assumption of homogeneity of the within group regression slopes. ANCOVAs were conducted with an interaction term between the covariate (baseline scores) and the group levels at the .10 level of significance. No

significant covariate by group interaction was found (see Table 4.10). ANCOVAs were subsequently run with the number of cigarettes smoked per day at posttest and 6-month follow-up up with the baseline measure as the covariate due to the assumptions being met. The results of these analyses are summarized in Table 4.11.

At posttest, participants in the intervention group reported fewer cigarettes smoked (adjusted mean = 5.49) than did the control group (adjusted mean = 8.32). Similarly, at 6-month follow-up, participants in the intervention group reported fewer cigarettes smoked (adjusted mean = 3.91) than did the control group (adjusted mean = 5.92). The results indicated that all of the baseline measures were not significant predictors of the number of cigarettes smoked per day at posttest and at 6-month follow-up. The posttest values of number of cigarettes smoked were adjusted based on the pretest values through the ANCOVA procedure. There were no significant differences in the number of cigarettes smoked per day between the intervention group and the control group at posttest and at 6-months follow-up.

Hypothesis 3: Number of quit attempts will increase more in the intervention group than the control group at posttest. Hypothesis 4: Number of quit attempts will increase more in the intervention group than the control group at 6-month follow-up. Two one-way ANCOVAs were performed to address these hypotheses. The significance level was set at $\alpha = .05$.

Table 4.10

ANCOVA Results for the Assumption of Homogeneity-of-Slope for Cigarettes Smoked

Source of variation	df	MS	F value
Posttest			
Cigarettes Smoked per Day 1	1	245.71	.99
Group	1	1.73	.01**
Cig. Smoked 1 X Group	1	46.89	.19
Error	39	248.06	
Total	43		
6-month Posttest			
Cigarettes Smoked per Day 1	1	293.64	8.29**
Group	1	.61	.02
Cig. Smoked 1 X Group	1	50.49	1.43
Error	44	35.42	
Total	48		

Note: The "1" refers to measurements taken at baseline. **$p < .01$.

Table 4.11

ANCOVA Summary Table for Number of Cigarettes Smoked Per Day

Source of variation	df	MS	F value
Posttest			
Cigarettes Smoked per Day 1	1	269.74	1.11
Group	1	85.04	.35
Error	40	248.06	
Total	43		
6-month Posttest			
Cigarettes Smoked per Day 1	1	346.07	9.68
Group	1	1.36	.25
Error	45	35.76	
Total	48		

Note: The "1" refers to measurements taken at baseline.

Examination of descriptive statistics, histograms, and scatter plots showed that the distribution of the number of quit attempts at baseline, posttest, and 6-month follow-up were all non-normal. Data were transformed by ranking to normalize the data. Analyses were conducted to test the assumption of homogeneity of the within group regression slopes. ANCOVAs were conducted with an interaction term between the covariate (baseline scores) and the group levels at the .10 level of significance. No significant covariate by group interaction was found (see Table 4.12). ANCOVAs were subsequently run with the number of quit attempts at posttest and 6-month follow-up with the baseline measure as the covariate due to the assumptions being met. The results of these analyses are summarized in Table 4.13.

Table 4.12

ANCOVA Results for the Assumption of Homogeneity-of-Slope for Quit Attempts

Source of variation	df	MS	F value
Posttest			
Quit Attempts 1	1	2503.56	25.00**
Group	1	53.72	.53
Quit Attempts 1 X Group	1	144.52	1.41
Error	39	102.21	
Total	43		
6-month Posttest			
Quit Attempts 1	1	959.51	5.54
Group	1	264.07	.22
Quit Attempts 1 X Group	1	199.78	.29
Error	44	173.30	
Total	48		

Note: The "1" refers to measurements taken at baseline.
**$p < .01$.

Table 4.13

ANCOVA Summary Table for Number of Quit Attempts

Source of variation	df	MS	F value
Posttest			
Quit Attempts 1	1	2368.44	22.94**
Group	1	29.74	.28
Error	40	103.27	
Total	43		
6-month Posttest			
Quit Attempts 1	1	1240.27	7.13**
Group	1	64.32	.37
Error	45	173.89	
Total	48		

Note: The "1" refers to measurements taken at baseline.

The results indicated that the baseline measure of quit attempts was a significant predictors of the number of quit attempts at posttest and at 6-month follow-up. At posttest, participants in the intervention group reported slightly more quit attempts (adjusted mean = 22.94) than did the control group (adjusted mean = 21.25). Similarly, at 6-month follow-up, participants in the intervention group reported more quit attempts (adjusted mean = 25.71) than did the control group (adjusted mean = 23.39). There were no statistically significant differences in the number of quit attempts between the intervention and the control groups at posttest and 6-months follow-up.

Hypothesis 5: The intervention group will have a higher proportion of quitters (quit rate) than the control group at posttest. Hypothesis 6: The intervention group will have a higher proportion of quitters (quit rate) than the control group at 6-month follow-up. Chi-square tests for independent samples were used to assess the differences in

proportions for these hypotheses. The significance level was set at $\alpha = .05$. An intention to treat analysis was employed to control for potential bias due to participants who are more likely to fail leaving the study. Non-respondents for each assessment period were considered smokers.

At posttest, 14.3% of participants in the intervention group reported quitting smoking compared to 22.9% in the control group (see Table 4.14). However, at 6-month follow-up, 25.7% of participants in the intervention group reported quitting compared to 17.1% in the control group. The proportion of quitters at posttest $\chi^2(1) = .85$, $\underline{p} = .36$ and at 6-month follow-up $\chi^2(1) = .76$, $\underline{p} == .38$ did not differ significantly between the intervention and control groups. Another measure of smoking cessation is the odds ratio (number of quitters/number of quitters and smokers in the program). The odds ratio for quitting of the intervention over the control group was .56 at posttest and 1.67 at 6-month follow-up.

Table 4.14

Proportion of Quitters at Posttest and 6-Month Follow-up by Group

	Posttest		6-Month	
Group	Smoker	Quitter	Smoker	Quitter
Control	27 (77.1%)	8 (22.9%)	29 (82.9%)	6 (17.1%)
Intervention	30 (85.7%)	5 (14.3%)	26 (74.3%)	9 (25.7%)

Research Question 2

The purpose of Research Question 2 was to assess differences between the intervention and control groups in forward stage of quitting movement, self-efficacy and attitudes toward smoking at posttest.

Hypothesis 7: The intervention group will have a higher proportion of smokers moving forward in stage of readiness to quit than the control group at posttest. Chi-square tests for independent samples were used to assess the differences in proportions between the groups for these hypotheses. The significance level was set at $\alpha = .05$. Non-respondents were categorized as having no forward movement in their stage of readiness to quit.

At posttest, 28.6% of participants in the intervention group reported moving forward in their stage of change compared to 42.9% in the control group (see Table 4.15). No significant association was found for proportion of participants reporting forward stage movement at posttest and group $\chi^2(1) = 1.56$, $p = .21$.

Table 4.15

Proportion of Participants Moving Forward in Stage of Change at Posttest by Group

Group	No Movement	Forward Movement
Control	20 (57.1%)	15 (42.9%)
Intervention	25 (71.4%)	10 (28.6%)

Table 4.16

Stage of Change Distribution at Three Assessments by Group

	Intervention					Control					Total				
Assessment	N	PC	C	P	A[a]	N	PC	C	P	A	N	PC	C	P	A
Baseline	35	0%	71.4%	28.6%	--	35	0%	65.7%	34.3%	--	70	0%	68.6%	28.6%	--
Posttest	19	0%	33.3%	38.9%	27.8%	24	0%	33.3%	33.3%	33.3%	43	0%	33.3%	35.7%	31.0%
6-month follow-up	23	0%	52.2%	8.7%	39.1%	25	4.0%	48.0%	24.0%	24.0%	48	2.1%	50.0%	16.7%	31.3%

Note. PC = Precontemplation (not thinking about quitting). C = Contemplation (thinking about quitting in the next 6 months). P = Preparation (thinking about quitting in the next 30 days). A = Action (having quit). [a]No cases possible because of smoking status at baseline.

Table 4.16 shows the stage distribution of the groups at each assessment period. The control group has more participants in the action stage at posttest than the intervention group (33.3% versus 27.8%). However, the effects of the intervention increase the proportion of participants in the action stage (39.1%) for the intervention group at 6-month follow-up, while the proportion of participants in the control group diminishes (24.0%).

Hypothesis 8: Self-efficacy will increase more in the intervention group than the control group at posttest. A one-way ANOVA was performed to address this hypothesis. The significance level was set at $\alpha = .05$.

Examination of descriptive statistics, histograms, and scatter plots showed that the distribution of self-efficacy at posttest was non-normal. A non-parametric procedure was then used to test for group differences. Results of the Kruskal Wallis test are reported in Table 4.17. The participants reported similar self-efficacy for not smoking in the intervention group (mean = 28.2, SD = 10.4, 3.13 on a 5-point scale) and in the control group (mean = 28.0, SD = 8.3, 3.11 on a 5-point scale). No significant difference was found for self-efficacy between the groups.

Table 4.17

Kruskal Wallis tests of Self Efficacy (n = 43)

	df	H-value	p
Self-efficacy	1	.02	.89

The following hypotheses assessed whether the intervention and control group differed in attitudes toward smoking. Hypothesis 9: The intervention group will more strongly agree to the adverse effects of smoking as compared to the control group. Hypothesis 10: The intervention group will less strongly agree to the benefits of smoking as compared to the control group. Hypothesis 11: The intervention group will less strongly agree to the pleasure of smoking as compared to the control group. Kruskal Wallis tests were performed to test these hypotheses. The significance level was set at $\alpha = .05$. No significant differences were found between the groups for adverse effects of smoking, psychoactive benefits of smoking, and pleasure of smoking (Table 4.18). At posttest averages were 4.46 on a 5-point scale versus 4.57 for the adverse effects, 3.20 versus 4.00 for benefits of smoking, and 3.53 versus 3.70 for pleasure of smoking for the intervention and control groups, respectively.

Table 4.18

Kruskal Wallis Tests of Attitudes Toward Smoking (n = 43)

Construct	df	H-value	p
Adverse effects	1	.76	.38
Benefits of smoking	1	.62	.43
Pleasure of smoking	1	.92	.34

Additional Analyses

Other analyses were conducted to learn more about the primary outcome measures because there were no significant differences between the intervention and control groups at posttest and 6-month follow-up. The researcher first examined differences within the intervention group on the interval level outcome variables between the different assessments by conducting paired-t tests. There were significant differences in self-efficacy to not smoke and attitudes about the negative effects of smoking between baseline and posttest for the intervention group. The paired t-test results are presented in Table 4.19. The quit rate for the intervention group was 14.3% at posttest. Chi-square analyses for differences in proportions of quitters and participants moving forward in stages of change at posttest and 6-month follow-up were conducted. There was a significant difference in quit rate at posttest and 6-month follow-up χ^2 (1) = 8.99, $\underline{p}$ = .003. There was no difference proportion of participants with forward stage movement within the intervention group between the two time periods χ^2 (1) = .42, $\underline{p}$ = .52.

Table 4.19

Paired T-test Results for the Intervention Group on Interval Level Outcomes

Variables	Mean Difference	S.D.	t-value	df
Cigarettes smoked per day				
Baseline-posttest	2.79	8.74	1.39	18
Posttest-6 month follow-up	1.00	4.84	.83	15
Number of 24-hr quit attempts				
Baseline-posttest	1.05	8.28	.55	18
Posttest-6 month follow-up	-10.31	45.90	-.90	15
Self-efficacy				
Baseline-posttest	8.26	12.84	2.80*	18
Adverse effects (ATS-18)				
Baseline-posttest	-3.57	4.40	-3.55**	18
Benefits of smoking (ATS-18)				
Baseline-posttest	.11	3.25	.14	18
Pleasure of smoking (ATS-18)				
Baseline-posttest	-.63	2.27	-1.21	18

Note: *$p < .05$. **$p < .01$.

The researcher also analyzed the primary outcome measures of quitting, forward stage movement, and number of cigarettes smoked in the past 24 hours to determine the characteristics of participants in the intervention who change as hypothesized. The measures were transformed into Z scores to examine those who were 1 standard deviation from the mean for their characteristics. Examination of those who reported quitting, moving forward in stages of change, and smoking less in the last 24 hours was also conducted. For participants who reported quitting, they were likely to be lower classman,

were male, were 18 to 20 years old, had higher self-efficacy, and reported less positive agreement with the benefits of smoking. For participants who reported moving forward in their stage of change, they were more likely to be upper classman, were 18 to 21 year olds, reported smoking less in the last 24 hours, had higher self-efficacy, and reported more positive agreement with the adverse effects of smoking. For fewer number of cigarettes smoked in the past 24 hours, they were more likely to be seniors, be 20 to 22 years old, reported more positive agreement with the adverse effects of smoking, and reported less positive agreement with the benefits of smoking. This information should be reviewed with caution because of the small sample.

Dose is reported to play a role in successful cessation (Botvin, Epstin, & Botvin, 1998). Differences between participants in the intervention group receiving a low versus high dose of the intervention were compared on the outcome variables. The number of sessions attended from 1-4 was recoded into 2 categorical variables of 1=0 to 2 sessions and 2 = 3 to 4 sessions. There was a significant association between proportion of participants reporting forward stage movement between precontemplation to preparation at posttest and sessions attended, $\chi^2 (1) = 6.49$, $\underline{p} = .01$.

Process Evaluation

The purpose of this analysis was to determine the acceptability of a web-based health intervention. The Research Question 3 was answered by conducting a process evaluation of the intervention. The process evaluation assessed: 1) use of the intervention 2) the acceptability of the *Kick It!* program, 3) the strengths and weaknesses of the program. Thirty-two participants (45.7% of the total participants) completed the process

evaluation via an online survey administered at the posttest. Seventeen were from the intervention group and 15 were from the control group. Six participants from the intervention group were also interviewed to receive their opinions of the program after its completion.

Use

Table 4.20 presents the use of the program based on participants' responses. Ninety-four percent of the 17 students in the intervention group participated in the 4 sessions with a range of 2 to 4 sessions. They read 86.3% of the web session content. Students reported reading the text (94.1%), taking quizzes (88.2%), and using the quitting resources link page (64.7%) as the top web activities (Table 4.21). These same web components were rated higher in value to the students than other activities. The activity that was used the least was ask-the-expert. Furthermore, the use of the other social support components of the discussion board and personal stories was very low. Eighty-six percent of the 15 students in the control group attended the 4 sessions with a range of 3 to 4 sessions. They read almost 100% of the content.

Table 4.20

Participants' Reported Use (n=32)

	Intervention (n=17)	Control (n=15)
Number of web sessions attended, n (%)		
2	1 (5.9)	
3	-	2 (13.3)
4	16 (94.1)	13 (86.7)
Percentage read, mean (SD)	86.3 (14.4)	99.5 (1.4)

Table 4.21

Participation in Intervention Activities and Value of Activities

	Participation n (%)	Value[a] mean (SD)
Text	16 (94.1)	3.6 (0.5)
Quizzes	15 (88.2)	3.4 (0.6)
Quitting Resources	11 (64.7)	3.1 (0.9)
Personal stories	4 (23.5)	2.8 (1.1)
Ask the Expert	1 (5.9)	2.8 (1.0)
Discussion boards	4 (23.5)	2.7 (0.8)
Q&A	5 (29.4)	2.4 (0.8)
Top Ten Reasons Contest	6 (35.3)	2.3 (1.1)

Note: [a]Response choices are 1=not valuable at all, 2=not very valuable, 3=somewhat valuable, 4=very valuable.

