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The Adolescent Smoking Prevention Project: A Web-Based Smoking Prevention for Adolescents

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The Adolescent Smoking Prevention Project:
A Web-Based Smoking Prevention for Adolescents

by

Whitney N. Brown

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A Dissertation submitted in partial satisfaction of
the requirements for the degree
Doctor of Philosophy in Clinical Psychology

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September 2016

Each person whose signature appears below certifies that this dissertation in his/her opinion is adequate, in scope and quality, as a dissertation for the degree Doctor of Philosophy.

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CONTENT

TABLES

ABBREVIATIONS

ASPP	Adolescent Smoking Prevention Project
SE	Self-Efficacy
OE	Outcome Expectancies
Cl$^-$	Confidence Interval
SD	Standard Deviation
GPA	Grade Point Average
M	Mean

ABSTRACT OF THE DISSERTATION

The Adolescent Smoking Prevention Project:

A Web-Based Smoking Prevention for Adolescents

by

Whitney N. Brown

Doctor of Philosophy, Clinical Psychology
Loma Linda University, September 2016
Dr. Holly E. R. Morrell, Chairperson

In 2014 2.5% of middle school students and 9.2% of high school students

reported smoking cigarettes in the past 30 days (CDC, 2014). However, there is currently

a lack of evidence-based programs targeting prevention of adolescent smoking. The

current study evaluated the effectiveness of a novel web-based adolescent smoking

prevention program, the Adolescent Smoking Prevention Project (ASPP), based on the

sensitization-homeostasis theory of nicotine dependence and developed by the study

investigators. A sample of 54 adolescents (aged 12-15) were recruited from public

schools in Southern California. Of these adolescents 26 were randomly assigned to the

ASPP program and 28 were randomly assigned to the control group. Results of two-way

ANOVAs indicated that the intervention group endorsed greater positive smoking

expectancies compared to the control group. Results of hierarchical multiple linear

regression analyses indicated that resistance self-efficacy significantly predicted

participants' willingness to try a cigarette if offered and to refuse an offer of a cigarette.

Furthermore, both negative social impressions and negative affect reduction expectancies

significantly predicted participants' willingness to leave the situation if offered a

cigarette. Gender, resistance self-efficacy and social facilitation outcome expectancies

(OEs) significantly predicted participants' intentions to smoke in the future. These results suggest that positive smoking expectancies and benefits need to be targeted in prevention/intervention efforts in order to reduce adolescents' susceptibility to smoking. When designing smoking prevention programs, content should target multiple factors in order to have a significant impact on smoking behavior of adolescents. Future research should continue to evaluate the effectiveness of the ASPP intervention in order to determine whether this innovative approach to addiction education and smoking prevention is effective and should be more widely disseminated.

CHAPTER ONE

BACKGROUND, RATIONALE, AND LITERATURE REVIEW

Cigarette Smoking as a Major Public Health Concern

Tobacco smoking remains the leading preventable cause of death in the United

States, with a global prevalence of 1 billion smokers worldwide (Tingen, Andrews, &

Stevenson, 2009). According to the Centers for Disease Control and Prevention in 2014,

17.8% of U.S. adults age 18 and over are current smokers (18 out of every 100 adults;

CDC, 2014). Additionally, in 2014 2.5% of middle school students and 9.2% of high

school students reported past month smoking (CDC, 2014). Additionally, tobacco

smoking poses a high risk for developing various types of preventable diseases including

cancer, heart disease, stroke and emphysema (WHO, 2004). Approximately 1 in 5 deaths

in the U.S. are attributed to tobacco use, which is about 480,000 deaths per year (CDC,

2014). On a more global scale, it has been estimated that over 13,000 people die per day

from tobacco-related diseases (WHO, 2004). The per year cost of human life associated

with tobacco use is cause for concern; however, the annual economic costs are also

problematic, with tobacco smoking accounting for $300 billion dollars in costs per year,

which can be broken down to include $170 billion for direct medical care and more than

$156 billion in lost productivity (including $5.6 billion in lost productivity due to

secondhand smoke exposure) every year in the United States (CDC, 2014).

It is clear that tobacco smoking is a very prevalent issue among both the adult and

child/adolescent population; however, the biggest problem with this issue lies in the

morbidity/mortality rate associated with cigarette smoking and the highly addictive

nature of nicotine. It is estimated that 50% of all lifetime tobacco users die from some

form of tobacco use (Dobbins, DeCorby, Manske, & Goldblatt, 2008). Given that approximately 1/5th of the U.S. population engages in cigarette smoking, combined with the high rate of death and conditions associated with the use of tobacco that significantly diminish quality of life, there is grave cause for concern based on the highly addictive nature of nicotine. It has been reported that although 70% of U.S. smokers have a desire to quit, only 5% are actually able to sustain cessation for a year or more (Civljak, Sheikh, Stead, & Car, 2010). The high capacity for nicotine addiction explains the high rates of smoking observed among the population despite the well known health related consequences, because many smokers are unable to quit despite knowledge or even direct experience with the devastating consequences.

Initiation of Cigarette Smoking during Adolescence

Tobacco use is a problem maintained across the lifespan which is typically first initiated during adolescence before individuals have reached the legal smoking age (Cokkinides, Bandi, McMahon, Jemal, Glynn, & Ward, 2009), with nearly 9 out of 10 cigarette smokers having first tried smoking by age 18 (CDC, 2014). Additionally, it has been reported that an estimated 3 million adolescents are current smokers (SAMHSA, 2007) and everyday nearly 3,800 youth 18 years of age or younger try smoking for the first time and an additional 2,100 become daily smokers (CDC, 2014). What is even more problematic is that despite the recent trend of a decline in adult tobacco smoking, adolescent smoking rates have not shown a parallel decline and remain much higher than would be expected (Amos, Wiltshire, Haw, & McNeill, 2006; Rosen & Maurer, 2008). This may in large part be due to the fact that adolescent susceptibility to cigarette

smoking has failed to decline in recent years (CDC, 2010), possibly due to ineffective prevention and intervention efforts. It has been found that once an individual is past this period of high vulnerability (during adolescence), an individual who has not become a smoker is unlikely to ever become one (Wang, Henley, & Donovan, 2004), thus highlighting the importance of preventing the initiation of smoking behavior during this age period.

Predictors of Susceptibility, Initiation and Development of Adolescent Smoking

Factors that predict initiation and development of adolescent smoking behavior as well as susceptibility to smoking are important to understand in the design of a smoking prevention program for this age group. Understanding these underlying predictors of adolescent smoking is especially important when evaluating an intervention program to determine if the program is effective above and beyond the influence of these common factors. Additionally, certain predictors of adolescent smoking are malleable to change and can be targeted in the program itself (e.g., outcome expectancies). Some of the most commonly cited predictors of adolescent smoking include smoking behavior of significant others, various demographic factors (including academic performance), exposure to tobacco marketing, engagement in other risk behaviors including other substance use, outcome expectancies, perceptions of the risks and benefits of smoking, intentions/willingness to smoke (also termed susceptibility to smoking), and resistance self-efficacy, with the latter half of the list including those predictors which may be malleable to change and can be included as outcomes when evaluating intervention programs.

Having significant others (e.g., parents, siblings and friends) in one's life who smoke has consistently been shown to predict susceptibility, initiation and development over time of smoking behavior among adolescents (Forrester, Biglan, Severson, & Smolkowski, 2007; Hiemstra et al., 2011; Scherer et al., 2012; Tjora, Hetland, Aaro, & Overland, 2011). Studies have found that 60% of children are exposed to secondhand smoke, with 25% of them being exposed to secondhand smoke at home (Racicot, McGrath, & O'Loughlin, 2011), indicating that a great number of children are exposed to smokers that are significant others. The greater the number of smokers that children are exposed to increases their susceptibility to smoking and expected benefits from smoking, which in turn predict smoking initiation (Racicot et al., 2011). Moreover, the greater number of smokers that children are exposed to also increases their perception that nicotine dependence contributes to maintenance of smoking behavior over time (Racicot et al., 2011). Furthermore, it has been suggested that exposure to environmental tobacco smoke may exert both a genetic and environmental influence on adolescents' propensity towards smoking initiation (Seo, Torabi, & Weaver, 2008). In fact, exposure to significant others' smoking may serve both as social modeling and a biological risk factor due to neuroadaptations to nicotine that occur in the brain as a result of exposure to environmental tobacco smoke (Racicot et al., 2011). Given the strong effect of the smoking behavior of significant others on adolescents' smoking, it is important to control for others' smoking when evaluating the effectiveness of any smoking intervention.

Smoking initiation is also correlated with a number of demographic factors including both SES and race/ethnicity, with white adolescents exhibiting the highest smoking rates and African-Americans exhibiting the lowest smoking rates, and with

those from lower socioeconomic groups typically exhibiting higher smoking rates compared to those from higher socioeconomic groups (Ferguson & Meehan, 2011; Scherrer et al., 2012; Vidrine, Anderson, Pollack, & Wetter, 2005). However, it should be noted that a trend towards an increase in smoking among Hispanic adolescents has been noted in the literature (Vidrine et al., 2005). A unique demographic factor that has also been cited in the literature in relation to smoking initiation is grade point average (GPA). Even after controlling for social influences such as parental smoking status, having average grades of C or lower still has strong predictive value in determining smoking initiation (Forrester et al., 2007). Conversely, it has also been reported that having a higher GPA serves as a protective factor against smoking, resulting in a 75% decrease in the likelihood of being an early smoker (Ferguson & Meehan, 2011; Morin et al., 2011). It has been suggested that GPA may be a mediating factor between social factors and smoking, rather than a direct predictor of smoking initiation (Morin et al., 2011).

Another important risk factor for tobacco use among adolescents is exposure to tobacco related media and marketing (Unger et al., 2001), which may take the form of television commercials, billboards, magazine ads and depictions of tobacco smoking in popular culture (e.g., films and television series). It has been well established that adolescents who have greater exposure and are more receptive to tobacco marketing are more likely to progress to smoking (Forrester et al., 2007; Gilpin, Distefan, & Pierce, 2004). More specifically, exposure to smoking in movies is associated with earlier initiation of smoking among adolescents, as well as the likelihood of being an established smoker during adolescence (Cin, Stoolmiller, & Sargent, 2012; Primack, Longacre, Beach, Adachi-Mejia, Titus, & Dalton, 2012), which is important to note given the

frequency of movie watching among this population and the numerous health related consequences associated with earlier onset of smoking initiation. It is also important to note that current smokers also exhibit greater recognition of anti-tobacco ads (Unger et al., 2001), which may suggest that anti-tobacco marketing can be equally if not more powerful than pro-tobacco advertising if receptivity to these advertisements can be effectively increased. Given that adolescents are inundated with media in multiple settings within their lives, they are likely exposed to a mass array of tobacco marketing; therefore, it is important to consider controlling for the effect of tobacco media exposure when determining the effectiveness of a smoking prevention program.

A substantial body of research in the adolescent risk behavior literature focuses on the correlation and co-occurrence of risk behaviors including substance use, risky sexual activity and criminal activity (Hair, Park, Ling, & Moore, 2009). In fact, research shows that adolescent perceptions of invulnerability to risk increases with age, peaking in young adulthood (e.g. college years; Millstein & Halpern-Felsher, 2002). However, research also shows that adolescents may accurately assess risks and feel some level of vulnerability to these risks. Despite these feelings of vulnerability adolescents are sensitive to the perceived benefits/rewards of a given behavior, which outweigh the costs, leading to engagement in risky behavior (Goldberg, Halpern-Felsher, & Millstein, 2002; Chein, Albert, O'Brien, Uckert, & Steinberg, 2011). The influence of perceived rewards on adolescent decision-making makes sense given the dramatic rise in sensation seeking during adolescence, which is thought to be a form of impulsivity. This impulsivity is thought to be a result of an imbalance in the adolescent brain between reward processing and cognitive control systems that guide decision-making (Romer, 2010; Vorobyev et al.,

2015). It has also been found that adolescents' lack of experience with novel adult behavior leads to an increased risk of experimentation with behaviors such as smoking (Romer, 2010).

Prior research also indicates that associating with delinquent peers is one of the strongest predictors of engaging in substance use including tobacco use, with this predictor being the strongest for adolescents who begin smoking between the ages of 13 and 16 (Ferguson & Meehan, 2011). Additionally, in brain imaging studies adolescents show enhanced reward processing of risk taking when under the influence of peers (Vorobyev, et al., 2015). Moreover, it has been found that children who exhibit externalizing behaviors such as aggression, hyperactivity or conduct disorder in early adolescence are more likely to initiate tobacco use (Ferguson & Meehan, 2011; Korhonen et al., 2012). Given the prevalence of these co-occurrences in risk behaviors among this population it can be inferred that involvement in one risk behavior may be a strong predictor of engagement in other risk behaviors (Ohene, Ireland, & Blum, 2005). A common theoretical explanation of the co-occurrence of risk behaviors is Problem Behavior Theory (Jessor & Jessor, 1977), which states that various risk behaviors are manifestations of the same tendency towards deviance that can be attributed to a common underlying factor of unconventionality (Ohene et al., 2005). That being said, other risk behavior involvement may predict smoking initiation and as a result it is important to control for the influence of these factors when evaluating the effectiveness of a smoking prevention program.

Outcome expectancies (OEs) can be defined as one's belief, expectancies or confidence in the probability of consequences that will result from a certain behavior

(e.g., smoking) and usually involve beliefs about both risks and benefits of using substances (Musher-Eizenman et al., 2003; Stacy, 1997). In the case of substance use, positive OEs are often more powerful predictors of subsequent substance use than negative outcome expectancies, given that awareness of risks associated with substance use alone are not sufficient to sway an adolescent towards abstaining from use when also posed with the perceived benefits of using the substance (Goldberg, 2002; Josendal & Aaro, 2012). Some examples of common smoking outcome expectancies held by adolescents are, "it is not harmful if I don't smoke for an extended period of time," "smoking makes it easier to socialize," and "I will not become addicted if I am not an everyday smoker" (Josendal & Aaro, 2012). Given the strong predictive power of OEs on adolescents' decisions to smoke, it is important to consider tracking these expectancies across the course of a prevention program to determine whether the program effectively changes or influences these expectancies in a way that will decrease the likelihood of smoking initiation.

Another important predictor of progression towards smoking initiation is susceptibility to smoking, which can also encompass willingness and openness to smoking. Smoking susceptibility has been defined as a lack of a permanent commitment among never smokers to not smoke (Racicot et al., 2011). When designing and evaluating smoking prevention programs, it is important to note that smoking initiation does not occur suddenly, but instead follows a course of progression from becoming susceptible to experimentation to progressing to daily smoking (Forrester et al., 2007). Smoking susceptibility in and of itself has predictors which may differ significantly from predictors of actual smoking initiation, which makes this an important factor to assess in

prevention programs where more immediate susceptibility outcomes may be equally if not more important to measure than actual smoking initiation, given that initiation may take much longer to occur and therefore may be harder to track long term (Forrester et al., 2007).

A prominent theoretical model in the research on substance use and addictions is Social Cognitive Theory. Self-efficacy serves as a major component of this theoretical model. Self-efficacy is defined as individuals' perceptions of and confidence in their ability to perform in a way that allows them to influence events that affect their life by determining how they feel, think, behave and motivate themselves (Bandura, 1977). This model has been extended more specifically to focus on substance use and resistance self-efficacy, which is a person's ability to resist offers or opportunities for substance use and even more specific to tobacco, one's ability to remain a non-smoker (Carpenter & Howard, 2009; Hiemstra et al., 2011). Research shows that despite the importance of self-efficacy at baseline in predicting smoking likelihood, the most important factor is ensuring that self-efficacy to resist offers of smoking does not decrease over time (Hiemstra et al., 2011). This suggests that prevention programs can have a significant effect on self-efficacy by increasing or maintaining a non-smoker's initial level of self-efficacy in order to decrease the likelihood that one will initiate smoking. Therefore, it is important to consider evaluating whether a prevention program affects self-efficacy, and whether changes in self-efficacy predict rates of smoking initiation.

Currently Available Adolescent Smoking Prevention Programs

Given that long-term smoking is usually first initiated during adolescence,

prevention rather than intervention efforts are an important focus for addressing this public health epidemic. As with most substance use prevention efforts, school based programs serve as the traditional setting for tobacco use prevention among young people (Muller-Riemenschneider et al., 2008). However, previous research shows that prevention efforts in this setting have failed to produce long term effectiveness (Dobbins, DeCorby, Manske, & Goldblatt, 2008), but whether this is attributable to the setting, program content or a combination of the two is not completely clear. This lack of effectiveness ultimately signals the need for alternative prevention efforts targeted at this age group. Furthermore, as with other substance use prevention programs, there currently is a need for evidenced based practices targeting adolescent smoking based on the fact that there is a lack of more recently evaluated programs available to this age group (Sherman & Primack, 2009).