Acceptability

Generally, participants in the intervention group rated the *Kick It!* program positively on every components with the highest component as personal relevance on the process evaluation survey (Table 4.22). On a scale ranging from 1 to 4 with 4 indicating a more positive rating, participants found the program somewhat useful, interesting, valuable, and personally relevant. The ratings of the participants in the control group were virtually identical. Independent t-tests found no significant differences on the acceptability measures between the two groups. The majority of the intervention group (94.1%) and the control group (93.3%) reported that they consider participating in more web-based programs.

Table 4.22

Acceptability of the *Kick It!* Program

	Intervention mean, (SD)	Control mean, (SD)
Useful	3.2 (0.7)	3.2 (0.4)
Interesting	2.9 (0.9)	3.0 (0.9)
Valuable	3.2 (0.8)	3.2 (0.7)
Personally Relevant	3.4 (0.6)	3.5 (0.6)

Note: Responses choices are 1=not at all, 2=not very, 3=somewhat, 4=very.

Strengths

Participants in the intervention group gave mostly positive feedback about the program. One person said, "Thanks to your program, I quit smoking." Many participants indicated the ease of the program on the online survey: "the ease of the Internet instead of another method," "hassle free and informative," and "that I was able to try things at my own pace." An interviewee stated about the web-based program,

> it's less paperwork to keep track of. It's convenient and it doesn't take much time…it's not like you have to go somewhere and meet with a bunch of people or meet up with the whole group and everybody…your schedules don't have to coincide to participate…that is really good.

Another interviewee stressed the asset of the private nature of the program, saying,

> more people would do the online, just because a lot of people are shy, or you wouldn't get as much out of them. As far as this, it is confidential, pretty much, you know. You are not like saying it in front of 69 other people.

Some commented about the cue-to-action for quitting that the program offered on the online survey: "the constant reminders of goals and benefit of quitting," "text information really hit home. I could identify with many of the things said there," and "it kept reminding me that I was really seriously trying to quit smoking since a new session would start every few days." An interviewee also commented about the consciousness-raising within the program, saying, "Yea, I really like this stuff. Advantages to being smoke free and why…it really makes you think…you want to think about it, then you have to think in depth and think about a log and go more into the topic." Many interviewees felt the length of the program and the number of sessions was appropriate.

Comments from the online survey also focused on the value of the program components in terms of it being informative and relevant to them. The parts they enjoyed most were "the good tips" and "the quizzes." Many echoed the thought that "it [the program] was very informative." One participant also said, "I liked how the web pages were customed to college students."

Many participants mentioned the interactive components of the program. An interviewee commented about the interactivity saying,

> the immediate feedback, once we took the amount of cravings…all you had to do was to hit "submit" and it came up automatically. That was really good. I think that more things like that that have an immediate response…would be a good thing.

Another interviewee remarked,

> I liked how it structured it out into really making goals for yourself and also making lists and making you realize what is going to be involved in quitting as far as thing like…what are times it is most difficult not to smoke...like being with friends…So, it really makes you think about the tough times…I like that.

Only a few comments were made about the social support aspects. One participant remarked, "I really liked the way there was an open forum for people to discuss aspects of their smoking habits."

Weaknesses

Participants described what they like least about the program. The factors revolved around repetition of the content, technical issues, and availability of previous session. On the online survey, participants said, "the sessions seemed very repetitive," "when the web pages would not load," and "some of the questions seemed irrelevant," and "the sessions were not available throughout the entire program." Many comments were made about the repetition of the look, information presented, and survey questions in both the posttest and interviews.

Some suggestions for components to add was social support in person with other participants and a more personalized system. One interviewee suggested adding a social support component where participants interacted, saying "…I know there is advice and stuff about that, but like getting together or getting in touch with your peers that are in the program…Like, if you are interested in talking to somebody else in the program who is going through it, then maybe you could fill out something." Another interviewee spoke to a more individualized program, stating, "if the site could progress with your own

progress, then that would be more beneficial. It just seemed like, by the time you were at the fourth session, it was just like the first one…and the site doesn't change with you."

Additionally, some participants recommended changes to the program mostly in terms of format and content on the online survey. The suggestions were: "make each session cover new material and ask different questions," "more info," "different types of sessions," and "more attractive design – 'eye candy' - get the important stuff in BIG print so that I am attracted to read what I need to know and will pick up the rest as I skim the page." One interviewee wanted web sessions with more pages, saying, "it might have look better if it were spread out over a couple of different pages. Like if the first page told you a little, then you hit 'Next' and it told you a little more…You will get more people to pay more attention to what they are reading."

Other Comments

Comments concerning other aspects of the program are presented next. The interviewees were asked about the social support aspects of the intervention because their usage was very low. Time and interest seem to be the reason that many of them did not use these aspects of the program. One participant remarked, "I wasn't willing to spend that much time on the Internet to actually go to the discussion board." One interviewee spoke to needing information and images to make smoking really unattractive, saying "…put in really graphic stuff…like this is happening to your body because it is really disgusting…and that is what's happening every time you pick up a cigarette…"

Interviewees were also probed about the use of other media, such as video and audio files to possibly make the sessions more attractive and maintain participants across sessions. Some participants thought it was good to include short videos like testimonials;

however, one interviewee spoke to the difficulties of receiving it saying, "if there is any sort of major media incorporated into it [the program], it can be difficult. On campus, that's the thing, if I am on campus and do it, you can't hear anything." Again, most said that they like having a web-based health program as an option over the group programs.

Summary of Results

Seventy University of Georgia undergraduate and graduate students participated in the *Kick It!* intervention study. Most used the Internet daily (65.7%), 30.0% used it almost every day, and 4.3% used it a few times a week. The majority of the participants were full-time students (95.7%), White (92.9%), female (62.9%), and Juniors (30.0%) and Seniors (34.3%). The intervention and control groups were not significantly different at baseline with respect to the demographic variables and outcome measures. Survey non-respondents at posttest and 6-month follow-up had similar baseline values on demographic variable and outcome measures to those of respondents.

The reliability of the self-efficacy and attitudes towards smoking scales were calculated for the baseline sample. Both measures had Cronbach's alpha coefficients of .70 or higher.

The three research questions of this study were: 1) Are there differences between the intervention and control groups in number of cigarettes smoked, quit attempts, and quitters at post-intervention assessments for smokers moving from the preparation stage of quitting to action? 2) Are there differences between the treatment and control groups in forward stage of quitting movement, self-efficacy, and attitudes toward smoking at posttest? 3) How was the web-based intervention received by the participants? Results of

the statistical tests found no significant statistical differences between the groups on any of the outcome measures. However, participants in the intervention group did report lower number of cigarettes smoked and quit attempts between posttest and 6-month follow-up after adjusting for baseline scores and a greater quit rate at 6-month follow-up. They also had greater proportion in the action stage than the control group at 6-month follow-up. Within the intervention group, there were significant differences in self-efficacy and attitudes about adverse effects of smoking between the baseline and posttest assessments. The group also had a significant difference in proportion of quitters between the posttest and 6-month follow-up. The effects of quit rate and quitters in action persisted to the 6-month follow-up for the intervention group. There was a dosage effect for stage of change movement in which participants who attended more sessions reported more forward stage movement.

The web-based intervention was generally well-received. The majority of 17 participants in the intervention group (94%) who completed the process evaluation attended all four web-based sessions and read almost all of the material. They also rated the intervention high on usefulness, interest, value, and personal relevance. Generally, they like the program because it was easy to do and convenient, provided a cue to action to quitting, had interactive components, and sustained their interest in terms of length and content. Some weaknesses were the repetition of information and layout issues.

CHAPTER 5

DISCUSSION AND RECOMMENDATIONS

This chapter presents the discussions, conclusions, and recommendations for future research on the topic for the study. In the first section, the findings and conclusions of the study are discussed. Limitations of the study are presented. The final section describes recommendations for future research based on the results from this present study.

Summary

Few smoking cessation studies for adolescents have been implemented and evaluated. Successful interventions to increase cessation among young adults are needed. The purpose of this study was to assess the efficacy of a web-based smoking cessation program with the college population. The intervention and control groups were compared on six outcome variables: number of cigarettes smoked per day, number of 24-hour quit attempts, quit rate, forward stages of change movement, self-efficacy and attitudes toward smoking. The results of the analysis revealed no significant differences between the groups on these outcome measures. Therefore, the intervention group did not report significantly more reducing smoking, making quit attempts, or making changes in attitudes about smoking than the control group. However, there were differences between groups on several outcome variables that although, not significant, indicate a

slight intervention effect, including number of cigarettes smoked and 24-hr quit attempts. There were also baseline and posttest differences within the intervention group on self-efficacy and attitudes toward adverse effects of smoking. This research is the first known study to evaluate the efficacy of a web-based smoking cessation intervention.

Discussion

Effectiveness of Web-based Intervention

The results indicate that the *Kick It!* intervention did not significantly affect number of cigarettes smoked, number of quit attempts, smoking rates, forward stages of change movement or attitudes towards smoking as compared to the control group. However, the participants in the *Kick It!* program did benefit from the intervention in several ways in that they had decreased levels of smoking, increased number of 24-hour quit attempts, reported quitting at posttest and 6-month follow-up, had increased self-efficacy not to smoke, and more strongly agreed with the adverse effects of smoking. The lack of differences between groups may be due to the small sample size. Power calculation to detect differences between the groups on the primary outcome of quit rate indicated that 71 participants were needed per group, while this study had only half as much at each assessment period. Consequently, a study with an adequate size may have found a significant difference between the groups.

The effect size (quit rate of experimental minus control) of the *Kick It!* program was -8.6% at posttest as compared to 14% in Sussman et al. (2001), 25% in Weissman et al. (1987), and 42% in Adelman et al. (2001). At 6-month follow-up, the program had an increased intervention effect size of 8.6%. This effect size was comparable 9% found by

Sussman et al. (2001) and higher than the 0.9% reported by Aveyard et al. (1999). The quit ratio was 1.67 at posttest; this ratio was lower that the ratios of 4.33 and 2.36 reported by studies consisting 8- sessions school-based, programs (Adelman et al, 2001; Sussman et al., 2001). However, it was higher than the ratio of 1.08 found in a Transtheoretical Model computer and class program (Aveyard et al., 1999).

Participation in the *Kick It!* program was relatively limited. Despite multiple recruitment strategies and an extended recruitment period, numbers of students registering for the program was low. Other studies have similarly found difficulties in recruiting adolescents to smoking interventions (Sussman et al., 1995; McCormick et al., 1999; Sussman et al., 1999). One explanation is that generally the college years are associated with individuals engaging in more risk behaviors due to having more independence and social influences. Consequently, few students are trying to stop behaviors such as smoking. Other possible reasons are issues related to the recruitment of participants. First, the recruitment appeal may have been ineffective. Perhaps a variety of messages to get the attention of adolescent smokers should be pilot-tested and used. Second, the recruitment period may have been too short. These findings suggest that health professionals planning for smoking cessation programs should invest more research into participant recruitment and extend the recruitment period.

Overall, participation in the study was higher for Juniors and Seniors. This is probably due to the fact that juniors and seniors are closer to assuming more adult roles. This may suggest that college smokers who perceive themselves as making the transition to adulthood are more likely to consider quitting. This may have implications for targeting such students specifically for smoking cessation programs. Research shows that

smokers with more social roles are more likely to make quit attempts as implied by the role socialization theory (Rose et al., 1996).

The results of this study support previous research indicating that college students begin smoking before 18 years (USDHHS, 1994; Moskal et al., 1999). Most of smokers started smoking at 15 years of age. The average number of cigarettes smoked per day was 9; the median was 6. Therefore, over 50% of the participants reported smoking at least half a pack of cigarettes per day. These data stress the importance of intervening with this population before they become addicted.

The results of decrease in the number of cigarettes smoked per day by intervention participants were expected. The intervention group reported a lower mean number of cigarettes smoked per day at posttest and 6-month follow-up than did the control group. This is consistent with other studies that employed a psychosocial intervention (Perry et al., 1980; Prince, 1995). In lieu of participants' quitting, smoking fewer cigarettes is an effective step in harm reduction and may be a valid outcome measure as a precursor to cessation. This finding demonstrates that the intervention does have an effect on participants' smoking intake.

Both intervention and control groups had increased number of 24-hour quit attempts. The range of quit attempts was wider with the posttest and 6-month follow-up. A reason for the increase in both groups is that the web pages with quitting messages (intervention: interactive, stage-matched, social support versus control: generic messages) served as cues to action or reminders for the smokers to consider quitting and therefore, they made quit attempts more frequently in the midst of the program. This is indicative of the finding that an estimated 30% of participants in both groups moved forward in

their stage of change at posttest; therefore, they are considering quitting sooner and trying more to stop smoking. Another reason for the increase in quit attempts may be the effects of pretesting, which could have sensitized the participants in the control group to the study and made them more aware of the responses that the researcher wanted. Therefore, a web-based system may offer an effective medium to promote quit attempts among college smokers.

The results for the quit rate for the intervention group at posttest and follow-up is in agreement with previous research. The quit rate for the intervention group was 14.3% at posttest and 25.7% at 6-month follow-up. The results are consistent with other smoking cessation interventions. Viswesvaran & Schmidt (1992) found a 15% effectiveness rate of other self-care programs at posttest in a meta-analysis. Sussman et al. (1998) found a mean quit rate for posttest of 20.7% across 12 reviewed cessation studies. Pallonen et al. (1998) found 14 to 20% quit rates among adolescents at immediate posttest and 6% at 6-month follow-up; similarly Colby et al. (1998) found a 20% quit rate with motivational interviews. Moreover, the quit rate of 25.7% at 6-month follow-up in the intervention group was higher than the 13% found at three to six-month follow-up across other adolescent cessation studies (Sussman et al., 1999). The increased quit rate at the follow-up is consistent with adult expert systems that employed the Transtheoretical Model of Change (Prochaska et al., 1993, 1994). The finding of an increased percentage of quitters at 6-month follow-up in the intervention group may imply that the program has lasting effects. These results suggest that the effects of a web-based intervention are at least comparable to other self-help programs and may offer a medium for health education that participants may desire. They also indicate that

researchers should develop interventions with more follow-up assessments to determine its true effects.

This study found no difference between the groups on proportion of quitters. Aveyard et al. (1999; 2001) similarly found no significant difference on quitting between a computer-based expert system based on the Transtheoretical Model of Change and a generic health education curriculum for adolescents. It is possible that an intervention based on the theories employed in the study is not as effective as other interventions or that this intervention does not incorporate all aspects of quitting to assist smokers to quit. Interventions that address additional factors such as social influences and the environment (e.g., smoking policies) may have a greater impact on cessation (Everett et al., 1999; Wechsler et al., 2001).