Despite the lack of evidence-based programs currently available and the failure to offer smoking prevention programs in more efficacious settings, support has been found for a variety of specific components of tobacco smoking preventions/interventions that may be effective. Studies have found that tailored programs have greater effectiveness than non-tailored (standard delivery) programs (Civlkaj, Sheik, Stead, & Car, 2010; Taualii, Bush, Bowen, & Forquera, 2010), but the latter is typically the approach of the classic, school-based prevention programs. Tailored interventions are those that alter the content delivered based on cultural, ethnic, gender or individual level factors of the participants and typically provide personalized counseling. Furthermore, significant program effects have been noted among prevention/interventions targeting skill building, deconstruction of media messages, attitudes and beliefs about benefits of smoking,

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influences on smoking behavior (such as having friends who are smokers), as well as cognitive and emotional factors that may promote and/or maintain use (Dobbins et al., 2008; Tingen, Andrew, & Stevenson, 2009). Although these specific content components may impact program effectiveness, some studies have noted that specific components may not truly impact efficacy (Rooke, Thorsteinsson, Karpin, Copeland, & Allsop, 2010) and the underlying differences may actually result from method of program delivery. Possible methods of delivery by which programs may exert their effects include: motivational interviewing, follow-up phone calls and booster sessions, use of electronic media, and communication and active participant learning (Civljak et al., 2010).

A more recent approach to adolescent smoking prevention is the use of web-based programs. In a meta-analysis of computer delivered interventions for alcohol and tobacco use it was found that these interventions resulted in a significant decrease in substance use (Rooke et al., 2010). Web-based preventions/interventions are more economical than other forms of intervention. It has been estimated that the cost of implementing a web-based intervention with 8,000 participants per year is comparable to the cost of running a small smoking cessation clinic treating about 600 smokers annually (approximately 50 per month; Civljak et al., 2010). This indicates that web-based preventions/interventions may be much more cost effective and highly accessible to a wide-ranging population of both smokers and those at risk of becoming smokers. This suggests potentially greater utility in this type of program delivery method. Moreover, it has been suggested that web-based preventions/interventions provide a much-needed solution to the issues of stigma, inaccessibility and consistency in delivery method associated with many traditional approaches (Rooke et al., 2010). Web-based programs offer increased protection of

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anonymity when completing an intervention from the privacy of one's personal computer. They also eliminate the need for transportation to and from a program site, which may be a barrier to program participation, especially for adolescents who rely on parents and other adults for transportation, and are easily accessible to individuals in rural populations who often live too far from interventions that are typically offered in urban areas. Furthermore, adolescents currently spend a large amount of time using technology (including social media and texting), and therefore a web-based intervention may be more acceptable and appealing to an adolescent compared to a traditional face-to-face intervention. A critical gap exists in research studies that have analyzed the long-term effects of web-based smoking preventions (Civljak et al., 2010) and therefore it is unknown whether this delivery method produces greater or equal effects of non web-based preventions/interventions.

Adolescents' Understanding of Addiction

One reason that adolescents may engage in smoking, despite the numerous public health warnings and school-based prevention programs, may be due to their lack of understanding of the addiction process. Since nicotine dependence has been classified as the most common life threatening condition among the pediatric population (Tingen et al., 2009), it is imperative for adolescents to have a realistic and accurate understanding of how to recognize addiction and the course of its occurrence. Simply teaching skills to resist peer pressure to smoke cigarettes may be ineffective when more biologically based influences such as dependence are at play (O'Loughlin et al., 2002). Unfortunately, concepts of addiction are rarely, if at all, addressed in current prevention and cessation

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programs despite the fact that 20-60% of adolescent smokers are classified as dependent on nicotine (Wang, Henley, & Donovan, 2004).

Studies show that adolescents view addiction as a uniquely adult phenomenon and do not connect dependency on nicotine to child/adolescent smoking (Rugkasa, Knox, Sittlington, Kennedy, Treacy, & Abaunza, 2001). One possible explanation for this is that adolescents perceive themselves as having a false sense of control over their smoking behavior (Amos et al., 2006), believing that addiction only occurs after a prolonged period of use (e.g., in adulthood) where smoking becomes a *necessary* method to reduce anxiety, stress and other "adult" problems. In contrast, adolescents typically perceive their smoking behavior as merely a matter of habit, often smoking in social settings to fit in or communicate a particular image, which can be willfully ceased when the individual desires (Rugkasa et al., 2001). It is clear from this line of research that adolescents have a very poor understanding of how and when addiction occurs.

Early Onset of Nicotine Addiction

An interaction has been found between adolescents' understanding of how long it takes to become addicted and propensity toward experimentation with cigarette smoking (Wang, Henley, & Donovan, 2004), suggesting that time to nicotine addiction/dependence needs to be at the forefront of prevention efforts. The classic definition of nicotine dependence holds that a large enough nicotine intake to sustain blood levels progressively throughout the day is required to cause dependence. However, a pivotal shift in the field's understanding of what it takes to become addicted came about in 2000 with Joseph DiFranza's work on the Development and Assessment of Nicotine

Dependence in Youth (DANDY) study (DiFranza, 2002). This study provided evidence that withdrawal symptoms, a primary marker of dependence, could occur before the onset of daily smoking. This new conceptualization of the early onset of nicotine is colloquially referred to as "hooked from the first cigarette (or first puff)," but is more formally referred to as the sensitization-homeostasis theory. This theory suggests that escalation of smoking does not arise from the pursuit of pleasure, as traditionally thought, but instead arises from early dependence that may not be readily apparent to the smoker during initial stages and that shows a dose-response relationship (the more you smoke the more likely dependence is to occur; Doubeni, Reed, & DiFranza, 2010). Contrary to adolescents' common beliefs about nicotine dependence during adolescence, 10% of adolescents show dependence after smoking their first cigarette and 25% show dependence within 2 weeks of beginning to smoke (DiFranza & Richmond, 2008). It has been found that even limited exposure to nicotine can change the brain by modifying neurons in ways that stimulate cravings and thereby reinforce dependence (DiFranza & Richmond, 2008).

Several key symptoms of early dependence that have been noted in the literature include latency to needing a cigarette (LTNC) and loss of autonomy over smoking. A shorter LTNC leads to more cigarettes being smoked out of necessity than for pleasure (Ursprung, Morello, Gershenson, & DiFranza, 2011), while loss of autonomy occurs when quitting would be extremely difficult or unpleasant (DiFranza, Sweet, Savageau, & Ursprung, 2011). It can be inferred based on the above findings that many adolescent smokers are experiencing these physiological symptoms (depending on their level of susceptibility). However, based on the limited evidence available, which suggests that adolescents do not understand addiction, they may lack the knowledge to recognize these

symptoms as such. This highlights the importance of teaching adolescents how to recognize these symptoms and helping them to understand the likelihood of addiction occurring essentially from the first cigarette, given that this may effectively deter them from experimenting with cigarette smoking as a result of the fear of addiction (Wang, Henley, & Donovan, 2004). DiFranza's body of work in this area provides an emerging theory with a wealth of support; however, to date this research has yet to be effectively integrated into an adolescent smoking prevention program.

Significance of the Present Study

The current study was an initial pilot test of the effectiveness of a novel and innovative web-based adolescent smoking prevention program developed by the study investigators, Whitney Brown, M.A. and Holly E. R. Morrell, Ph.D. The program is based on DiFranza's sensitization-homeostasis theory of the development of nicotine dependence, which to date has yet to be incorporated into any publicly disseminated intervention or prevention program for adolescent smoking. This study was designed to investigate the role that adolescents' understanding of addiction plays in development of smoking behavior and to add to the limited body of research on this topic. Additionally, we hope to use the findings from this study to improve and more widely disseminate this program and other programs of this type.

Aims and Objectives

The current study was designed to test the effectiveness of a web-based adolescent smoking prevention program (the Adolescent Smoking Prevention Program,

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or ASPP) rooted in DiFranza's theory of early onset of nicotine dependence. The program was tested against a control group condition where participants did not receive any form of intervention/prevention (beyond what may be standard in their school setting) to determine the impact of the ASPP approach on adolescents' willingness and intentions to smoke, understanding of addiction, smoking outcome expectancies, perceptions of the risk and benefits of smoking, and resistance self-efficacy above and beyond the effects of other common predictors of smoking behavior (e.g., gender, age, ethnicity, GPA, significant others that smoke, exposure to tobacco media and marketing).

The proposed study used a pre-post repeated measures designed to achieve the specific aims, which were to: (1) Evaluate the effect of the ASPP on adolescents' willingness and intentions to smoke in the future, above and beyond other common predictors of smoking behavior; (2) Evaluate the effect of the ASPP on adolescents' understanding of the addiction process; (3) Evaluate the effect of the ASPP on adolescents' smoking perceptions and outcome expectancies; (4) Evaluate the effect of the ASPP on adolescents' resistance self-efficacy (perceived ability to competently resist offers of smoking); and (5) Determine if the ASPP's effects are significantly greater than receiving no intervention at all.

Hypotheses

We hypothesized that, compared to participants in the control group condition, participants who completed the ASPP web-based intervention would report weaker willingness/intentions to smoke and belief in a shorter latency to addiction, more negative smoking outcome expectancies, greater resistance self-efficacy, fewer perceived benefits

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from smoking and greater perceived short and long term risks from smoking, after completing the intervention. Additionally, we hypothesized that participants who completed the ASPP web-based intervention would demonstrate larger changes in smoking related attitudes, beliefs and perceptions than adolescents who received no intervention at all.

CHAPTER TWO

METHODS

Participants

A sample of 54 adolescents was recruited from junior high and high schools in Southern California to participate in this study. Twenty-six adolescents were randomly assigned to complete the ASPP web-based smoking prevention and 28 adolescents were randomly assigned to the control group condition (no intervention). Participants ranged in age from 12 – 15 years of age, with a mean of 12.9 years ($SD = .71$). Thirty-eight females and 16 males participated in the study. Of the total sample, 59.4% identified as Hispanic/Latino. The racial breakdown of the participants consisted of 27.8% Mixed Race, 24.1% Other, 16.7% Asian/Asian-American, 7.4% White/Caucasian, 5.6% Black/African-American, 1.9% American Indian/Alaska Native, and 16.7% declined to state. Only three participants reported having ever smoked a cigarette, even one puff and one participant reported having ever smoked a whole cigarette in his/her lifetime (See Table 1 for complete demographic data).

Table 1. Participant demographics.

Variable	Total (n = 54)	Intervention (n = 26)	Control (n = 28)	p
Age				
Mean (SD)	12.9 (.71)	12.8 (.63)	12.9 (.79)	0.66[*]
Gender				
Male	16 (29.6%)	9 (34.6%)	7 (25%)	0.44
Female	38 (70.4%)	17 (65.4%)	21 (75%)	
Ethnicity				
Hispanic/Latino	32 (59.3%)	13 (50%)	19 (67.9%)	0.18
Non-Hispanic/Latino	22 (40.7%)	13 (50%)	9 (32.1%)	
Race				
American Indian/Alaska Native	1 (1.9%)	0 (0%)	1 (3.6%)	0.61
Asian/Asian American	9 (16.7%)	5 (19.2%)	4 (14.3%)	
Black/African American	3 (5.6%)	2 (7.7%)	1 (3.6%)	
White/Caucasian	4 (7.4%)	2 (7.7%)	2 (7.1%)	
Other	13 (24.1%)	5 (19.2%)	8 (28.6%)	
Mixed Race	15 (27.8%)	10 (38.5%)	5 (17.9%)	
Did Not State	9 (16.7%)	2 (7.7%)	7 (25%)	
Grade Level				
7th Grade	15 (27.8%)	8 (30.8%)	7 (25%)	0.88
8th Grade	33 (61.1%)	15 (57.7%)	18 (64.3%)	
9th Grade	6 (11.1%)	3 (11.5%)	3 (10.7%)	
Current Living Situation				
With Parents	35 (64.8%)	17 (65.4%)	18 (64.3%)	0.53
With Mother Only	2 (3.7%)	0 (0%)	2 (7.1%)	
Half Time w/Mother and Father	7 (13%)	3 (11.5%)	4 (14.3%)	
With Parent & Stepparent	4 (7.4%)	2 (7.7%)	2 (7.1%)	
With Grandparent(s)	1 (1.9%)	1 (3.8%)	0 (0%)	
Other	4 (7.4%)	3 (11.5%)	1 (3.6%)	
Did Not State	1 (1.9%)	0 (0%)	1 (3.6%)	
Participation in Organized Sports				
No	32 (59.3%)	18 (69.2%)	14 (50%)	0.20
Yes	21 (38.9%)	8 (30.8%)	13 (46.4%)	
Did Not State	1 (1.9%)	0 (0%)	1 (3.6%)	
Grade Point Average (GPA)				
Mean (SD)	3.62 (.42)	3.60 (.44)	3.64 (.41)	0.73[*]
Ever Smoked In Lifetime (Even One Puff)				
No	49 (90.7%)	23 (88.5%)	26 (92.9%)	0.65
Yes	3 (5.6%)	1 (3.8%)	2 (7.1%)	
Did Not State	2 (3.7%)	2 (7.7%)	0 (0%)	
Smoked Whole Cigarette In Lifetime				
No	51 (94.4%)	23 (88.5%)	28 (100%)	0.28

Yes	1 (1.9%)	1 (3.8%)	0 (0%)
Did Not State	2 (3.7%)	2 (7.7%)	0 (0%)

Note: [*] Indicates *t*-test, all other *p*-values denote Chi-Square tests.

Procedures

Recruitment and Screening

Participants were recruited from public junior high and high schools in Southern California. A brief overview of the study and information about how to proceed with participating in the study were presented to potential participants via brief five-minute in-class presentations given by study personnel. At that time, parental consent forms were distributed. The consent form contained contact information for study personnel in order for parents to contact research personnel with any questions about the study that they might have. All potential participants were reassured that participation was voluntary and that they could decline to participate at any time before or during the study. Potential participants were instructed that in order to participate in the current study, the consent form had to be signed and dated by at least one parent or designated legal guardian and returned by the following week when study personnel would return to their school to administer the surveys.

Baseline Measurement

One week after the researchers initially presented the study at the various school locations, they returned to the schools to collect the consent forms and proceed with Part 1 of the study. Those adolescents whose parents provided written informed consent for study participation and who still wished to participate in the study were asked to provide

assent via a separate assent form if they were 12 years old or younger; all other participants were required to sign the consent form. Study personnel verified that all required signatures were obtained and all the students who did not have a signed consent form or who did not wish to participate in the study were directed to their teacher for instructions about an alternative activity. At this time, all participants were assigned a study ID number and instructed that they would need this number again in two weeks in order to complete Part 2 of the study online. All pertinent information about how to access the study webpage for Part 2 of the study and who to contact if an ID number was lost or forgotten was also provided at this time. Additional information about the requirements of participating in the study and compensation were provided both at this time and again later via the study webpage.

Each participant was given a study questionnaire and a writing utensil, and general instructions for how to complete the questionnaire were provided. This questionnaire consisted of questions assessing demographics, smoking behavior, understanding of addiction, smoking outcome expectancies, significant others' smoking, perceptions about smoking, intentions/willingness to smoke, other substance use behaviors, resistance self-efficacy, delinquency/conduct problems, psychological reactance and exposure to tobacco messages in the media (see Appendix A). Participants were required to complete a contact information sheet before starting the questionnaire and were informed that this information would be used in order to contact them in two weeks so that they could complete Part 2 of the study. Once each participant completed the questionnaire, study personnel collected the consent form/assent form, contact

information sheet and study questionnaire from him or her and allowed the participant to choose one piece of candy as compensation for completion of Part 1 of the study.

Web-Based Intervention/Control Condition

Two weeks after completing the initial baseline assessment, participants were contacted via email (or telephone if they did not provide an email address) and randomly assigned to either (1) complete the online study questionnaire only or (2) participate in the online ASPP intervention followed by the online study questionnaire. Participants were provided with a link that directed them to the study questionnaire via the Qualtrics website or a link that directed them to the online ASPP intervention (with a link to the study questionnaire via Qualtrics provided at the end of the intervention). Participants were prompted to enter their participant ID (assigned at baseline) at the beginning of the study questionnaire. A reminder about how to retrieve their study ID if it was lost or forgotten was provided both in the email they received and again at the beginning of the online study questionnaire. If a participant failed to complete the questionnaire or intervention one week after the initial email/telephone call was made, research personnel contacted the participant via email/telephone to remind him or her to complete Part 2 of the study. This process was completed approximately every two weeks until the target number of participants completed Part 2 of the study.