Stage movement has been widely employed as an intermediate outcome to cessation in many studies that employ the Transtheoretical Model. The stage distribution of the total sample at baseline was 31% in Preparation and 69% in Contemplation. This same pattern was also found within the two groups. The stage distribution differs slightly from the adult sample with approximately 20% in the Preparation stage (Velicer et al., 1995). Approximately 30% of individuals reported forward movement in their stage of change in both groups; there was no significant difference between the groups. Within the intervention group, those who attended more sessions reported more stage movement in comparison to those attending fewer sessions. The intervention group also had a greater proportion of participants in the action stage at 6-month follow-up, indicating that the intervention may have a persistent effect. This means that a web-based smoking cessation intervention applying stage-matched messages may move people along in their

stage of change, particularly with greater exposure. However, the stage distribution in the study found variability in stage of change for the participants at the three assessment points. The use of an outcome of forward stage movement for smoking cessation in young adults may be invalid for adolescents because of the frequency of changes in their smoking patterns (Aveyard et al., 2001).

The study assumes that changes in self-efficacy and attitudes influence smoking cessation. Overall, both groups of smokers only reported being moderately confident to not smoke across tempting situations at posttest. It is very likely that college smokers lack confidence to overcome these temptations and that their environments make it difficult to quit smoking. There was a significant increase in self-efficacy not to smoke between the baseline and posttest within the intervention group, but no treatment effects were observed when these measures were compared to the control group. This has also been demonstrated with other studies with adolescents (Adelman, 2001). In contrast, one study found levels of temptation to remain unchanged after the intervention (Pallonen et al., 1998). This result suggests that the strategies and skills taught within smoking cessation programs can increase self-efficacy. However, the increase in self-efficacy was not remarkable based on the 50-point scale. Cessation interventions may have to incorporate more messages and strategies to assist smokers to build their situational confidence to not smoke.

The findings for attitudes toward smoking are that there is a significant increase in the adverse effects of smoking (Cons) and no difference in the benefits of smoking and pleasure of smoking (Pros) between the baseline and follow-up for both groups. These results suggest that offering smoking cessation messages raises smokers' awareness of

the negative consequences of smoking. The significant increase in the Cons of smoking is similar to another study that employed the Transtheoretical Model (Pallonen et al., 1998).

The process evaluation findings indicate that a web-based intervention incorporating multiple components is feasible and acceptable among college smokers. Other studies have found participants accept and are satisfied with a web-based intervention (McKay et al., 2001; Woodruff et al., 2001; Zabinski et al., 2001). Participants repeatedly spoke of the convenience of the web-based program in the process evaluation; therefore, the asynchronous nature of the program in which participants could participate at their own time was of great value to these college smokers. The acceptability of a web-based program was fairly high among all participants. Some participants in the intervention group reported that the web sessions were very useful in reminding them to think about quitting and that the messages were personally relevant. They especially liked the interactive components. Over 90% of all participants reported that they would participate in other web-based interventions. These findings suggest that the web is positively received by young adults as a medium for health education.

The use of the social support components in the intervention was very low. These components included discussion boards, personal stories, and ask-the-expert. Time and number of participants may be factors in promoting active sharing and posting to the discussion board and personal story areas. This finding of low participation in support areas of a web-based intervention is not unique to this study (McKay et al., 2001).

Use of online surveying found similar findings to previous studies. The attitudinal scales of self-efficacy and attitudes toward smoking demonstrated comparable

factor structure and reliabilities to those of paper versions (Stanton, 1998, Buchanan and Smith, 1999). The data collection conducted on the Internet was received faster than traditional paper surveys (Allie, 1995; Gaddis, 1998; Szabo & Frenkl, 1996). Using automated data collection reduced data entry time and entry errors (Buchanan & Smith, 1999).

This study demonstrates the feasibility of a web-based program in providing health education to young adults and the value of conducting a process evaluation. It also has provided other important lessons about Internet-based interventions. The advantages of this interactive technology are the ease and convenience of use anywhere with Internet access, automated data collection for all types of evaluation, the ability to make the intervention interactive, the ability to provide immediate feedback, and the ease of dissemination to a broad population. Many of these factors were reflected in the participants' qualitative responses. Particularly, these findings support other research that found that web-based technology can offer individuals access to information and support on demand (Harris, 1995), provide information tailored to particular characteristics of individuals (Robinson et al., 1998), and appeal to individuals based on their learning style by increasing use of different media such as text, audio and graphics (Harris, 1995). The practical applications of the qualitative finding are that these components of the Internet may make it a very useful medium to deliver behavior change messages and that participants enjoy the components.

Lack of Significant Differences Between Groups

There was a lack of significant differences between groups on the outcome measures. Potential reasons for the lack of effect are sample size of the study, dosage of the intervention, and theoretical framework of the program components.

One strong explanation for the lack of effects is the limited sample size. Because fewer participants than planned enrolled and were retained at the posttest, the study may be underpowered. Recruiting college students to participate was difficult despite the various recruitment strategies employed. This may be explained by the fact that the college years are known more for risk-taking behaviors than healthy behaviors. It also may be that many college students do not choose to participate because they consider themselves social smokers or not "heavy" smokers. Difficulties in recruitment for smoking cessation and lack of reach are consistent across smoking cessation studies (Sussman et. al, 1999). Another concern was attrition of participants at posttest and 6-month follow-up for both groups. The attrition rates were 31% and 46% at posttest and 29% and 35% at 6-month follow-up for the control and intervention group, respectively. This was slightly higher than a mean attrition of 23% found in a review of adolescent cessation studies (Sussman et. al, 1999). Research has documented the difficulties of recruiting and maintaining adolescents from the start of a study to the posttest (McCormick et al., 1999). However, based on comparisons of respondents and non-respondents, attrition appeared not to have biased the posttest findings in this study.

The role of the control group was to compare the intervention group to one that was receiving minimal theory-based, smoking cessation messages. However, the use of a comparison group that received generic smoking cessation messages may have also

contributed to the lack of differences between the two groups on outcome variables. The comparison group also had the same dose of four sessions as the intervention group, and as participation rates indicated, the majority attended most of the sessions as reported in the process evaluation results. If the study design employed a true control group that received no information, the intervention effects may have been stronger.

Another possible explanation is that the intervention dose may be too minimal in terms of sessions and/or length. There were four sessions that lasted roughly 20-30 minutes over eight weeks. Thus, this program may not have been potent enough to change smoking outcomes significantly because it was minimal and brief. Some traditional smoking cessation programs have been longer at each session. Researchers also have suggested that a longer program (Botvin, Epstin, & Botvin, 1998), more intense programs, and several sessions lasting for more than 10 minutes (Rennard & Daughton, 2000) may be more effective in successful cessation. In addition, booster sessions may also be employed to deliver more health messages to increase behavior change (Botvin, Epstin, & Botvin, 1998). With the web-based format, perhaps more emails with intervention messages may be sent to participants in-between sessions.

Another explanation for the lack of intervention effects is that that a psychosocial intervention for smoking cessation may not be as effective without employing a pharmacological substance to assist with nicotine dependence. Adolescents have demonstrated nicotine dependence and withdrawal similar to adults (USDHHS, 1991; Rojas et al., 1998). The Clinical Practice Guidelines for Smoking Cessation (USDHHS, 1996) recommends that moderate to heavy smokers receive some time type of pharmacotherapies to assist people who are attempting to quit smoking to promote long-

term abstinence because they are more likely to be dependent on nicotine. These therapies include nicotine replacement therapies such as the gum, patch or buproion. Hurt et al. (1999) has found that biopsychosoical interventions may be successful for adolescents. This intervention may have had an increased intervention effect if pharmacotherapies were given to participants who were heavy smokers.

One final additional explanation may that the theoretical approaches for the intervention are not comprehensive enough to impact quitting. The primary theoretical framework was the Transtheoretical Model of Change in which participants received messages and strategies matched to their stage of change (not thinking about quitting, considering it, and considering it in the immediate future). Young smokers often cycle through smoking with periods of abstinence or occasional smoking. Therefore, a stages of change measure may not be a valid outcome of cessation in adolescents (Aveyard et al, 2001). The theory of social support was the basis for discussion boards, personal stories, and ask-the-expert components. These theories may not be comprehensive enough to achieve behavior change in that their concepts may not address factors that impact smoking, such as the participant's external environment, social influences, stress reduction, coping skills, or addiction and recovery methods. Perhaps a more comprehensive intervention with components from other theories that address these factors may have a larger impact on smoking outcomes.

Conclusions

This study is the first to examine the feasibility of a web-based smoking cessation intervention on cessation outcome measures. While the intervention group did not

significantly differ from the control group at posttest on number of cigarette smoked in the past 24 hours, number of 24-hour quit attempts, quit rate, forward stage of change movement, self-efficacy and attitudes toward smoking, participants in the intervention group did report lower number of cigarettes smoked at both post-intervention assessments and a greater quit rate at 6-month follow-up than the intervention group. They also had an increase in self-efficacy from the baseline to the posttest. The efficacy of the web-based intervention was difficult to assess due to the low power for detecting group differences because of the small sample size. Among the intervention participants, those who attended more sessions derived significantly greater benefits in terms of forward stage movement at posttest and 6-month follow-up.

The participants rated the web-based intervention as highly personally relevant and somewhat useful, valuable and interesting. Most would consider participating in more web-based programs for behavior change.

This study may be more of a test of the feasibility of a web-based smoking cessation study than a true test of the efficacy of an Internet intervention. Although the limited sample size may prohibit drawing conclusions on the efficacy of the Internet for smoking cessation, web-based interventions may hold promise as a medium for behavior change based on the results of this study.

Study Limitations

Several study limitations should be taken into consideration in interpreting the results. Because students self-reported data on smoking status and amount of cigarettes smoked, it is not possible to determine the validity of their responses. For example,

students who reported smoking and quitting were not assessed with a biochemical test. To insure greater validity of data reporting, however, students were assured of the confidentiality of their data and asked to potentially take a biochemical test (bogus pipeline procedure) at the post-intervention assessment. There is a debate in the research literature on whether biochemical validation is applicable to adolescents because their bodies may metabolize nicotine in a different manner than adults (Sussman et al., 1999) and the validity scores are questionable (Stacy et al., 1990). However, Stanton et al. (1996) examined methodological issues in smoking research and suggested that "information obtained from these adolescents was found to be reliable, having high internal consistency and valid" (p. 1712).

Another potential threat to internal validity is attrition. The attrition rate was high for the intervention group, despite several strategies undertaken to reduce attrition. The researcher attempted to reduce attrition by recruiting many students to participate through several different advertising channels. Students also received small monetary incentives for participation. Because fewer participants enrolled and were retained at the posttest, the study may be underpowered.

Diffusion of treatments or contamination is another potential problem because the students are in the same campus community and may communicate with each other about the program (Cook & Campbell, 1979). To reduce this problem, some health information through web pages was provided to the control group as well so that both groups received some cessation information. The impact of offering information about smoking cessation to participants in the control group may have lead to their reducing or quitting smoking.

Implications of the Study

The research on successful smoking cessation interventions for young adults is limited and has shown varied success in the past (Adelman et al., 2001; Aveyard et al., 2001; Aveyard et al., 1999; Loctecka & MacWhinney, 1983; Perry et al., 1980, 1983; Prince, 1995; Pallonen et al., 1998; Townsend et al., 1991; Weissman et al., 1987). While most of the cessation studies for adolescents have been focused on the school or clinical setting, it is important to examine whether a program based on the Internet and accessed at the convenience of the participant would promote smoking cessation among young adults. The present study supports previous research that educational self-help materials impact numbers of cigarettes smoking, smoking cessation, stages of change movement, self-efficacy, and attitudes about the adverse effects of smoking.

This study provides evidence that cessation interventions for young adults need to educate them about the adverse effects of smoking and increase skill-building to help them quit smoking to address issues of self-efficacy. The concept of social support was introduced as a potential component to promote quitting smoking. The process data found that study participants utilized this component the least and found it least useful. This component should be studied further to determine if adolescents desire it and how it may play a role in cessation. The study also found that the web-based intervention was acceptable and valued by the participants. Despite the nonsignificant findings between the intervention and control groups, this study did find changes in the intervention group on smoking outcomes. Because college students are comfortable with the Internet and do not generally participate in traditional smoking cessation programs, the Internet as a medium for behavior change should be further explored.

Recommendations for Future Research

This study is the first to assess the impact of web-based smoking cessation intervention and fills a gap in the cessation literature regarding smoking cessation programs for young adults. However, to fully evaluate the effectiveness of a smoking cessation intervention, several recommendations for future research are discussed in the following section.

The replication of the study with a larger sample of the college population and other populations who may benefit from a smoking cessation program is needed. Because of the small sample size for this randomized control trial, the researcher was limited in drawing conclusions about the effectiveness of the intervention for this population. It is also important to assess if the results are similar for other populations. The demographic characteristics of this sample limit the generalizability of the study because it does not include participation among other minority groups in large percentages and different groups of young adults such as those from technical colleges or those not in college. The small sample size may have also limited the use of the online discussion boards and personal stories components of the Internet. A large number of participants may be required to reach critical mass for active and vibrant support among each other (McKay et al., 2001).

This study should also be replicated with the addition of varying comparison groups. There may be informative results if the study design includes a true control condition in which the participants receive no smoking cessation materials. In addition, researchers could also add conditions that vary in length to determine what dosage may best impact smoking cessation outcomes. Longer programs may be more effective in

producing a lasting reduction in smoking (Botvin, Epstin, & Botvin, 1998) and should be tested with this Internet medium. The current design compares the effectiveness of the intervention to another group receiving some smoking cessation messages. It may be instructive to have more treatment and comparison groups to test whether there are differential effects with varying levels of intervention.

Future web-based smoking cessation interventions should incorporate more tailored messages and strategies to test the impact of the program. While this program presented stages of change-matched messages, tailoring to other factors such as each participant's demographics and smoking history may enhance the effectiveness of the program. Programs that have used intervention materials tailored to characteristics of the participants (e.g., gender, behavioral history) have been found to be effective in behavior change (Prochaska et al., 1993, 1994). This aspect of increased tailoring should be explored to incorporate more personally relevant messages for all participants.

The role of self-efficacy and social support in web-based health intervention needs more refinement in future studies. Within this study, methods were used to build strategies to bolster participants' self-efficacy and social support with little success. More research could determine whether the Internet could serve more as a diagnostic tool for measuring self-efficacy than a method in delivering strategies to increase participant's self-confidence. It would be valuable to explore whether these constructs can be incorporated effectively in a web-based medium.

Future research should also explore methods to enhance the use of key intervention components on the web and to maintain use of the program web site over time. In this study, there were some participants who attended less than two of the four

sessions. In addition, many of the social support components were used by less than twenty-five percent of the participants. It may be informative to study what factors are barriers to attendance of web-based programs and what strategies would increase the appeal of the intervention components to participants.

Finally, future research should test the effectiveness of a web-based intervention which supplements other smoking cessation strategies, such as routine advice from a primary care doctor or health professional or use of a pharmacological agent. Web-based messages and strategies may compliment these other cessation methods to increase the likelihood of quitting.

REFERENCES

Adelman, W. P., Duggan, A. K., Hauptman, P., & Joeffe, A. (2001). Effectiveness of a high school smoking cessation program. *Pediatrics, 107(4),* 1-8.