The ASPP web-based intervention was developed entirely by the study investigators, Whitney Brown, M.A. and Holly E. R. Morrell, Ph.D., using a theory based approach for developing the intervention. The content of the program is primarily based on DiFranza's sensitization-homeostasis theory of addiction. ASPP is an educationally-

based smoking prevention program that focuses on educating adolescents on the addiction process and how early onset of nicotine addiction occurs using an interactive approach. The study investigators initially sought to use information obtained from adolescent focus groups to develop the program content; however, due to recruitment barriers and time constraints the content of the intervention was based on theory and research on cigarette smoking and addiction. The program teaches adolescents how to recognize what addiction feels like, the likelihood of addiction occurring among adolescents of their age group, and the consequences of addiction in an effort to empower them to make healthy choices and refrain from initiating cigarette smoking (the ASPP intervention can be viewed at http://www.morrellsmokinglab.com/adolescent-smoking-prevention-project---version-b.html).

The ASPP intervention takes approximately 20-40 minutes to complete (based on time estimates provided by study personnel during trial runs of the program). The intervention is a series of webpages/screens that the participants click through at their own pace. Each screen/page consists of either pictures, text or a combination of the two that the participant clicks through and reads. On certain screens there are links to content on other webpages including testimonials by adolescent smokers (whyquit.com). The participants are instructed to click through and choose at least three testimonials to read. The intervention includes thought provoking questions that ask the participant to estimate the likelihood of addiction for adolescents and to think about reasons why addiction may occur among this population. The intervention guides participants through the addiction process, including effects of nicotine on the brain (e.g., neurotransmitters, withdrawal symptoms, cigarette cravings), explanations how addiction can occur from "the first

cigarette," and discusses addiction as not only an adult problem. The content of the program was uniform for each participant completing the intervention.

Post-Test Measurement

Immediately after participants completed the intervention (ASPP condition) or two weeks after they completed the baseline questionnaire (control condition), they completed an online self-report questionnaire that was identical to the paper-and-pencil questionnaire they completed at baseline, with the exception of the addition of qualitative questions assessing participants' satisfaction with the ASPP intervention or suggestions for improvement, and the exclusion of questions assessing their five closest friends' smoking habits/behaviors (see Appendix B for a list of participant comments).

Participant Compensation

Adolescents can be considered a hard-to-retain population. Therefore, participants were informed at the beginning of the study that they had the potential to receive a gift card after completion of both parts of the study: baseline measurement (Part 1) and intervention/post-test measurement (Part 2). Participants were entered in a raffle for the following prizes: one $50 Amazon.com gift card; five $25 Aamzon.com gift cards; ten $10 Amazon.com gift cards. The prizes were mailed to participants following completion of the study.

Measures

A number of potential variables were included for use in the study questionnaire that was administered to participants at baseline and immediate follow-up.

Demographic Characteristics

Participants were asked to respond to a series of questions about their age, gender, race/ethnicity, parents marital status, their current living situation, self-reported academic performance in school, participation in extracurricular activities, and religious preference.

Smoking Behavior

Smoking behavior was measured using a series of questions assessing "have you ever tried smoking a cigarette, even one puff?", "have you ever smoked a whole cigarette?" and "have you smoked 100 whole cigarettes in your lifetime?" Questions were answered with a simple "yes" or "no" response.

Smoking Behaviors of Significant Others

The smoking habits of family members (parents and siblings), other household members, and friends were assessed using ten items adapted from a prior survey of adolescent risk behavior (see Morrell, Song, & Halpern-Felsher, 2010 for an example of a study published using data from the prior survey; see Appendix A).

Perceptions about Addiction

Perceptions about cigarette addiction were measured by having respondents

answer three questions about the ease of smoking cessation and length of time it will take to become addicted and to become a regular smoker based on the assumption that they smoke about two or three cigarettes each day. Responses were on a five-point scale (1 = *Very Easy* to 5 = *Not Very Easy*; 1 = *Will Not Happen* to 5 = *3-4 years*). Each item was analyzed individually; the items were not summed to create a scale. Each individual item tapped into a distinct aspect of the addiction process; therefore, it was deemed most appropriate not to sum these items.

Perceptions about the Risks/Benefits of Smoking

Participants were asked to estimate the likelihood of 15 smoking-related risks and benefits using conditional risk assessments, in which scenarios are used to explicitly place the outcomes under investigation in the context of a specific behavior. Participants were instructed to imagine two separate smoking scenarios. The first scenario evaluates short-term risks and benefits: "Imagine that you just began smoking. You smoke about two or three cigarettes each day. Sometimes you smoke alone, and sometimes you smoke with friends. If you smoke about two or three cigarettes each day, what is the chance that . . .?" The second scenario evaluates long-term risks: "Imagine that you continued to smoke about two or three cigarettes each day for the rest of your life. What is the chance that . . .?" Previous research shows that conditional risk assessments more closely reflect health risk behavior models and are stronger predictors of behavior than unconditional risk assessments, which do not place outcomes in a precise behavioral context (Halpern-Felsher et al., 2001; Ronis, 1992; van der Velde, Hooykaas, & van der Pligt, 1996). After reading the scenarios, participants indicated the likelihood that each outcome would

occur, by filling in the blank with any number between 0 and 100%. In the current study, internal consistency reliabilities for short-term risks (α = .72), long-term risks (α = .73), and benefits (α = .73) were within the acceptable range.

Smoking Outcome Expectancies

Smoking outcome expectancies were measured using the Adolescent Smoking Consequences Questionnaire (ASCQ; Lewis-Esquerre, Rodrigue, Kahler, 2005). The ASCQ consists of 30 statements, where respondents are asked to indicate on a five-point scale (1 = *Never* to 5 = *Always*) what they expect or believe will happen as a result of smoking cigarettes. Example items include, "Cigarettes help with concentration" and "Smoking helps a person forget about problems at home." For the current study, reliabilities for each of the subscales were as follows: α = .89 for Negative-Affect Reduction, α = .40 for Taste/Sensorimotor Manipulation, α = .65 for Social Facilitation, α = .56 for Weight Control, α = .52 for Negative Physical Feelings, α = .31 for Boredom Reduction, and α = .45 for Negative Social Impression. In previous studies scores on the ASCQ were associated with both current smoking and intent to smoke in the future (Lewis-Esquerre, Rodrigue, Kahler, 2005).

Intentions to Smoke

Intent to smoke was assessed using four items that were adapted from Gibbons et al. (1998) for use in a prior survey of adolescent risk behavior (see Morrell, Song, & Halpern-Felsher, 2010 for an example of a study published using data from the prior survey). According to the Theory of Reasoned Action and the Theory of Planned

Behavior, behavioral intent (intent to smoke, in this case) is the most proximal predictor of risk behavior. Participants rated the extent to which they intend to smoke within the next six months or within their lifetime on a seven-point Likert scale (1 = *Definitely will not* to 7 = *Definitely will*). In the current study, internal consistency reliability for this scale was good (α = .87).

Willingness to Smoke

Willingness to smoke was assessed using three items adapted from Gibbons et al. (1998) for use in the present study. A key component of the Prototype-Willingness model of decision-making is an individual's willingness to smoke. The primary distinction between behavioral willingness and behavioral intent is that willingness is associated with a lack of planning or premeditation, and is reactive instead of deliberative (Gibbons et al., 1998). Participants were asked to imagine that a friend has offered them a cigarette and then rate how likely they are to try the cigarette, refuse the cigarette, or leave the situation on a seven-point Likert scale (1 = *Not at all likely* to 7 = *Very likely*). In the current study, Cronbach's alpha was .48.

Resistance Self-Efficacy

Smoking resistance self-efficacy was measured using the Drug Use Resistance Self-Efficacy scale (DURSE; Carpenter & Howard, 2009). The full scale consists of items assessing self-efficacy to resist offers of various drugs including alcohol, cigarettes and marijuana; however, only the eight items specific to cigarette smoking were used in the current study. Respondents were asked to indicate on a four-point Likert scale (1 =

Not sure at all to 4 = *Definitely*) how sure they were that they would be able to resist offers of cigarettes in various situations. Example items include "How sure are you that you can refuse if a friend offers you a cigarette at a party and you do not want it?" and "How sure are you that you can refuse if a brother, sister, or cousin offers you a cigarette at your home when no adults are home and you do not want it?" Previous studies on this scale have demonstrated good predictive and construct validity, as well as excellent internal consistency reliability (α = .98 for females and α = .97 for males; Carpenter & Howard, 2009). In the current study, this scale demonstrated excellent reliability (α = .91).

Although this scale has not been widely used, it taps into important domain-specific aspects of self-efficacy for the younger adolescent age group (Carpenter & Howard, 2009). Given the age range of study participants and the lack of well developed and widely used domain-specific self-efficacy measures for this age group, use of this scale was warranted.

Other Substance Use

Participants were asked how often they have used a variety of substances within their lifetime, within the past year, within the past 30 days, and since the last survey time point. Use was assessed using a single item for each of the following substances: cigars, light cigarettes, smokeless tobacco, electronic cigarettes, alcohol, marijuana, and other drugs. Higher scores indicate more frequent substance use. These items were developed for use in a prior survey of adolescent risk behavior (see Morrell, Song, & Halpern-Felsher, 2010 for an example of a study published using data from the prior survey).

Exposure to Tobacco Marketing, Media, and Education

Four items were used to assess adolescents' exposure to both pro- and anti-tobacco messages in the media or in school. Example items include, "Have you ever attended a school program that taught you about cigarette smoking and told you not to smoke?" and "Have you ever seen or heard an advertisement trying to sell cigarettes (for example, an advertisement for Marlboro or Camel cigarettes)?" These items were developed for a longitudinal study being conducted by the Principal Investigator and based on items that were developed for use in a prior survey of adolescent risk behavior (see Morrell, Song, & Halpern-Felsher, 2010 for an example of a study published using data from the prior survey).

Data Analyses

Analyses were performed using SPSS version 20.0. Power analyses were conducted with GPower3 (Erdfelder, Faul, & Buchner, 1996) evaluating the sample size required to detect a medium effect size ($f^2 = .25$) for the analyses of variance (ANOVA). Assuming $\alpha = .05$, with two groups and two measurement points (2x2), adequate power (.80) to detect a medium effect size would require a total sample of 34. Power analyses were also conducted evaluating the sample size required to detect a large effect size ($f^2 = .35$) for the multiple linear regression analyses. Assuming $\alpha = .05$ and seven predictors, adequate power (.80) to detect a large effect size would require a total sample of 49. Effect size estimates were based on effect sizes obtained from correlation analyses of these variables.

Preliminary analyses were run on possible predictor variables in order to determine which covariates to include in the final analyses. Preliminary analyses included correlations, *t*-tests, and one-way ANOVAs. After conducting these preliminary analyses, a large number of potential covariates remained for the multiple linear regression analyses. Given that we did not have enough power to include so many covariates, we used theory and previous research to determine the final choice of covariates (see Tables 2 and 3). Final covariates included resistance self-efficacy, perceptions of short-term risks of smoking, and the taste/sensorimotor manipulation, negative social impressions, weight control, negative affect reduction and social facilitation subscales of the ASCQ for the multiple linear regression model predicting willingness to smoke cigarettes; and resistance self-efficacy, perceptions of the long-term risks of smoking, perceptions of the benefits of smoking, and the negative physical feelings, social facilitation, negative affect reduction, and taste/sensorimotor manipulation subscales of the ASCQ for the multiple linear regression model predicting intentions to smoke cigarettes. Preliminary analyses did not indicate any significant covariates for the ANOVAs; therefore, no covariates were included in the final ANOVAs (see Table 2).

Two-way (2x2) mixed analyses of variance (ANOVAs) were used to evaluate differences in mean scores on (1) resistance self-efficacy, (2) understanding of addiction (which includes belief in ease of quitting smoking, belief in time it takes to become addicted to cigarettes, and belief in time it takes to become a regular smoker), (3) smoking outcome expectancies (subscales: negative affect reduction, taste/sensorimotor manipulation, social facilitation, weight control, negative physical feelings, boredom reduction, and negative social impression), and (4) perceptions of risks and benefits of

smoking from pre- to post-test (within-subjects factor). The between-subjects factor was experimental condition, which included two levels: control and intervention. Given that there were only two levels of the independent variables in each of the ANOVAs, the sphericity assumption was automatically met for all analyses

Hierarchical multiple linear regression analyses were used to test sets of variables in predicting willingness and intentions to smoke cigarettes separately at immediate follow-up (Part 2). There were three separate regression analyses predicting different aspects of willingness to smoke. The first analysis predicted willingness to leave the situation if offered a cigarette by a friend. The second analysis predicted willingness to refuse a cigarette if offered by a friend. The third analysis predicted willingness to smoke a cigarette if offered one by a friend. In all three analyses predicting willingness to smoke, Set 1 included gender. Gender was entered first in order to control for this variable. Set 2 included resistance self-efficacy, perceptions of the short-term risks of smoking, and the taste/sensorimotor manipulation, negative social impressions, weight control, negative affect reduction and social facilitation subscales of the ASCQ (i.e., outcome expectancies). Set 3 included the experimental condition to which the participant was assigned (control or intervention). Experimental condition was entered in the model last to determine if it was predictive of willingness to smoke after controlling for other predictors of smoking behavior.

Similarly, in the hierarchical multiple regression predicting intentions to smoke, Set 1 included gender in order to control for this variable. Set 2 included resistance self-efficacy, perceptions of the long-term risks of smoking, perceptions of the benefits of smoking, and the negative physical feelings, social facilitation, negative affect reduction

and taste/sensorimotor manipulation subscales of the ASCQ. Set 3 included the experimental condition to which the participant was assigned (control or intervention).

For both hierarchical multiple linear regression analyses, we tested for outliers and assumptions. No extreme univariate outliers were identified in the data set. Analysis of Mahalanobis Distance scores did not indicate any multivariate outliers for either model. Analysis of scatter plots indicated that the assumption of linearity was met for both models. Second, analysis of histograms and Q-Q plots indicated that the variables were normally distributed. Third, multicollinearity was checked by examining values for Tolerance and the Variance Inflation Factor (VIF). Collinearity statistics (Tolerance and VIF) were within accepted limits; therefore, the assumption of multicollinearity was determined as being met. Finally, analysis of residual scatterplots indicated that the assumption of homoscedasticity was met for both models.

Table 2. Covariates of interest for regression analyses and ANOVAs.

Variable	Considered for Regression Analyses	Included in Regression Model (Willingness)	Included in Regression Model (Intentions)	Considered for ANOVAs
Age	•			•
Gender	•	•	•	•
Race	•			•
Grade Point Average (GPA)	•			•
Parents Marital Status	•			
Current Living Situation	•			
Participation in Organized Sports	•			
Other Substance Use	•			
Household Income	•			
Exposure to Smoking Marketing, Media and Education				•
Family Members that Smoke	•			•
Friends that Smoke	•			•
Perceptions: Long-Term Risks	•		•	
Perceptions: Short-Term Risks	•	•		
Perceptions: Benefits	•		•	
ASCQ: Negative Affect Reduction	•	•	•	
ASCQ: Taste/Sensorimotor Manipulation	•	•	•	
ASCQ: Social Facilitation	•	•	•	
ASCQ: Weight Control	•	•		
ASCQ: Negative Physical Feelings	•		•	
ASCQ: Boredom Reduction	•			
ASCQ: Negative Social Impression	•	•		
Resistance Self-Efficacy	•	•	•	

Table 3. Correlations among selected variables of interest for regression analyses.

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Family Smokers	1														
2	Friend Smokers	.56*	1													
3	Long-Term Risks	-.17	-.09	1												
4	Short-Term Risks	-.35*	-.21	.71**	1											
5	Benefits	.29	.47**	-.01	-.12	1										
6	Negative Affect Reduction	-.22	-.15	.16	.10	.47**	1									
7	Taste/Sens. Manipulation	.21	.11	-.07	-.18	.41**	.54**	1								
8	Social Facilitation	.27	.21	.10	-.03	.56**	.69**	.49**	1							
9	Weight Control	.15	.37*	.02	.11	.34*	.29	.29*	.28	1						
10	Negative Physical Feelings	-.27	-.04	.68**	.65**	-.11	.09	-.20	-.08	.06	1					
11	Boredom Reduction	.15	.11	.07	-.01	.36*	.50**	.59**	.43**	.43**	-.02	1				
12	Negative Social Impression	-.28	-.08	.51**	.55**	-.06	.03	-.26	-.14	-.02	.49**	-.21	1			
13	Resistance Self-Efficacy	-.15	-.24	.78**	.78**	-.05	.12	-.13	-.06	-.01	.74**	.10	.48**	1		
14	Willingness to Smoke	.58**	.67**	-.19	-.35*	.28	.02	.41**	.28	.36*	-.24	.28	-.33*	-.60**	1	
15	Intentions to Smoke	.56**	.54**	-.34*	-.40**	.31*	.05	.27	.38*	.22	-.41**	.15	-.19	-.64**	.76**	1

*p <.05, **p <.01

CHAPTER THREE

RESULTS

Results of independent-samples t-tests and chi-square tests indicated that there were significant differences between the final sample included in our analyses (full study group) and those participants that dropped out of the study after the pre-test (those that did not participate in the intervention and/or complete post-test) on several key variables of interest (see Table 4). In terms of demographic variables, there was a significant difference in age between these two groups ($p < .01$), with the study dropout group being older than the full study group. There was a significant difference in ethnicity between the two groups ($p < .05$), with the study dropout group having significantly more Hispanic/Latino adolescents than non-Hispanic adolescents compared to the full study group. There was also a significant difference in GPA between the two groups ($p < .01$), with the full study group having a higher average GPA than the study dropout group. There was a significant difference between the two groups in their understanding of addiction. The study dropout group reported that they believed that it takes a longer period of time to become a regular smoker ($p < .01$), that it is easier to quit smoking ($p < .01$) and that it takes a longer of period of time to become addicted to cigarettes ($p < .001$) compared to the full study group. There was also a significant difference between the two groups on perceptions about smoking. The dropout group had lower perceptions of short-term ($p < .01$) and long-term risks ($p < .001$) from smoking compared to the full study group. Finally, there was a significant difference between the two groups in resistance self-efficacy, with the full study group reporting greater resistance self-efficacy compared to the study dropout group ($p < .001$).