Ahluwalia, J. S., Resnicow, K., & Clark, W. S. (1998). Knowledge about smoking, reasons for smoking, and reasons for wishing to quit in inner city African Americans. *Ethnicity & Disease, 8,* 385-393.

Ajzen, I. (1988). *Attitudes, personality, and behavior.* Buckingham: Open University Press.

Allie, D. A. (1995). The internet and research: Explanation and resources. *Journal of Mind and Behavior, 16(4),* 339-367.

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: American Psychiatric Association.

American Cancer Society. (1998). *A resource guide to youth tobacco cessation programs.* Atlanta, GA: American Cancer Society.

Ary, D., Jacobs, L. C., & Razavieh, A. (1996). *Introduction to research in education* (5th ed.). Forth Worth, TX: Harcourt Brace College Publishers.

Aveyard, P., Cheng, K. K., Almond, J., Sherratt, E., Lancashire, R., Lawrence, T., Griffin, C., & Evans, O. (1999). Clustered randomised controlled trial of expert system based on the transtheoretical ("stage of change") model for smoking prevention. *British Medical Journal, 319,* 948-953.

Aveyard, P., Sherratt, E., Almond, J., Lawrence, T., Lancashire, R., Griffin, C., & Cheng, K. K. (2001). The change-in-sage and updated smoking status results from a cluster-randomized trial of smoking prevention and cessation using the transtheoretical model among British adolescents. *Preventive Medicine, 33,* 313-324.

Bandura, A. (1977a). *Social learning theory.* Englewood Cliff, NJ: Prentice Hall.

Bandura, A. (1997b). The anatomy of stages of change. *American Journal of Health Promotion, 12(1),* 8-10.

Berkman, L. (1984). Assessing the physical health effects of social networks and social support. *Annual Review of Public Health, 5,* 413-432.

Black, D. R., & Babrow, A. S. (1991). Identification of campaign recruitment strategies for a stepped smoking cessation intervention for a college campus. *Health Education Quarterly, 18,* 235-248.

Black, D. R., Tobler, N. S., & Sciacca, J. P. (1998). Peer helping/involvement: An efficacious way to meet the challenge of reducing alcohol, tobacco, and other drug use among youth? *Journal of School Health, 68,* 87-93.

Borenstein, M., Rothstein, H., & Cohen, J. (1997). *Power and Precision Version 1.20* [Computer Program]. Teaneck, NJ: National Institute of Mental Health.

Borzekoski, D. L, & Rickert, V. I. (2000). Urban girls, internet use, and accessing health information. *Journal of Pediatric & Adolescent Gynecology, 13(2),* 94-95.

Borzekoski, D. L, & Rickert, V. I. (2001). Adolescent cybersurfing for health information: A new resource that crosses barriers. *Archives of Pediatrics & Adolescent Medicine, 155(7),* 813-817.

Bosworth, K., Espelage, D., DuBay, T., Dahlberg, L. L., & Daytner, G. (1996). Using multimedia to teach conflict-resolution skills to young adolescents. *American Journal of Prevention Medicine, 12(5),* 65-74.

Botvin, G. J., Epstein, J. A., & Botvin, E. M. (1998). Adolescent cigarette smoking: Prevalence, causes, and intervention approaches. *Adolescent Medicine, 9(2),* 299-313.

Brug, J., Steenhaus, I., van Assema, P., & de Vries, H. (1996). The impact of computer-tailored nutrition intervention. *Preventive Medicine, 25,* 236-242.

Brener, N. D., & Collins, J. L. (1998). Co-occurrence of health-risk behaviors among adolescents in the United States. *Journal of Adolescent Health, 22,* 209-213.

Buchanan, T., & Smith, J. L. (1999). Using the internet for psychological research: Personality testing on the World Wide Web. *British Journal of Psychology, 90,* 125-144.

Campbell, D. T., & Stanley, J. C. (1963). *Experimental and quasi-experimental designs for research.* Dallas, TX: Houghton Mifflin Company.

Campbell, M., DeVellis, B., Strecher, V., Ammerman, A., DeVellis, R., & Sandler, R. (1994). Improving dietary behaviour: the effectiveness of tailored messages in primary care settings. *American Journal of Public Health, 84,* 783-787.

Cassel, J. (1976). The contribution of the social environment to host resistance. *American Journal of Epidemiology, 104,* 107-123.

Celio, A. A., Winzelberg, A. J., Wilfley, D. E., Eppstein-Herald, D., Springer, E. A., Dev, P., & Taylor, C. B. (2000). Reducing risk factors for eating disorders: Comparison of an internet- and a classroom-delivered psychoeducatiol program. *Journal of Consulting and Clinical Psychology, 68(4),* 650-657.

Centers for Disease Control and Prevention. (1989). *Reducing the health consequences of smoking: 25 years of progress--a report of the Surgeon General*. Rockville, MD: US Department of Health and Human Services, Public Health Service, CDC.

Centers for Disease Control and Prevention. (1994). Medical-care expenditures attributable to cigarette smoking--United States. *Morbidity and Mortality Weekly Report, 43,* 469-472.

Centers for Disease Control and Prevention. (1997). Smoking-attributable mortality and years of potential life lost--Unites States, 1984. *Morbidity and Mortality Weekly Report, 46,* 444-51.

Centers for Disease Control and Prevention. (1997). Youth risk behavior surveillance: National college health risk behavior surveillance—United States, 1995. *Morbidity and Mortality Weekly Report, 46,* 1-56.

Centers for Disease Control and Prevention. (1998). Incidence of initiation of cigarette smoking--United States, 1965-1996. *Morbidity and Mortality Weekly Report, 47(39),* 837-840.

Chambliss, C. A., & Murray E. J. (1979). Cognitive procedures for smoking reduction: symptom attribution versus efficacy attribution. *Cognitive Therapy Research, 3,* 91-95.

Chassin, L., Presson, C. C., & Sherman, S. J. (1984a). Cognitive and social influences factors in adolescent smoking cessation. *Addictive Behaviors, 9,* 383-390.

Chassin, L. Presson C. C., Sherman, S. J., Corty, E., & Olshavsky, R.W. (1984b). Predicting the onset of cigarette smoking in adolescents: A longitudinal study. *Journal of Applied Social Psychology, 14(3),* 224-243.

Chen, P., White, H. W., & Pandina, R. J. (2001). Predictors of smoking cessation from adolescence into young adulthood. *Addictive Behaviors, 26,* 217-529.

Cheung, Y. W. (2000). Substance abuse and developments in harm reduction. *Canadian Medical Association, 162(12),* 1697-1700.

Colby, S. M., Monti, P. M., Barnett, N. P., Rohsenow, D. J., Weissman, K., Spirito, A., Woolard, R. H., & Lewander, W. J. (1998). Brief motivational interviewing

in a hospital setting for adolescents smoking: A preliminary study. *Journal of Consulting and Clinical Psychology, 66(3),* 574-578.

Coleman-Wallace, D., Lee, J. W., Montgomery, S., Blix, G., & Wang, D. T. (1999). Evaluation of developmentally appropriate programs for adolescent tobacco cessation. *Journal of School Health, 69,* 314-319.

Conrad, K. M., Flay, B. R., & Hill, D. (1992). Why children start smoking cigarettes: Predictors of onset. *British Journal of Addiction, 87(12),* 1711-1724.

Cook, T. D. & Campbell, D. T. (1979). *Quasi-experimentation: Design and Analysis.* Boston, MA: Houghton Mifflin Co.

Curry, S. J., Grothaus, L., & McBride, C. (1997). Reasons for quitting: Intrinsic and extrinsic motivation for smoking cessation in a population-based sample of smokers. *Addictive Behaviors, 22(6),* 727-739.

Curry, S., Wagner, E. H., & Grothaus, L. C. (1990). Intrinsic and extrinsic motivation for smoking cessation. *Journal of Consulting and Clinical Psychology, 58(3),* 310-316.

Davidson, R. (1998). The Transtheoretical Model: A critical overview. In W. R. Miller & N. Heather (Eds.), *Treating Addictive Behaviors* (pp. 25-38). New York: Plenum Press.

Deardorff, W. W. (1986). Computerized health education: A comparison with traditional formats. *Health Education Quarterly, 13(1),* 61-72.

DeBernardo, R. L., Aldinger, C. E., Dawood, O. R., Hanson, R. E., Lee., S., & Rinaldi, S. R. (1999). An e-mail assessment of undergraduates' attitudes toward smoking. *Journal of American College Health, 48,* 61-66.

DeVellis, R. F. (1991). *Scale development: Theory and applications.* Newbury Park, CA: Sage Publications.

DiClemente, C. C. (1981). Self-efficacy and smoking cessation maintenance: A preliminary report. *Cognitive Therapy and Research, 9,* 181-200.

DiClemente, C. C. (1986). Self-efficacy and the addictive behaviors. *Journal of Social and Clinical Psychology, 4,* 302-325.

DiClemente, C. C., & Prochaska, J. O. (1998). Toward a comprehensive, transtheoretical model of change: Stages of change and addictive behaviors. In W. R. Miller, & N. Heather (Eds.), *Treating addictive behaviors* (pp. 3-24). New York: Plenum Press.

DiClemente, C. C., Prochaska, J. O., Fairhurst, S. K., Velicer, W. F., Velasquez, M. M., & Rossi, J. S. (1991). The process of smoking cessation: An analysis of precontemplation, contemplation, and preparation stages of change. *Journal of Consulting and Clinical Psychology, 59(2),* 295-304.

DiClemente, C. C., Prochaska, J. O., & Gibertini, M. (1985). Self-efficacy and the stages of self-change and smoking. *Cognitive Therapy and Research, 9,* 181-200.

Digilio, A. H. (1998). Web-based instruction adjusts to the individual needs of adult learners. *Journal of Instructional Delivery Systems, 12,* 26-28.

Dillman, D. A. (2000). *Mail and internet surveys: The tailored design method* (2nd ed.). New York: John Wiley & Sons.

Dillman, D. A., & Bowker, D. K. (2001). The web questionnaire challenge to survey methodologists. In U. D. Reips & M. Bosnjak., *Dimensions of Internet Science.* Eichengrund, Germany: Pabst Science Publishers.

Ding, L., Pallonen, U.E., Migneault, J.P., & Velicer, W.F. (1994). Development of a measure to assess adolescents' temptation to smoke. *Annals of Behavioral Medicine, 16,* S175 (Abstract).

Domel, S. B., Thompson, W. O., Davis, H., Baranowski, T., Leonard, S. B., Baranowski, J. (1996). Psychosocial predictors of fruit and vegetable consumption among elementary school children. *Health Education Research: Theory and Practice, 11,* 299-308.

Donovan, J. E., & Jessor, R. (1985). Structure of problem behavior in adolescence and young adulthood. *Journal of Consulting and Clinical Psychology, 53,* 890-904.

Dozois, D. N., Farrow, J. A., & Miser, A. (1995). Smoking patterns and cessation motivations during adolescents. *International Journal of Addictions, 30,* 1485-1498.

Dzewaltowski, D. A. (1994). Physical activity determinants: A social cognitive approach. *Medicine and Science in Sports and Exercise, 26,* 1395-1399.

Eng, T. R., Maxfield, A., Patrick, K., Deering, M. J., Ratzan, S. C., & Gustafon, D. H. (1998). Access to health information and support: A public highway or a private road? *JAMA, 280,* 1371-1375.

Emmons, K. M., Linnan, L. A., Shadel, W. G., Marcus, B., & Abrams, D. B. (1999). The working healthy project: A worksite health promotion trial targeting physical activity, diet, and smoking. *JOEM, 41(7),* 545-555.

Emmons, K. M., Wechsler, H., Dowdall, G., & Abraham, M. (1998). Predictors of smoking among US college students. *American Journal of Public Health, 88,* 104-107.

Erickson, P. G. (1999). Introduction: the three phases of harm reduction. An examination of emerging concepts, methodologies, and critiques. *Substance Use & Misuse, 34(1),* 1-7.

Ershler, J., Leventhal, H., Fleming, R., & Glynn, K. (1989). The quitting experience for smokers in sixth through twelfth grades. *Addictive Behaviors, 14,* 365-378.

Etter, J., Humair, J., Bergman, M. M., & Perneger, T. V. (2000). Development and validation of the attitudes toward smoking scale (ATS-18). *Addiction, 95(4)*, 613-625.

Everett, S. A., Husten, C. G., Kann, L., Warren, C. W., Sharp, D., & Crossett, L. (1999). Smoking initiation and smoking patterns among US college students. *Journal of American College Health, 48,* 55-60.

Fagerstrom, K. O. (1978). Measuring degree of physical dependence to tobacco smoking with reference to individualization of treatment. *Addictive Behavior, 3,* 235-241.

Feasley, C. E. (1983). *Serving learners at a distance: A guide to program practices.* Washington, DC: Association for the Study of Higher Education.

Ferguson, T. (1997). Health online and the empowered medical consumer. *Journal of Quality Improvement, 23,* 251-257.

Fleming R., Leventhal, H., Glynn, K., & Ershler, J. (1989). The role of cigarettes in the initiation and progression of early substance use. *Addictive Behaviors, 14 (3),* 162-272.

Fulop, M. P., & Varzandeh, N. N. (1996). The role of computer-based resources in health promotion and disease prevention: Implications for college health. *Journal of American College Health, 45,* 11-17.

Gaddis, S. E. (1998). How to design online surveys. *Training & Development, 52,* 67-71.

Georgia Institute of Technology's Graphics, Visualization, and Usability Center. (1999). *GVU's WWW user surveys: Results of GVU's tenth World Wide Web user survey* [Online]. Available URL: http://www.cc.gatech.edu/gvu/user_surveys/survey-1998-10/thenthreport.html.

Gillespie, A., Stanton, W., Lowe, J. B., & Hunter, B. (1995). Feasibility of school-based smoking cessation programs. *Journal of School Health, 65,* 432-437.

Gustafon, D. H., Bosworth, K., Chewning, B., & Hawkins, R. P. (1987). Computer-based health promotion: Combining technological advances with problem-solving techniques to effect successful health behavior changes. *Annual Review of Public Health, 8,* 387-415.

Hansen, W. B., Collins, L. M., Johnson, C. A., & Graham, J. W. (1985). Self-initiated smoking cessation among high school seniors. *Addictive Behaviors, 10,* 265-271.

Harris, L. M. (Ed.) (1995). *Health and the news media: technologies transforming personal and public health.* Mahwah, NJ: Lawrence Erlbaum Associates Inc. Publishers.

Harvey-Berino, J., Pintauro, S. J., & Gold, E. C. (2002). The feasiblity of using internet support for the maintenance of weight loss. *Behavior Modification, 26(1),* 103-116.

Heaney, C. A., & Israel, B. A. (1997). Social networks and social support. In K. Glanz, F. M. Lewis, & B. K. Rimer (Eds.), *Health behavior and health education: Theory, Research, and Practice* (pp. 179-205). San Francisco: Jossey-Bass.

Heatherton, T. F., Kozlowski, L. T., Frecker, R. C., & Fagerstrom, K. O. (1991). The Fagerstrom test for nicotine dependence: A revision of the Fagerstrom tolerance questionnaire. *British Journal of Addictions, 86,* 1119-1127.