Table 4. Differences between study dropouts and participants that completed the full study on key variables of interest.

Variable	Study Dropouts (n = 125)	Full Study (n = 54)	p
Age – Mean (SD)	13.4 (.92)	12.9 (.71)	< .01[**]
Gender+			
Male	54 (43.9%)	16 (29.6%)	.07
Female	69 (56.1%)	38 (70.4%)	
Ethnicity+			
Hispanic/Latino	91 (74.6%)	32 (59.3%)	.04[*]
Non-Hispanic/Latino	31 (25.4%)	22 (40.7%)	
Race+			
American Indian/Alaska Native	2 (1.8%)	1 (2.2%)	.25
Asian/Asian American	16 (14%)	9 (20%)	
Native Hawaiian/Pacific Islander	4 (3.5%)	0 (0%)	
Black/African American	1 (0.9%)	3 (6.7%)	
White/Caucasian	10 (8.8%)	4 (8.9%)	
Other	46 (40.4%)	13 (28.6%)	
Mixed Race	10 (38.5%)	35 (30.7%)	
Grade Level+			
7th Grade	13 (11.6%)	15 (27.8%)	.13
8th Grade	71 (63.4%)	33 (61.1%)	
9th Grade	23 (20.5%)	6 (11.1%)	
Did Not State	5 (4.5%)	0 (0%)	
Grade Point Average – Mean (SD)	3.17 (.64)	3.62 (.42)	< .01[**]
Current Living Situation+			
With Parents	67 (54.9%)	35 (66%)	.61
With Mother Only	12 (9.8%)	2 (3.8%)	
With Father Only	5 (4.1%)	0 (0%)	
Half Time w/Mother and Father	12 (9.8%)	7 (13.2%)	
With Parent & Stepparent	9 (7.4%)	4 (7.5%)	
With Grandparent(s)	3 (2.5%)	1 (1.9%)	
Other	14 (11.5%)	4 (7.5%)	
Participation in Organized Sports+			
No	49 (69.2%)	32 (50%)	.03[*]
Yes	67 (30.8%)	21 (46.4%)	
Ever Smoked In Lifetime (Even One Puff)+			
No	107 (86.3%)	49 (94.2%)	.13
Yes	17 (13.7%)	3 (5.8%)	
Smoked Whole Cigarette In Lifetime+			
No	124 (100%)	51 (98.1%)	.12
Yes	0 (0%)	1 (1.9%)	

Family Smoking Exposure – Mean (SD)	1.63 (1.62)	1.55 (1.43)	.16
Number of Friends that Smoke – Mean (SD)	.20 (.40)	.20 (.40)	.95
Lifetime Substance Use – Mean (SD)	4.19 (14.21)	2.51 (6.52)	.32
Outcome Expectancies – Mean (SD)			
Weight Control	9.68 (4.10)	10.83 (3.77)	.19
Boredom Reduction	4.06 (2.14)	4.54 (2.03)	.68
Social Facilitation	13.59 (5.56)	13.31 (4.47)	.30
Taste/Sensorimotor Manipulation	2.90 (1.51)	3.06 (1.54)	.84
Negative Affect Reduction	15.29 (6.54)	17.58 (7.05)	.65
Understanding of Addiction – Mean (SD)			
Time to Regular Smoker	3.93 (2.70)	2.94 (2.42)	$< .01^{**}$
Ease of Quitting	3.22 (1.61)	3.50 (1.37)	$< .01^{**}$
Time to Addiction	3.77 (2.77)	2.73 (2.34)	$< .001^{***}$
Smoking Perceptions – Mean (SD)			
Short Term Risks	77.37 (24.47)	85.77 (13.18)	$< .01^{**}$
Long Term Risks	82.57 (23.31)	91 (11.67)	$< .001^{***}$
Benefits	23.69 (24.16)	22.69 (20.69)	.06
Resistance Self-Efficacy – Mean (SD)	26.51 (8.69)	29.34 (5.11)	$< .001^{***}$

Note. + indicates a Chi-Square test, all other *p*-values denote *t*-tests.
$*p < .05.$ $**p < .01.$ $***p < .001.$

Results of the two-way ANOVAs indicated that there was not a significant effect of experimental condition, Time or of the interaction between Time and experimental condition on participants' level of resistance self-efficacy, belief in time it takes to become addicted to cigarettes, belief in time it takes to become a regular smoker, belief in the ease of quitting smoking, social facilitation OEs, weight control OEs, negative physical feelings OEs, boredom reduction OEs, negative social impression OEs, perceptions of the short-term risks of smoking, and perceptions of the long-term risks of smoking (see Table 5). However, results indicated that there was a significant effect of experimental condition on negative affect reduction OEs, $F(1, 42) = 9.63, p < .01$; taste/sensorimotor manipulation OEs, $F(1, 47) = 5.26, p < .05$; and social facilitation OEs, $F(1, 40) = .6.46, p < .05$. Regardless of time, the intervention group endorsed

greater expectations of negative affect reduction from smoking (intervention group: $M = 20.14$, $SD = 1.24$; control group: $M = 14.81$, $SD = 1.18$), greater expectations of taste/sensorimotor manipulation from smoking (intervention group: $M = 3.21$, $SD = .21$; control group: $M = 2.54$, $SD = .20$), and greater expectations of social facilitation from smoking (intervention group: $M = 14.14$, $SD = .81$; control group: $M = 11.23$, $SD = .81$). There was not a significant effect of Time or a significant Time X Condition interaction predicting participants' negative affect reduction OEs, taste/sensorimotor manipulation OEs, or social facilitation OEs (see Table 5).

Table 5. Results of two-way (2x2) mixed analyses of variance.

Dependent Variable	Time			Condition			Time X Condition		
	F	p	Partial η^2	F	p	Partial η^2	F	p	Partial η^2
Resistance Self-Efficacy	1.46	> .20	.03	.82	> .30	.02	3.29	> .70	.00
Time to Addiction	.12	> .70	.00	1.47	> .20	.03	.25	> .60	.01
Time to Regular Smoker	.04	> .80	.00	1.05	> .30	.02	1.56	> .20	.04
Ease of Quitting	.01	> .90	.00	.00	> .90	.00	1.20	> .20	.03
OE Negative Affect Reduction	.03	> .80	.00	9.63	$< .01^{**}$	.19	.08	> .70	.00
OE Taste/Sens. Manipulation	2.85	> .05	.06	5.26	$< .05^{*}$	.10	1.05	> .30	.02
OE Social Facilitation	3.76	> .05	.09	6.46	$< .05^{*}$	.14	.05	> .80	.00
OE Weight Control	1.26	> .20	.03	.06	> .80	.00	.73	> .30	.02
OE Negative Physical Feelings	2.31	> .10	.05	1.26	> .20	.03	.26	> .60	.01
OE Boredom Reduction	.21	> .20	.00	1.21	> .20	.03	.01	> .90	.00
OE Negative Social Imp.	.47	> .40	.01	.15	> .60	.00	1.44	> .20	.03
Perceptions of Short-Term Risks	.08	> .70	.00	.29	> .50	.01	1.11	> .20	.02
Perceptions of Long-Term Risks	1.08	> .30	.02	2.42	> .10	.05	.05	> .80	.00
Perceptions of Benefits	2.61	> .10	.06	3.36	> .05	.07	.29	> .50	.01