House, J. S. (1981). *Work stress and social support.* Reading, MA: Addison-Wesley.

House, J. S., Umberson, D., & Landis, K. R. (1988). Structures and processes of social support. *Annual Review of Sociology, 14,* 293-318.

Hurt, R. D., Croghan, G. A., Croghan, I. T., Wolter, T., Paten, C. A., & Offord, K. T. (1999). Nicotine patch therapy in adolescents. *Nicotine Tobacco Research, 1,* 193.

Jessor, R. (1991). Risk behavior in adolescence: A psychosocial framework for understanding and action. *Journal of Adolescent Health, 12,* 57-605.

Joseph, J., Breslin, C., & Skinner, H. (1999). Critical perspectives on the Transtheoretical Model and Stages of Change. In J. A. Tucker, D. M. Donovan, & G. A.

Marlatt (Eds.), *Changing addictive behavior: Bridging clinical and public health strategies.* New York: Guilford Press.

Keller, J. M. (1983). Motivational design of instruction. In C. M. Reiguluth (Ed.), *Instructional design theories and models: An overview of their current status* (pp. 386-434). Hillsdale, NJ: Lawrence Erbaum Associates.

Keppel, G. (1991). *Design and analysis: A researcher's handbook* (3rd ed.). Upper Saddle River, NJ: Prentice Hall.

Kviz, F., Clark, M., Crittenden, K., Freels, S., & Warnecke, R. (1994). Age and readiness to quit smoking. *Preventive Medicine, 23,* 211-222.

Kreuter, M. W., Strecher, V. J., & Glassman, B. (1999). One size does not fit all: The case for tailoring print materials. *Annals of Behavioral Medicine, 21(4),* 276-283.

Lee, W. W., & Owens, D. L. (2000). *Multimedia instructional design: computer-based training.* San Francisco: Jossey-Bass/Pfeiffer.

Leed-Kelly, A., Russell, K. S., Bobo, J. K., & McIlvain, H. (1996). Feasibility of smoking cessation counseling by phone with alcohol treatment center graduates. *Journal of Substance Abuse Treatment, 13(3),* 203-210.

Lotecka, L, & MacWhinney, M. (1983). Enhancing decision behavior in high school "smokers." *International Journal of Addictions, 18,* 479-490.

Maibach, E., & Murphy, D. A. (1995). Self-efficacy in health promotion research and practice: Conceptualization and measurement. *Health Education Research: Theory and Practice, 10,* 37-50.

Marlatt, G. A. (1996). Harm reduction: Come as you are. *Addictive Behaviors, 21(6),* 779-788.

Mayhew, K. P., Flay, B. R., & Mott, J. A. (2000). States in the development of adolescent smoking. *Drug and Alcohol Dependence, 59,* S61-S81.

McCormick, L. K., Crawford, M., Anderson, R. H., Gittelsohn, J., Kingsley, B., & Upson, D. (1999). Recruiting adolescents into qualitative tobacco research studies: Experiences and lessons learned. *Journal of School Health, 69,* 95-99.

McKay, H. G., King, D., Eakin, E. G., Seeley, J. R., & Glasgow, R. E. (2001). The diabetes network internet-based physical activity intervention: A randomized pilot study. *Diabetes Care, 24(8),* 1328-1334.

McKillip, J. & Vierke, S. (1980). College smokers: worried, sick but still puffing. *Journal of the American College Health Association, 28,* 282-290.

Millstein, S. G., Irwin, C. E., Alder, N. E., Cohn, L. D., Kegeles, S. M., & Dolcini, M. M. (1992). Health-risk behaviors and health concerns among young adolescents. *Pediatrics, 3,* 422-428.

Moolchan, E. T., Ernst, M., & Henningfield, J. E. (2000). A review of tobacco in adolescents: Treatment implications. *Journal of the American Academy of Child & Adolescent Psychiatry, 39(6),* 682-693.

Moskal, P. D., Dziuban, C. D., & West, G. B. (1999). Examining the use of tobacco on college campuses. *Journal of American College Health, 47(6),* 280-5.

Myers, M. G. (1999). Smoking interventions with adolescent substance abusers: Initial recommendations. *Journal of Substance Abuse Treatment, 16,* 289-298.

Myers, M. G., & Brown, S. (1994). Smoking and health in substance-abusing adolescents: A two year follow-up. *Pediatrics, 93,* 561-566.

Nicki, R. M., Remington, R. E., & MacDonald, G. A. (1985). Self-efficacy, nicotine-fading/self-efficacy monitoring and cigarette smoking behavior. *Behavior Research Therapy, 22,* 477-485.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric Theory.* New York: McGraw-Hill.

O'Loughlin, J., Paradis, G., Renaud, L., Meshefedjian, G., & Barnett, T. (1997). The "Yes, I Quit" smoking cessation course: Does it help women in a low income community quit*?* *Journal of Community Health, 22(6),* 451-468.

O'Neill, H. Glasgow, R., McCaul, K. (1983). Component analysis in smoking prevention research: Effects of social consequences information. *Addictive Behaviors, 8,* 419.

Oenema, A., Brug, J, & Lechner, L. (2001). Web-based tailored nutrition education: Results of a randomized controlled trial. *Health Education Research, 16(6),* 647-660.

Ovarec, J. A. (2000). On-line medical information and service delivery: Implications for health education*.* *Journal of Health Education, 31,* 105-110.

Pallonen, U. E. (1998). Transtheoretical measures for adolescent and adult smokers: Similarities and differences. *Preventive Medicine, 27,* A29-A38.

Pallonen, U. E., Rossi, J. S., Smith, N. F., Prochaska, J. O., & Almeida, M. A. (1993). Applying the stages of change and processes of change to adolescent smoking cessation. *Annuals of Behavioral Medicine, 15,* S131.

Pallonen, U. E., Velicer, W. F., Prochaska, J. O., Rossi, J. S., Bellis, J. M., Tsoh, J. Y., Migneault, J. P., Smith, N. F., & Prokhorov, A. V. (1998). Computer-based

smoking cessation interventions in adolescents: Description, feasibility, and six-month follow-up findings. *Substance Use & Misuse, 33,* 935-965.

Parcel, G. S., Simons-Morton, B., O'Hara, N. M., Baranowski, T., & Wilson, B. (1989). School promotion of healthful diet and physical activity: Impact on learning outcomes and self-reported behavior. *Health Education Quarterly, 16,* 181-199.

Perry, C., Killen, J., Telch, M., Slinkard, L. A., & Danaher, B. G. (1980). Modifying smoking behavior of teenagers: A school-based intervention. *American Journal of Public Health, 70,* 722-727.

Perry, C., Telch, M. J., Killen, J., Burke, A., & Maccoby, N. (1983). High school smoking prevention: The relative efficacy of varied treatments and instructors. *Adolescence, 71,* 561-566.

Perry, T. T., Perry, L. A., & Hosack-Curlin, K. (1998). Internet use by university students: An interdisciplinary study on three campuses. *Internet Research, 8,* 136-141.

Pennbridge, J., & Moya, R. (1999). Questionnaire survey of California consumers' use and rating of sources of health care information including the Internet. *Western Journal of Medicine, 171,* 302-305.

Perz, C. A., DiClemente, C. C., & Carbonari, J. P. (1996). Doing the right thing at the right time? The interaction of stages and processes of change in successful smoking cessation. *Health Psychology, 15(6),* 462-468.

Pierce, J. P., Farkas, A. J., & Gilpin, E. A. (1998). Beyond stages of change: The quitting continuum measures progress toward successful smoking cessation. *Addiction, 93(2),* 277-286.

Prince, F. (1995). The relative effectiveness of a peer-led and adult-led smoking intervention program. *Adolescence, 30,* 187-194.

Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology, 51(3),* 390-395.

Prochaska, J. O., & DiClemente, C. C. (1984). Self change processes, self-efficacy and decisional balance across five stages of smoking cessation. In Liss A. R. (Ed.): *Advances in cancer control: Epidemiology and research.* New York: Alan R. Liss.

Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change: Applications to addictive behaviors. *American Psychologist, 47 (9),* 1102-1114.

Prochaska, J. O., DiClemente, C. C., Velicer, W. F., Ginpil, S., & Norcross, J. C. (1995). Predicting change in smoking status for self-changers. *Addictive Behaviors, 10(4),* 395-406.

Prochaska, J. O., DiClemente, C. C., Velicer, W. F., & Rossi, J. S. (1993). Standardized, individualized, interactive and personalized self-help programs for smoking cessation. *Health Psychology, 12,* 399-405.

Prochaska, J. O., Norcoss, J. C., & DiClemente, C. C. (1994). *Changing for good: A revolutionary six-stage program for overcoming bad habits and moving your life positively forward.* New York: Avon Books.

Prochaska, J. O., Redding, C. A., & Evers, K. E. (1997). The transtheoretical model and stages of change. In K. Glanz, R. M. Lewis, & B. K. Rimer (Eds.), *Health behavior and health education* (pp.60-84). San Francisco: Jossey-Bass.

Prochaska, J. O., & Velicer, W. F. (1997). The transtheoretical model of health change. *American Journal of Health Promotion, 12(1),* 38-48.

Prochaska, J. O., Velicer, W.F., DiClemente, C. C., & Fava, J. L. (1988). Measuring the process of change: Application to the cessation of smoking. *Journal of Consulting and Clinical Psychology, 56,* 520-528.

Rennard, S. I., & Daughton, D. (2000). Smoking cessation. *Chest, 117(5),* 360-364.

Rimal, R. N., & Flora, J. A. (1997). Interactive technology attributes in health promotion: Practical and theoretical issues. In R. L. Street, W. R. Gold, & T. Manning (Eds.), *Health promotion and interactive technology: Theoretical applications and future directions* (pp. 19-38). Mahwah, NJ: Lawrence Erlbaum Associates.

Robinson, T. N., Patrick, K., Eng, T. R., & Gustafson, D. (1998). An evidence-based approach to interactive health communication : A challenge to medicine in the information age. *JAMA, 280,* 1264-1269.

Rojas, N. L., Killen, J. D., Haydel, K. F., & Robinson, T. N. (1998). Nicotine dependence among adolescent smokers. *Archives of Pediatrics and Adolescent Medicine, 152,* 151-156.

Rose, J. S., Chassin, L., Presson, C. C., & Sherman, S. J. (1996). Prospective predictors of quit attempts and smoking cessation in young adults. *Health Psychology, 4,* 261-268.

Sargent, J. D., Mott, L. A., & Stevens, M. (1998). Predictors of smoking cessation in adolescents. *Archives of Pediatric and Adolescent Medicine, 152,* 388-393.

Sax, L. J. (1997). Health trends among college freshmen. *Journal of American College Health, 45,* 252-263.

Sciacca, J., & Melby, C. (1992). Stress-related symptoms, beliefs, and behaviors in college students. *Wellness Perspectives, 9,* 70-74.

Schapira, D. V., Kumar, N. B., Lyman, G. H., & Baile, W. F. (1991). The effect of duration of intervention and locus of control on dietary change. *American Journal of Preventive Medicine, 7,* 341-347.

Scheerhorn, D. (1997). Creating illness-related communities in cyberspace. In R. L. Street, W. R. Gold, & T. Manning (Eds.), *Health promotion and interactive technology: Theoretical applications and future directions* (pp. 171-185). Mahwah, NJ: Lawrence Erlbaum Associates.

Schmidt, W. C. (1997). World-Wide Web survey research: Benefits, potential problems, and solutions. *Behavior Research Methods, Instruments, & Computers, 29(2),* 274-279.

Schrum, L. (2000). Online teaching and learning: Essential conditions for success! In L. Lau (Ed.), *Distance learning technologies: Issues, trends, and opportunities* (pp. 91-106). Hershey, PA: Idea Group Publishing.

Science Panel on Interactive Communication and Health. (1999). *Wired for health and well-being: the emergence of interactive health communication.* Washington, DC: US Department of Health and Human Services, US Government Printing Office.

Skinner, C. S., Siegfried, J. C., Kegler, M. C., & Strecher, V. J. (1993). The potential of computers in patient education. *Patient Education and Counseling, 22,* 27-34.

Smith, M. A., & Leigh, B. (1997). Virtual subjects: Using the internet as an alternative source of subjects and research environment. *Behavior Research Methods, Instruments, & Computer, 29,* 496-505.

Smith, T. A., House, R. F., Croghan, I. T., Gauvin, T. R., Colligan, R. C., Offord, K. P., Gomez-Dahl, L. C., & Hurt, R. D. (1996). *Nicotine patch therapy in adolescent smokers. American Academy of Pediatrics, 98*, 659-667.

SPSS Inc. (1999). *SPSS for Windows* (Release 10.0). Chicago, IL: Author.

Stacy, A. W., Flay, B. R., Sussman, S., Brown, K. S., Santi, S., & Best, J. A. (1990). Validity of alternative self-report indices of smoking among adolescents. *Psychological Assessment, 2,* 442-446.

Stanton, B., Kim, N., Galbraith, J., & Parrott, M. (1996). Design issues addressed in published evaluations of adolescent HIV-risk reductions interventions: A review. *Journal of Adolescent Health, 18,* 387-396.

Stanton, J. M. (1998). An empirical assessment of data collection using the Internet. *Personnel Psychology, 51,* 709-725.

Stanton, W. R., (1995). DSM-III-R tobacco dependence and quitting during late adolescentce. *Addictive Behaviors, 20,* 595-603.

Stanton, W. R., Lowe, J.B., Fisher, K. J., Gillespie, A. M., & Rose, J. M. (1999). Beliefs about smoking cessation among out-of-school youth. *Drug and Alcohol Dependence, 54,* 251-258.

Stanton, W. R., McClelland, M., Elwood, C., Ferry, D., & Silva, P. A. (1996). Prevalence, reliability and bias of adolescents' reports of smoking and quitting. *Addiction, 91,* 1705-1714.

Strecher, V. J., DeVellis, B. M., Becker, M. H., & Rosenstock, I. M. (1986). The role of self-efficacy in achieving health behavior change. *Health Education Quarterly, 113,* 73-91.

Strecher, V.J., Kreuter, M., DenBoew, D.J., Hospers, H., Kobrin, Skinner, C.S. (1994). The effects of computer-tailored smoking cessation messages in family practice settings. *Journal of Family Practice, 39(3),* 22-270.

Stone, S. L., Kristeller, J. L. (1992). Attitudes of adolescents toward smoking cessation. *American Journal of Preventive Medicine, 8,* 221-225.

Sussman, S., Dent, C. W., & Lichtman, K. L. (2001). Project EX outcomes of a teen smoking cessation program. *Addictive Behaviors, 26,* 435-438.

Sussman, S., Dent, C.W., Burton, D., Stacy, A. W., & Flay, B. R. (1995). *Developing school-based tobacco use prevention and cessation programs.* Thousand Oaks, CA: Sage Publications.

Sussman, S., Dent, C. W., Nezami, E., Stacy, A. W., Burton, D., & Flay, B. R. (1998). Reasons for quitting and smoking temptation among adolescent smokers: Gender differences. *Substance Use & Misuse, 33,* 2703-2720.

Sussman, S., Dent, C. W., Severson, H., Burton, D., & Flay, B. R. (1998). Self-initiated quitting among adolescent smokers. *Preventive Medicine, 27,* A19-A28.

Sussman, S., Lichtman, K., Ritt, A., & Pallonen, U. (1999). Effects of thirty four adolescent tobacco use cessation and prevention trials on regular users of tobacco products. *Substance Use & Misuse, 34,* 1469-1503.

Swoboda, W. J., Muhlberger, N., Weitkunat, R., & Schneeweb, S. (1997). Internet surveys by direct mailing. *Social Science Computer Review, 15(3),* 242-255.

Szabo, A., & Frenkl, R. (1996). Consideration of research on Internet: Guidelines and implications for human movement studies. *Clinical Kinesiology, 50(3),* 58-65.

Threlkeld, R., & Brzoska, K. (1994). Research in distance education. In B. Willis (Ed.), *Distance education: Strategies and tools* (pp.41-66). Englewood Cliffs, NJ: Educational Technology Publications.

Tuakli, N., Smith, M. A., & Heaton, C. (1990). Smoking in adolescence: Methods for health education and smoking cessation. *Journal of Family Practice, 31,* 369-374.

University of Georgia (2000a). *The UGA Factbook* [Online]. Athens, GA: UGA. Available: http://irhst40.irp.uga.edu/html/fa1999/irpb/CP/CP00R551.htm.

University of Georgia (2000b). *Student Profile Fall Semester 1999* [Online]. Athens, GA: UGA. Available: http://irhst40.irp.uga.edu/html/fa1999/irpk/student/Sirs/profile/l3/01.htmlhttp://irhst40.irp..uga.edu/html/fa1999/irpb/CP/CP00R551.htm.

U.S. Census Bureau. (2001). Home computers and internet use in the United States: August 2000 [Online]. Available: http://www.census.gov/population/www/socdemo/computer.html.

U.S. Department of Health and Human Services. (1996). *Clinical practice guideline number 18, smoking cessation.* Washington, DC: U.S. Government Printing Office.

U.S. Department of Health and Human Services. (2000). *Healthy people 2010:Understanding and improving health* (2nd ed.) . Washington, D.C.: U.S. Government Printing Office.

U.S. Department of Health and Human Services. (1990). *National Household survey on Drug Abuse: Main Findings 1991.* Washington, DC: DHHS.

U.S. Department of Health and Human Services. (1994). *Preventing tobacco use among young people: A report from the Surgeon General.* Washington, DC: DHHS, Public Health Service, Centers for Disease Control and Prevention.

U.S. Department of Health and Human Services. (1989). *Reducing the health consequences of smoking: 25 years of progress. A report of the Surgeon General.* Washington, DC: US Department of Health and Human Services, Public Health Service, Centers for Disease Control, Center for Health Promotion and Education, Office of Smoking and Health.

U.S. Department of Health and Human Services. (2000). *Reducing tobacco use: A report of the surgeon general.* Washington, DC: U.S. Government Printing Office.

U.S. Department of Health and Human Services. (1988). *The health consequences of smoking: Nicotine addiction. A report of the Surgeon General, 1988.* Washington, DC: US Department of Health and Human Services, Public Health Service, Centers for Disease Control, Center for Health Promotion and Education, Office of Smoking and Health.

Velicer, W. F., DiClemente, C. C., Prochaska, J. O., & Brandenburg, N. (1985). Decisional balance measure for assessing and predicting smoking status. *Journal of Personality and Social Psychology, 48,* 1279-1289.

Velicer, W. F., DiClemente, C. C., Rossi, J. S., & Prochaska, J. O. (1990). Relapse situations and self-efficacy: An integrative model. *Addictive Behaviors, 15,* 271-283.

Velicer, W. F., Fava, J. L., Prochaska, J. O., Abrams, D B., Emmons, K. M., & Pierce, J. P. (1995). Distribution of smokers by stage in three representative samples. *Preventive Medicine, 24,* 401-411.

Velicer, W. F., Prochaska, J. O., Bellis, J. M., DiClemente, C. C., Rossi, J. S., Fava, J. L., & Steiger, J. H. (1993). An expert system intervention for smoking cessation. *Addictive Behaviors, 18,* 269-290.

Velicer, W. F., Prochaska, J. O., Rossi, J. S., & Snow, M. G. (1992). Assessing outcome in smoking cessation studies. *Psychological Bulletin, 111,* 23-41.

Viswesvaran, C. & Schmidt, F. (1992). A meta-analytic comparison of the effectiveness of smoking cessation methods. *Journal of Applied Psychology, 77(4),* 554-561.

Weschsler, H., Kelley, K., Seibring, M., Kuo, M., & Rigotti, N. A. (2001). College smoking policies and smoking cessation programs: Results of a survey of college health directors. *Journal of American College Health, 49(5),* 205-212.

Wechsler, H., Rigotti, N., Gledhill-Hoyt, J., & Lee, H. (1998). Increased levels of cigarette use among college students: A cause for national concern. *Journal of the American Medical Association, 280(19),* 1673-78.

Weissman, W., Glasgow, R., Biglan, A., & Lichtenstein, E. (1987). Development and preliminary evaluation of a cessation program for adolescent smokers. *Psychology of Adolescent Behavior, 1,* 84-91.

Whitelaw, S., Baldwin, S., Bunton, R., & Flynn D. (2000). The status of evidence and outcomes in Stages of Change research. *Health Education Research Theory & Practice, 15(6),* 707-718.

Wilkins, A. S. (1999). Expanding internet access for health care consumers. *Health Care Management Review, 24(3),* 30-41.

Winzelberg, A. J., Eppstein, D., Eldredge, K. L., Wilfley, D., Dasmahapatra, R., Dev, P., & Taylor, C. B. (2000). Effectiveness of an Internet-based program for reducing risk factors for eating disorders. *Journal of Consulting and Clinical Psychology, 68,* 346-350.

Woodruff, S. I., Edwards, C. C., Conway, T. L., & Elliott, S. P. (2001). Pilot test of an internet virtual world chat room for rural teen smokers. *Journal of Adolescent Health, 29,* 239-243.

Yamaguchi, K., & Kandel, D. B. (1984). Patterns of drug use from adolescence to young adulthood: II. Sequences of progression. *American Journal of Public Health. 74(7),* 668-72.

Youth Tobacco Cessation Collaborative. (2000). *National blueprint for action: Youth and young adult tobacco-use cessation.* Washington, DC: Center for the Advancement of Health.

Zabinski, M., Wilfley, D. E., Pung, M. A., Winzelberg, A. J., Eldredge, K., & Taylor, C. B. (2001). An interactive internet-based intervention for women at risk of eating distorders: A pilot study. *International Journal of Eating Disorders, 30,* 129-137.

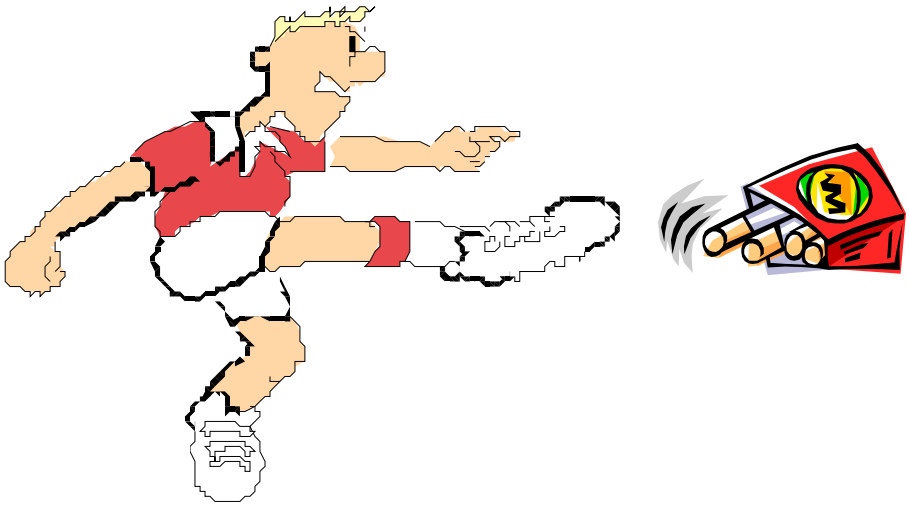
ZdNet. (2000). *The 100 Most Wired Colleges 1999* [Online]. Available: http://www.zdnet.com/yil/content/college/colleges99/intro4.html.

APPENDICES

Appendix A

Kick It! Recruitment Flier

Want to save $1,200 this year? Quit Smoking!



Join ***Kick It!,***

a web-based program, and find out how!

For info, call 542-8060 or email kickit@arches.uga.edu

Appendix B

Kick It! Registration Form

Participant Registration Form

What is Kick It! ?

Welcome to **Kick It!** The purpose of this program is to provide you with skills to help you quit smoking. Your participation is voluntary. The program will begin in September 2001 and end in May 2002. All web interactions will take place in the next couple of months with the exception of the final survey, which will take place in April or May of next year. If you decide to participate, you will be asked to attend web-based session(s) and complete 3 online surveys. The survey information will contribute to research designed to help young adults quit smoking and may be beneficial to all health professionals. You will receive up to $35 depending on your level of participation. There are no discomforts or risk factors for your participation.

Any information obtained in connection with this study that can be identified with you will remain confidential and will be disclosed only with your permission. However with the use of the Internet, there is a limit to the confidentiality that can be guaranteed due to the technology itself. If you decide to participate, you are free to withdraw at any time. If you have any questions now or at a later date, please contact me, Cam Escoffery, at 706/542-8060.

Your submission of this form indicates that you are interested in the program, have read the consent form, and consent to participate in the program.

If you are interested in participating in the program, please complete the form. A sample of registrants will be selected to participate in the study.

Register

I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study. I will be given a copy of this form.

Name:

Address:

Home Telephone:	
Work Telephone:	
Email Address:	
Student Status:	
	☐ Undergraduate
	☐ Graduate
Age:	

Name a contact where you could be reached in case of a change in address or telephone and the contact's phone number

Contact's name:	
Email or Phone number:	

Do you have access to the Internet?	
	☐ Yes

	☐	No

How often do you use the Internet?		
	☐	Daily
	☐	Almost every day
	☐	A few times a week
	☐	Never

Have you smoked one or more cigarettes in the last week?		
	☐	Yes
	☐	No

Are you on nicotine replacement therapy?		
	☐	Yes
	☐	No

How did you learn about the Kick It! Program?		
	☐	Flier

	☐	Bus Card
	☐	Radio public service announcement
	☐	The Red and The Black Ad
	☐	Word of mouth
	☐	Other (please specify)

Thank you for your interest!

Submit Reset

For questions or problems about your rights please call or write: Human Subjects Office, University of Georgia, 606A Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-6514; E-Mail Address IRB@uga.edu.

Appendix C

Kick It! Email

[First email-Intervention Group]

Dear [Name]:

Welcome to the Kick It! Program. The purpose of this program is to help you stop smoking. Thanks for agreeing to participate.

As part of the program, you will attend four Internet web-based sessions to learn skills to quit smoking and take 2 more surveys. You will access the sessions through emails sent to you indicating the location of the Kick It! Web site. If you do not attend, follow-up emails or phone calls will be made. The sessions will take about 20 minutes to complete. The following are the time and the activities in which you will participate:

1. First Kick It! Session – September 10 - 22 2000
2. Second Kick It! Session – September 24 – October 6, 2000
3. Third Kick It! Session – October 8 – October 20, 2000
4. Fourth Kick It! Session – October 22 – November 3, 2000
5. Follow-up Survey – November 5 – 17, 2000
6. Final Survey – April 29 – May 11, 2002

You will receive $20 dollars for participating in the program to be mailed with the completion of the final survey. Data compiled from the online sessions and surveys will be kept in strict confidence at all times.

If you have any questions about the program, please contact me at cescoffe@coe.uga.edu or 706-542-3408. We hope you enjoy the program.

Cam Escoffery
Doctoral Student, Health Promotion and Behavior

Appendix D

Intervention Group Session

Preparing to be Smoke-Free

Welcome to the first Kick It! session. This page has information on smoking. Read the information and type in answers to the interactive questions and activities. You can click on the Submit button at the end to save all of your typed responses. You may also want to print this document and reread it from time to time.

Congratulations on your excellent decision to stop smoking. Use the following information to make this decision a reality. Good luck!

Reasons for Quitting

You should have strong personal reasons for quitting. Make a list of your reasons for quitting to confirm your decision. Print out this list and keep it in a visible spot.

1.
2.
3.
4.
5.

What others have said about their quitting experiences:

- "I'm proud of myself."
- "I have won the battle."
- "I have more energy."
- "I have more money for me to spend on myself."
- "I can breathe a whole lot better."
- "I do not cough anymore."

The Good News about Quitting

The good news is that once you quit smoking, the effects of smoking decrease immediately and the body begins to heal itself.

Here are some of the immediate benefits of quitting:

After...	Benefits
20 minutes	Pulse rate and blood pressure drops to normal. Body temperature of hands and feet return to normal.
8 hours	Oxygen levels in the blood return to normal. The risk of heart attack starts to fall.
24 hours	Carbon monoxide is eliminated from the body.
48 hours	Nicotine is no longer detectable in the blood. Ability to smell and taste improves.
3-9 months	Breathing problems such as coughing, shortness of breath, and wheezing improve. Lung function is increased by 5-10%.
1 year	Risk of heart disease falls to about half that of a smoker.
10 years	Risk of lung cancer falls to about half that of a smoker.
15 years	Risk of heart disease is similar to that of non-smokers.

Lots of ex-smokers talk about how, after quitting, they:

- BREATHE better
- have more MONEY to spend
- don't cough anymore
- are in BETTER shape
- improve in athletic abilities
- are more highly regarded by others
- have smells on clothes go away
- LOOK better
- have more ENERGY for work and play

Think about how you will benefit from stopping smoking.

Strategies to Prepare Yourself for Quitting

Get support. Many ex-smokers said that help from those around them was a key part of their success. Seek people whom you can talk with and trust as you make this important decision. If your close friends or family smoke encourage them to stop smoking with you or try to avoid too much contact with them in the first weeks of quitting.

Take baby steps. Try dealing with not smoking by stopping for a few hours, then work up to a day. The time spent without cigarettes can help you stop smoking

and boost your confidence in your ability to quit. Gradually increase the time between each cigarette.

Buy only one pack of cigarettes at a time. Make it more difficult to smoke.

Tamper down on number of cigarettes smoked. Carry only the amount of tobacco that you are going to use that day and take out 1/4 of the cigarettes that you normally would have smoked.

Change cigarette brands to one with lower nicotine and tar. You may not like the taste of the lower nicotine and tar brand, so that will help you in efforts to quit.

Ignore the temptation. Smoking just ONE cigarette often leads to a relapse. After quitting, it is very important that you not give in taking just one drag or smoking just one cigarette.

Change your habits. As a smoker, you often associate smoking with something. Try to change the context of smoking. If you smoke after you wake up, take a shower or fix breakfast instead. Leave the table instead of smoking after a meal.

Set rules for smoking that make cigarettes less easy to use. Some examples are no smoking inside (dorm room, classes, etc.), no smoking while talking on the phone or in the car, or only smoking when standing up.

Limit the places and locations where you can smoke. Frequent places where smoking is not allowed such as libraries, non-smoking areas of restaurants, malls, or bookstores.

Identify strategies to lower your stress. Think about activities that you like that will make you feel relaxed. Go ahead and buy whatever you need to help you remain stress free such as candles, music CDs or tapes, computer games, running shoes, etc.

Build a survival kit with things you can use or do instead of smoking. The kit can include sugarless gum or candy, healthy snacks, music, phone numbers of your support buddies, etc. Keep your kit in your backpack so you can access it at all times.

The Day before Quitting

To make your planning a success, try to do the following on the day before your quit date:

- Throw away all your cigarettes wherever they are (home, car, work, etc.)
- Get rid of ashtrays and lighters. They are signs that may trigger an urge to smoke.

- Talk to your friends and family about what you are doing.
- Review your reasons for quitting and coping techniques.
- Have your teeth cleaned.

The Big Day

- Review your reasons for quitting.
- Keep busy by making plans not centered around smoking. Go to the movies, take a long walk, read a great book, etc.
- Avoid your triggers and other smokers as much as possible.
- Make a list of all the things you can reward yourself with from all the money you saved.
- Do something special or buy yourself a present to celebrate.
- Remind friends and family about your quit date and ask them for support during the rough days ahead.

Avoiding Temptation

You probably know you smoke in certain situations. It is helpful to identify these situations before you quit and prepare a strategy to resist smoking in each situation. List the situations and strategies to resist smoking in the following table. Keep this list with you as prepare to quit.

Risky Situation	Strategy to Resist Smoking
In the presence of other smokers	
In the car	
During exams	
In case of a great craving	

20 Ways to Resist the Urge to Smoke

These are ideas for ways to resist the urge to smoke each day. Create your own list by clicking My 20 Ways to Resist the Urge to Smoke.

Take a bath or shower	Brush your teeth
Cook a low-fat meal	Say out loud I can quit or other positive affirmations
Go on a short walk	Stay BUSY

Whoops - I slipped!

A slip means you smoked after your quit date. Don't give up, you have not gone back to smoking full time. And you have not failed! Reread your reasons for quitting, get rid of cigarettes, and plan strategies for handling temptations to smoke again. Start right away and develop an emergency plan in case you pick up some cigarettes again.

- Reread your reasons for quitting.
- Acknowledge that you slipped, but stick to the quit plan.
- Get rid of any cigarettes around.
- Think about the reasons for picking up cigarettes.

A relapse is returning to smoking after you quit. Lots of people relapse after attempting to quit. If you stick with it, you can quit even if you've had a relapse. Start planning a new quit date, review your triggers and coping techniques, get support, and reread your reasons for quitting.

What can you do to avoid slips and a relapse?

- Talk to a friend.
- Chew gum or on vegetables.
- Go for a walk around campus.
- Keep your hands busy by doing school work, drawing, or working on a puzzle
- Brush your teeth
- Exercise (jogging, walking, aerobics, team sports, roller bladding, swimming)
- Drink water
- Do something relaxing (take a bath or shower, stretch, listen to music, read a book)

Think about what triggered the relapse and have an emergency plan for that trigger in the future. Keep positive thoughts in mind. You can do it!

One Day at a Time

When you are trying to quit, focus on today.

- Don't think about next week. Quit for today.
- Keep saying, "I can do it!"
- Slip today? You can try again tomorrow.

Withdrawal symptoms

When you try to quit, many smokers feel symptoms of withdrawal from the nicotine in cigarettes. These symptoms may last for a couple of weeks. Some of the symptoms that you may experience are:

- craving for nicotine
- irritability
- frustration
- anger
- anxiety
- increased appetite
- restlessness
- difficulty concentrating
- impatience
- confusion
- depression
- sleeplessness

Some say that the symptoms for nicotine withdrawal are like those people have when they grieve for a loss of a close friend.

Here are some withdrawal symptoms and other activities you can do instead of smoking.

Urge to smoke	Get busy. Think of something else. Do a relaxing exercise. Practice the 5 D's.
Difficulty concentrating	Take a break. Go for a walk or do a relaxation technique. Take a nap and get plenty of rest.
Headaches	Avoid caffeine. Sit down and close your eyes. Take a warm bath or shower or try relaxation methods.
Increase in appetite	Avoid fatty foods. Drink lots of water. Snack on vegetables and fruit. Exercise.
Coughing	Suck on sugarless hard candy. Drink water, juice, or tea.
Irritability	Soak in a hot bath, do relaxation techniques, and exercise. Take a nap.
Sleep problems	Try relaxation techniques to make you calm such as deep breathing. Avoid caffeine within 6 hours before you sleep.
Depression	Stay active by doing things you like to do. Speak with someone you can share anything with. Avoid being alone. Do some work.

Remember that these symptoms are temporary and a sign that your body is healing.

Want Personalized Info about Your Smoking?

Want to learn more about your smoking habit? These 2 tools can tell you a lot of information about why you smoke and what you can do about it.

How Addicted are You?

Do you wonder how easy it would be to quit? Click here to take the How Addicted are You survey and find out your level of addiction.

Nicotine causes a strong physical addiction. With each cigarette you smoke, you strengthen this dependence. However, stopping smoking for 2 to 3 weeks may help decrease this dependence. Don't let fear of dependence stop you. Many ex-smokers have found that quitting was less difficult than they thought.

Keep a Smoking Log

To learn more about the reasons you smoke, you can use the Smoking Log to give a written account of your daily use of cigarettes. Print out and keep this page with you. Before you light up each cigarette, fill out the journal. It is easy to do and you will learn a lot about yourself.

This log will help you understand why you smoke, when you smoke, and what your are feeling at the time you smoke a cigarette. Use the log for a couple of days, and you will probably begin to see a pattern. It keeps track of:

- When you smoke - Note the date and time that you feel the need to smoke.
- Where you smoke - Note where you are when you felt the need to smoke.
- With Whom - Note who is around you when you feel the urge to smoke. Are you with a friend? In a crowd? Alone?
- Craving - Rate your craving for smoking from Low to High.
- Mood - Note the mood you are in when you feel the urge to smoke. Are you happy? Sad or depressed? Angry? Bored?

It is important to review your thoughts. What does your log tell you about the reasons you smoke and the type of mood you are generally in when you do smoke?

What Now?

As the Nike ad says, "Just do it!" You have been getting prepared, now is the time for change. Start by making a firm decision to stop smoking. Think of this as a very strong personal commitment to yourself.

Set the Quit Date

It is very important to set a quit date and stick to it. There is no "ideal time" to stop smoking. If you wait for summer vacation, after exams, or the new year, the ideal moment may never come. Set a date within the next 30 days.

Prepare Yourself for the Quit Date

Before the quit date arrives, throw away all of your cigarettes, matches, lighters, and ashtrays. Talk to others who can support you as you are quitting. Let them know that you may be experiencing withdrawal symptoms and to help you through it. Most importantly, ask friends who smoke to respect your decision.

Get Support

Start early and get help in quitting from people you know and trust. Many of them can really help you quit. Tell them how to help you. Here are some ways that they can help:

- Be positive in talking with you about quitting. Tell you that they are glad that you are doing it.
- Ask how things are going.
- Praise you when you doing well in reducing or stopping smoking.
- Tell you not to give up if you slip or relapse.

What's the Next Step?

- Keep coming back to Kick It! and learn more about stopping smoking.
- Read over your Reasons for Quitting constantly.
- Set a fixed date to stop smoking within the next 30 days. Tell everyone you know about it.
- Talk to others about stopping smoking and get their support.
- Prepare emergency plans in case you want to smoke again.
- Throw away all cigarettes, lighters, and ashtrays in your home

Kick It! can Help You!

You have just read individualized advice and information to help you stop smoking. This program has other components that may help you:

- Want to learn more about quitting smoking? Read the information in the Q & A section that offers answers to commonly asked questions related to quitting.
- Want to talk to and share with others who are in the same boat? Go to the Discussion Forum that best matches where you think you are with quitting and submit questions, comments, or tips for others. You may be able to help others, too.
- Want advice of a health care professional? Go to Ask the Expert and send in your question. You will receive feedback to your questions in a matter of days.
- Want to find other sources of help and information on quitting? Visit other authoritative websites at the Quitting Resources page.
- Explore the Kick It! program website and learn how to become a non-smoker.

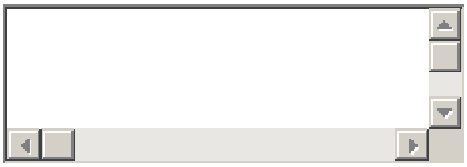
What's Your Plan?

Before the next session, think about a short goal that can help you on the way to becoming smoke-free. Some examples of goals are:

- I will sit only in the non smoking section when I go out ,
- I will put all of my smoking money in a box to buy myself something special, or
- I will cut down by 2 cigarettes each week before I quit.

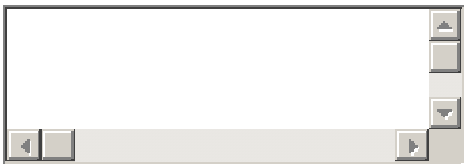
Type some goals that will make quitting happen in the next weeks.

I plan to:



Who can help me?

What are some good things that could happen if I reach this goal?



Just like 1/2 of all smokers, you are capable of quitting smoking. We wish you success in your efforts to stop smoking!

Submit

Appendix E

Control Group Session

Quitting Smoking

Smoking is the most preventive cause of death.

The Day before Quitting

To make your planning a success. Try to do the following on the day before your quit date:

- Throw away all your cigarettes whenever you are throughout the day (home, car, work, etc.)
- Get rid of ashtrays and lighters. They are signs that may trigger an urge to smoke.
- Talk to your friends and family about what you are doing.
- Review your reasons for quitting and coping techniques.
- Have your teeth cleaned.
- Get supplies for emergency situations (sugarless candy, gum, pens, stress balls, etc.)

The Big Day

- Review your reasons for quitting.
- Keep busy by making plans not centered around smoking. Go to the movies, take a long walk, read a great book, etc.
- Avoid your triggers and other smokers as much as possible.
- Make a list of all the things you can reward yourself with from all the money you are saving.
- Do something special or buy yourself a present to celebrate.
- Remind friends and family about your quit date and ask them for support during the rough days ahead.

Withdrawal Symptoms



Nicotine is a drug, so when you remove it from your system by quitting, your body will feel the effects of the missing nicotine. These effects are called withdrawals symptoms.

Here are some withdrawal symptoms and other activities you can do instead of smoking.

Symptom	Alternative activities
Urge to smoke	Get busy. Think of something else. Do a relaxing exercise. Practice the 5 Ds: Doing something else, Delaying smoking, Deep breathing, Drinking water, and Discussing with someone.
Difficulty concentrating	Take a break. Go for a walk or do a relaxation technique. Take a nap and get plenty of rest.
Headaches	Avoid caffeine. Sit down and close your eyes. Take a warm bath or shower. Try relaxation methods.
Increase in appetite	Avoid fatty foods. Drink lots of water. Snack on vegetables and fruit. Exercise.
Coughing	Suck on sugarless hard candy. Drink water, juice, or tea.
Irritability	Soak in a hot bath, do relaxation techniques, and exercise. Take a nap.
Sleep problems	Try relaxation techniques to make you calm such as deep breathing. Avoid stuff with caffeine within 6 hours before you sleep.
Depression	Stay active by doing things you like to do. Speak with someone you can share anything with. Avoid being alone. Do some work.

Remember that these symptoms are temporary and a sign that your body is

healing.

Slips and Relapses

A slip means you smoked after your quit date. Don't give up, you have not gone back to smoking full time. Reread your reasons for quitting, get rid of cigarettes, and plan strategies for handling temptations to smoke again.

A relapse is returning to smoking after you quit. Lots of people relapse after attempting to quit. If you stick with it, then you can quit even if you have a relapse. Start planning a new quit date, review your triggers and coping techniques, get support, and reread your reasons for quitting.

What can you do to avoid slips and relapse?

- Talk to a friend
- Chew gum or on vegetables
- Go for a walk around campus
- Keep your hands busy by doing school work, drawing, or working on a puzzle
- Brush your teeth
- Exercise (jogging, walking, aerobics, team sports, roller blading, swimming)
- Drink water
- Do something relaxing (take a bath or shower, stretch, listen to music, read a book)

Think about what triggered the relapse and have an emergency plan for that trigger in the future. Keep positive thoughts in mind. You can do it!

Eating Healthy 

This will help you not gain weight and be healthy. Many smokers complain about possibly gaining weight after quitting. Here are ways to eat healthy and reduce your chances of weight gain:

- Make sure you have a well balanced diet in terms of protein, carbohydrates, and fats
- Drink water before meals
- Chew on sugarless gum or candy

- Plan meals carefully
- Have low calorie foods around for snacking such as baby carrots, fresh fruits, popcorn, sunflower seeds
- Join an organized sports group, or exercise by yourself daily

You can quit for keeps.

Resources

Here are some Internet smoking cessation resources that you may find helpful.

American Cancer Society

The American Cancer Society leads the fight against cancer through prevention, programs, patient services, detection, and advocacy.

American Lung Association

The American Lung Association's mission is to prevent lung disease, such as lung cancer, and promote lung health.

Centers for Disease Control and Prevention's Office of Smoking and Health

The CDC's mission is to prevent and control disease, injury, and disability. The Office of Smoking and Health provides information, research, and resources on tobacco.

National Cancer Institute

The National Cancer Institute is a government cancer research center. It has information on many different cancers.

Appendix F

Kick It! Baseline Survey

Kick It! **Survey**

The ***Kick It!*** Program at the University of Georgia is conducting a survey about cigarette smoking and tobacco use. Your help will give us information to better help other college smokers stop smoking. It should take about 20 minutes to complete. Completing the survey is voluntary. You do not have to answer any questions that make you uncomfortable, and you may stop the survey at any time.

Some students will be asked to provide a saliva (spit) sample at a later date. This sample will be tested for a chemical called cotinine, which is produced in the body following cigarette smoking. Measuring this will allow us to verify the responses you provide. No other tests will be conducted on the saliva, and there is no way that the sample or the results will be linked back to you. Your answers will remain confidential.

Your help in taking this survey is important to helping young adults quit smoking. Remember that you will receive $35 for participating in this program.

Are you male or female?		
	☐	Male
	☐	Female

☐

What year of college are you in?		
	☐	Freshman
	☐	Sophomore
	☐	Junior
	☐	Senior
	☐	Other

Are you a fulltime or part-time student?

- ☐ Fulltime
- ☐ Part-time

☐

Which of the following best describes you?

- ☐ White (non-Hispanic)
- ☐ Black (non-Hispanic)
- ☐ Hispanic
- ☐ Asian
- ☐ Other

☐

Are you currently a smoker?

- ☐ Yes, I currently smoke
- ☐ No, I quit within the last 6 months
- ☐ No, I quit more than 6 months ago
- ☐ No, I have never smoked

☐

At what age did you first smoke a cigarette?

☐

How many of your three closest friends smoke?

☐

How many cigarettes have you smoked in the past 30 days?

☐

How many cigarettes have you smoked in the past 7 days?

How many cigarettes have you smoked in the last 24 hours?

The following are some statements concerning smoking. Please indicate whether or not you agree with each of them.

Smoking is extremely dangerous to my health					
A cigarette calms me down when I am stressed					
It bothers me to be dependent on cigarettes					
Smoking gives me very bad breath					
I like to hold a cigarette between my fingers					
My cigarette smoke bothers other people a great deal					
Smoking calms me down when I am upset					
Smoking is bad for my skin					
My cigarette smoke leaves an unpleasant smell					
I would have more energy if I did not smoke					
Smoking is ruining my health					
My second-hand smoke is dangerous to those around me					

It feels so good to smoke	☐ ☐ ☐ ☐ ☐
After a cigarette, I am able to concentrate better	☐ ☐ ☐ ☐ ☐
I like the motions of smoking	☐ ☐ ☐ ☐ ☐
A cigarette helps me deal with difficult situations	☐ ☐ ☐ ☐ ☐
I love smoking	☐ ☐ ☐ ☐ ☐
I spend too much money on cigarettes	☐ ☐ ☐ ☐ ☐

☐

☐

The following section has situations that lead some people to smoke. How confident are that you would not smoke in this situation? Please answer the following questions using point scale from

With friends at a party	☐ ☐ ☐ ☐ ☐
When I first get up in the morning	☐ ☐ ☐ ☐ ☐
When I am very anxious and stressed	☐ ☐ ☐ ☐ ☐
Over coffee while talking and relaxing	☐ ☐ ☐ ☐ ☐
When I feel I need a lift	☐ ☐ ☐ ☐ ☐

When I am very angry about something or someone	☐ ☐ ☐ ☐ ☐
With my spouse or close friend who is smoking	☐ ☐ ☐ ☐ ☐
When I realize I haven't smoked for a while	☐ ☐ ☐ ☐ ☐
When things are not going my way and I am frustrated	☐ ☐ ☐ ☐ ☐

☐

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

Are you seriously thinking of quitting smoking?

- Yes, within the next 30 days
- Yes, within the next 6 months
- No, not thinking of quitting

Submit Reset

Appendix G

Kick It! Posttest Survey

Kick It! Survey

The ***Kick It!*** Program at the University of Georgia is conducting a survey about cigarette smoking and tobacco use. Your help will give us information to better help other college smokers stop smoking. It should take about 20 minutes to complete. Completing the survey is voluntary. You do not have to answer any questions that make you uncomfortable, and you may stop the survey at any time.

Some students will be asked to provide a saliva (spit) sample at a later date. This sample will be tested for a chemical called cotinine, which is produced in the body following cigarette smoking. Measuring this will allow us to verify the responses you provide. No other tests will be conducted on the saliva, and there is no way that the sample or the results will be linked back to you. Your answers will remain confidential.

Your help in taking this survey is important to helping young adults quit smoking. Remember that you will receive $35 for participating in this program.

Are you currently a smoker?

- ☐ Yes, I currently smoke
- ☐ No, I quit within the last 6 months
- ☐ No, I quit more than 6 months ago
- ☐ No, I have never smoked

☐

How many cigarettes have you smoked in the past 30 days?

☐

☐

How many cigarettes have you smoked in the past 7 days?

☐

☐

How many cigarettes have you smoked in the last 24 hours?

The following are some statements concerning smoking. Please indicate whether or not you agree with each of them.

Smoking is extremely dangerous to my health	☐	☐	☐	☐	☐
A cigarette calms me down when I am stressed	☐	☐	☐	☐	☐
It bothers me to be dependent on cigarettes	☐	☐	☐	☐	☐
Smoking gives me very bad breath	☐	☐	☐	☐	☐
I like to hold a cigarette between my fingers	☐	☐	☐	☐	☐
My cigarette smoke bothers other people a great deal	☐	☐	☐	☐	☐
Smoking calms me down when I am upset	☐	☐	☐	☐	☐
Smoking is bad for my skin	☐	☐	☐	☐	☐
My cigarette smoke leaves an unpleasant smell	☐	☐	☐	☐	☐
I would have more energy if I did not smoke	☐	☐	☐	☐	☐
Smoking is ruining my health	☐	☐	☐	☐	☐
My second-hand smoke is dangerous to those around me	☐	☐	☐	☐	☐
It feels so good to smoke	☐	☐	☐	☐	☐
After a cigarette, I am able to concentrate better	☐	☐	☐	☐	☐
I like the motions of smoking	☐	☐	☐	☐	☐
A cigarette helps me deal with difficult situations	☐	☐	☐	☐	☐

I love smoking					
I spend too much money on cigarettes					

The following section has situations that lead some people to smoke. How confident are that you would not smoke in this situation? Please answer the following questions using point scale from

With friends at a party					
When I first get up in the morning					
When I am very anxious and stressed					
Over coffee while talking and relaxing					
When I feel I need a lift					

When I am very angry about something or someone					
With my spouse or close friend who is smoking					
When I realize I haven't smoked for a while					
When things are not going my way and I am frustrated					

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

Are you seriously thinking of quitting smoking?

Yes, within the next 30 days

	☐	Yes, within the next 6 months
	☐	No, not thinking of quitting

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

Since the last contact, how many times have you quit smoking for at least 7 days?

During the last 2 months, how many times have you quit smoking for at least 24 hours?

During the last 2 months, how many times have you quit smoking for at least 7 days?

Have you participated in any other program(s) to help you quit smoking during the Kick It! program?

	☐	Yes
	☐	No

Continue

Appendix H

Process Evaluation Interview Consent Form

Informed Consent Form
[on UGA letterhead]

I, _____ agree to part in the research titled "Formative Research for an Internet Smoking Cessation Program for College Students" conducted by Ms. Cam Escoffery from the Department of Health Promotion and Behavior at the University of Georgia, under the direction of Dr. Laura McCormick. I understand that I do not have to take part if I do not want to. I can stop taking part without giving any reason, and without penalty. I can ask to have all of the information about me returned to me, removed from the research records, or destroyed.

Purpose of the Study:
The purpose of this research is to understand the strengths, weaknesses, and recommendations for changes to improve the *Kick It!* Program. This program is an Internet-based program to motivate college smokers to quit smoking. I am being asked to participate because I am a college smoker who attended the program. Up to twelve people may be participating in the interviews from the University of Georgia.

Procedure:
The interview will consist of a series of questions regarding cigarette smoking and quitting experiences. In addition, I will be asked about potential ways to attract other smokers to the program and reactions to program components. One interviewer will ask the questions. The session will also be tape-recorded. This focus group will last approximately 30 minutes.

If I volunteer to take part in this research, I will be asked to do the following things:
1) Answer questions about my smoking history and quitting experiences
2) Answer questions about the smoking cessation program

Risks:
No discomforts or stresses are expected. There is no risk involved in this research. I may withdraw from the interview at any time without consequence.

Benefits:
There may be no direct benefit to me as a result of this study besides receiving $10 for answering questions. The purpose of this study is to learn about my experiences with the program, therefore the information learned from this study may help develop intervention to help me quit smoking.

Confidentiality:
All information concerning me will be kept private and confidential. If information about me is published in an article, it will be written in a way that I cannot be recognized. The audiotapes will only be accessible to the research team and the transcriber for transcription without any identifiers. In the event that my smoking information is used in the *Kick It!* Cessation Program as materials for the personal stories component, it will only be for educational or public health purpose. The *Kick It!* Program will only be accessible to intervention participants and health professionals at public health professional meetings.

Contact Persons:
To make inquiries concerning this study, contact Ms. Cam Escoffery at (706) 542-8060.

I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to volunteer for this study.

_____ _____

Cam Escoffery, MPH, CHES, Principal Investigator Date

_____

Signature of Participant Date

Appendix I

Process Evaluation Interview Protocol

Start Time: _____ End Time: _____

My name is Cam Escoffery. I am a doctoral student at the University of Georgia in the Health Promotion and Behavior department. Currently, I am working in on a research grant to help college students quit smoking and to develop a smoking cessation program.

Our purpose here today is talk to you about your smoking experiences with the Kick It! program. I will ask you questions about what you liked about the program, what you disliked and suggestions you would make for changing the program. We hope that you will give us honest answers and opinions on these questions.

I am audio-taping this session and a professional transcription company will transcribe the audiotapes. What you say will never be specifically attributed to you without your consent, so please feel comfortable expressing your true feelings. The tapes merely ensure that no information is lost before it can be used to help improve our efforts to help college smokers.

At the end of this session, each of you will be given $20 in thanks for your participation.

Before we begin, I would like to go around the room and have each person introduce herself and tell me what grade you are in.

[participants introduce themselves]

Thank you. Now let's begin.

I have a list of questions that I am going to read. As I read each question I'd like each of you to respond to the question.

Keep in mind, I want to know the following:

1. *Thoughts about program*
2. *What they liked /disliked*
3. *What they would change*

1. Tell me how you participated in the program. (# of sessions)

Areas:

Personalized Forms

Quizzes

Discussion Board

Personal Stories

Ask the Expert

2. What did you like best about the program? Or what has been most helpful to you in terms of thinking about quitting?

Content:

Interactivity:

3. What did you like the least about the program?

4. What would you suggest changing?

5. What should be continued just as it was in the program?

6. What other recommendations for web-based programs targeted for college students would you make?

7. Do you have any other advice about the program?

Thank you very much for participating. As I said, this information will be extremely valuable as I plan the smoking cessation program for college smokers.

Appendix J

Comparison of Respondents and Non-respondents

Respondents and Non-respondents at Posttest

	Group			
	Respondents (n = 43)	Non-respondents (n = 27)	Statistic	p value
Gender				
Female	30 (69.8%)	14 (51.9%)		
Male	13 (30.2%)	13 (48.1%)	2.3	.13[a]
Ethnicity				
White (non-Hispanic)	40 (93.1%)	25 (92.6%)		
Black (non-Hispanic)	1 (2.3%)	0		
Hispanic	1 (2.3%)	0		
Asian/Pacific Islander	0	1 (3.7%)		
Other	1 (2.3%)	1 (3.7%)	3.0	.57[a]
Grade				
Freshman	6 (14.0%)	3 (11.1%)		
Sophomore	6 (14.0%)	2 (7.4%)		
Junior	10 (23.2%)	11 (40.8%)		
Senior	17 (39.5%)	7 (25.9%)		
Other	4 (9.3%)	4 (14.8%)	3.8	.44[a]
Age (mean, SD)	20.7 (1.8)	22.0 (2.5)	-2.2	.04*[b]
No. of cigs. smoked	8.1 (7.7)	10.8 (7.7)	-1.4	.16[b]
No. quit attempts	8.2 (9.8)	4.5 (5.2)	1.8	.07[b]
Stages				
Preparation	15 (86.2%)	7 (31.8%)		
Contemplation	28 (58.3%)	20 (41.7%)	0.6	.43[a]
Self-efficacy	20.6 (6.7)	22.0 (8.4)	-0.8	.42[b]
Adverse effects	39.2 (7.1)	42.4 (4.9)	-2.0	.04*[b]
Benefits	15.6 (2.8)	16.1 (2.5)	-0.7	.46[b]
Pleasure	14.6 (3.2)	14.8 (3.0)	-0.3	.75[b]

[a]Chi-square test for homogeneity. [b]Independent sample t-test. * $p < .01$.

Comparison of Respondents and Non-respondents

Respondents and Non-respondents at 6-Month Follow-up

	Group			
	Respondents (n = 48)	Non-respondents (n = 22)	Statistic	p value
Gender				
Female	31 (64.6%)	13 (59.1%)		
Male	17 (35.4%)	9 (40.9%)	0.3	.58[a]
Ethnicity				
White (non-Hispanic)	45 (93.7%)	20 (91%)		
Black (non-Hispanic)	1 (2.1%)	0		
Hispanic	1 (2.1%)	0		
Asian/Pacific Islander	0	1 (4.5%)		
Other	1 (2.1%)	1 (4.5%)	3.4	.49[a]
Grade				
Freshman	7 (14.6%)	2 (9.1%)		
Sophomore	5 (10.4%)	3 (13.6%)		
Junior	13 (27.1%)	8 (36.4%)		
Senior	18 (37.5%)	6 (27.3%)		
Other	5 (10.4%)	3 (13.6%)	1.3	.82 [a]
Age (mean, SD)	20.9 (2.0)	22.0 (2.5)	-1.9	.06[b]
No. of cigs. smoked	8.9 (7.9)	9.6 (7.7)	-0.3	.75[b]
No. quit attempts	7.4 (9.3)	5.5 (6.4)	0.8	.40[b]
Stages				
Preparation	17 (35.4%)	5 (22.7%)		
Contemplation	31 (64.6%)	17 (77.3%)	1.1	.29[a]
Self-efficacy	22.5 (7.0)	18.3 (7.6)	2.3	.02*[b]
Adverse effects	39.5 (7.2)	42.4 (4.4)	-1.6	.10[b]
Benefits	15.6 (2.6)	16.0 (3.1)	-0.4	.64[b]
Pleasure	14.8 (3.2)	14.4 (3.1)	0.6	.60[b]

[a]Chi-square test for homogeneity. [b]Independent sample t-test. * $p < .01$.

Appendix K

Baseline Comparisons of Groups at Posttest

Characteristic (mean, SD)	Range	Group		Statistic	p-value
		Intervention (n = 24)	Control (n = 19)		
Age of 1st cigarette	10-20	14.9 (1.9)	15.2 (2.6)	0.4	.71
Number of cigarette smoked	0-30	8.4 (7.9)	7.8 (7.2)	-0.2	.84
Self-efficacy toward quitting	9-40	19.9 (7.3)	21.2 (6.4)	0.6	.55
Attitudes to Smoking					
Adverse effects (10 items)	10-48	40.3 (5.2)	38.3 (8.4)	-0.9	.37
Benefits (4 items)	9-20	15.4 (2.4)	15.7 (3.2)	0.3	.75
Pleasure (4 items)	9-20	14.2 (2.0)	14.9 (4.0)	0.8	.45

Note: The response categories for self efficacy were not all confident to extremely confident (1 to 5), with a higher score indicating higher confidence.
The response categories for attitudes toward smoking ranged from totally disagree to fully agree (1 to 5), with higher scores indicating more agreement.

Baseline Comparisons of Groups at 6-Month Follow-up

Characteristic (mean, SD)	Range	Group		Statistic	p-value
		Intervention (n = 23)	Control (n = 25)		
Age of 1st cigarette	10-18	15.0 (2.0)	14.8 (2.3)	-0.5	.65
Number of cigarette smoked	0-30	8.7 (7.5)	9.2 (8.5)	0.2	.84
Self-efficacy toward quitting	9-43	22.5 (7.1)	22.5 (7.1)	-0.2	.98
Attitudes to Smoking					
Adverse effects (10 items)	10-50	41.2 (5.1)	38.0 (8.5)	-1.5	.14
Benefits (4 items)	9-20	15.4 (1.8)	15.9 (3.1)	0.6	.55
Pleasure (4 items)	9-20	14.8 (2.5)	14.8 (3.8)	0.0	.99

Note: The response categories for self efficacy were not all confident to extremely confident (1 to 5), with a higher score indicating higher confidence.
The response categories for attitudes toward smoking ranged from totally disagree to fully agree (1 to 5), with higher scores indicating more agreement.