$^*p < .05.$ $^{**}p < .01$

Three separate hierarchical multiple linear regression analyses were conducted to predict participants' likelihood to leave the situation if offered a cigarette at post-test (Part 2). For the first analysis predicting participants' willingness to leave the situation if offered a cigarette, step 1 included gender, which did not explain a significant proportion of the variance in willingness to leave the situation, $R^2 = .02$, $F(1, 37) = .89$, $p > .30$. At Step 2 resistance self-efficacy, perceptions of the short-term risks of smoking, and the taste/sensorimotor manipulation, negative social impressions, weight control, negative affect reduction and social facilitation subscales of the ASCQ were added to the model. Together, these variables accounted for an additional 51.7% of the variance in willingness to leave the situation above and beyond the effect of gender, $F(7, 30) = 4.83$, $p < .01$. Finally, experimental condition was added to the model in Step 3 and did not account for any additional variance in willingness to leave the situation above and beyond all previously entered predictors, $F(1, 29) = .14$, $p > .70$. The full model, including all nine predictors, was significant and accounted for 54.3% of the variance in participants' willingness to leave the situation at post-test (Part 2), $F(9, 29) = 3.83$, $p < .01$ (see Table 6). However, only negative social impressions and negative affect reduction expectancies were significant individual predictors of willingness to leave the situation if offered a cigarette. As negative social impression expectancies increased by one point, participants' willingness to leave the situation increased by .34 points and as negative affect reduction expectancies increased by one point, participants' willingness to leave the situation increased by .13 points.

For the second analysis predicting participants' willingness to refuse an offer of a cigarette, step 1 included gender, which did not explain a significant proportion of the

variance in willingness to refuse, $R^2 = .06$, $F(1, 36) = 2.25$, $p > .10$. At Step 2 resistance

self-efficacy, perceptions of the short-term risks of smoking, and the taste/sensorimotor

manipulation, negative social impressions, weight control, negative affect reduction and

social facilitation subscales of the ASCQ were added to the model. Together, these

variables accounted for an additional 55.1% of the variance in willingness to refuse above

and beyond the effect of gender, $F(7, 29) = 5.84$, $p < .001$. Finally, experimental

condition was added to the model in Step 3 and did not account for any additional

variance in willingness to refuse above and beyond all previously entered predictors, $F(1,$

$28) = .27$, $p > .60$. The full model, including all nine predictors, was significant and

accounted for 61.3% of the variance in participants' willingness to refuse at post-test

(Part 2), $F(9, 28) = 4.93$, $p < .01$ (see Table 7). However, only resistance self-efficacy

was a significant individual predictor of participants' willingness to refuse an offer of a

cigarette. As resistance self-efficacy increased by one point, participants' willingness to

refuse an offer increased by .23 points.

For the third analysis predicting participants' willingness to try a cigarette if

offered, step 1 included gender, which did not explain a significant proportion of the

variance in willingness to try a cigarette, $R^2 = .04$, $F(1, 36) = 1.40$, $p > .20$. At Step 2

resistance self-efficacy, perceptions of the short-term risks of smoking, and the

taste/sensorimotor manipulation, negative social impressions, weight control, negative

affect reduction and social facilitation subscales of the ASCQ were added to the model.

Together, these variables accounted for an additional 51.2% of the variance in

willingness to try a cigarette above and beyond the effect of gender, $F(7, 29) = 4.69$, $p <$

$.001$. Finally, experimental condition was added to the model in Step 3 and accounted for

an additional .04% of the variance in willingness to try a cigarette above and beyond all previously entered predictors, $F(1, 28) = 2.95$, $p > .60$. The full model, including all nine predictors, was significant and accounted for 61.3% of the variance in participants' likelihood to refuse at post-test (Part 2), $F(9, 28) = 4.93$, $p > .05$ (see Table 8). However, only resistance self-efficacy and taste/sensorimotor manipulation expectancies were significant individual predictors of participants' willingness to try a cigarette if offered. As resistance self-efficacy increased by one point, participants' willingness to try a cigarette decreased by .24 points and as taste/sensorimotor manipulation expectancies increased by one point, participants' willingness to try a cigarette increased by .51 points.

Table 6. Hierarchical multiple linear regression analysis predicting willingness to leave the situation if offered a cigarette.

Variable	b (95% CI)	t	sr^2	ΔR^2	p	R^2	p
Step 1				**.02**	**> .30**	**.02**	**> .30**
Gender	-.69 (-2.18, .80)	-.94	.02				> .30
Step 2				**.52**	**.001****	**.54**	**.001****
Gender	-.77 (-2.05, .52)	-1.22	.02				> .20
Resistance SE	..19 (-.04, .42)	1.66	.04				>.10
Short-Term Risks	-.02 (-.07, .04)	-.53	.00				> .50
Taste/Sens. Manipulation	-.52 (-1.12, .08)	-1.76	.05				> .05
Negative Social Impressions	.33 (-.01, .64)	2.08	.07				< .05*
Weight Control	-.17 (-.38, .05)	-1.57	.04				> .10
Negative Affect Reduction	.12 (0, .24)	2.12	.07				< .05*
Social Facilitation	-.07 (-.28, .13)	-.73	.01				**> .40**
Step 3				**.00**	**> .70**	**.54**	**< .01****
Gender	-.81 (-2.14, .52)	-1.25	.02				> .20
Resistance SE	.81 (-.06, .42)	1.57	.04				> .10
Short-Term Risks	-.01 (-.07, .05)	-.46	.00				> .60
Taste/Sens. Manipulation	-.48 (-1.23, .16)	-1.54	.04				> .10
Negative Social Impressions	.34 (-.01, .68)	2.08	.07				< .05*
Weight Control	-.18 (-.41, .05)	-1.59	.04				> .10
Negative Affect Reduction	.13 (0, .25)	2.11	.07				< .05*
Social Facilitation	-.07 (-.28, .14)	-.71	.01				> .40
Experimental Condition	-.25 (-1.60, 1.10)	-.38	.00				> .70

Note. b = Unstandardized regression coefficient, CI = Confidence Interval, and SE = Self-Efficacy, R^2 = % variance in intentions to smoke accounted for by the model, ΔR^2 = % variance in intentions to smoke accounted for by predictors added in each step above and beyond all previously entered predictors. Full Model: $F(9, 29) = 3.83$, $p < .01$.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 7. Hierarchical multiple linear regression analysis predicting willingness to refuse a cigarette.

Variable	b (95% CI)	t	sr^2	ΔR^2	p	R^2	p
Step 1				**.06**	**> .10**	**.06**	**> .10**
Gender	-.61 (-1.43, .21)	-1.50	.06				> .10
Step 2				**.55**	**< .001*****	**.61**	**< .001*****
Gender	-.43 (-1.09, .24)	-1.30	.02				> .20
Resistance SE	.25 (.07, .38)	2.95	.12				<.01**
Short-Term Risks	.01 (-.03, .04)	.33	.00				> .70
Taste/Sens. Manipulation	-.17 (-.51, .16)	-1.07	.02				> .20
Negative Social Impressions	-.01 (-.17, .16)	-.12	.00				> .90
Weight Control	-.06 (-.18, .05)	-1.15	.02				> .20
Negative Affect Reduction	.03 (-.03, .10)	1.10	.02				>..20
Social Facilitation	-.10 (-.21, .01)	-1.80	.04				> .10
Step 3				**.00**	**> .60**	**.61**	**< .01****
Gender	-.40 (-1.08, .29)	-1.18	.02				> .20
Resistance SE	.23 (.07, .39)	2.93	.12				< .01**
Short-Term Risks	.00 (-.03, .04)	.23	.00				> .80
Taste/Sens. Manipulation	-.20 (-.56, .15)	-1.16	.02				> .20
Negative Social Impressions	-.02 (-.20, .15)	-.26	.00				> .70
Weight Control	-.05 (-.17, .07)	-.91	.01				> .30
Negative Affect Reduction	.03 (-.04, .10)	.94	.01				> .30
Social Facilitation	-.10 (-.22, .01)	-1.80	.04				> .05
Experimental Condition	.18 (-.52, .88)	.52	.00				> .60

Note. b = Unstandardized regression coefficient, CI = Confidence Interval, and SE = Self-Efficacy, R^2 = % variance in intentions to smoke accounted for by the model, ΔR^2 = % variance in intentions to smoke accounted for by predictors added in each step above and beyond all previously entered predictors. Full Model: $F(9, 28) = 4.93$, $p < .01$.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 8. Hierarchical multiple linear regression analysis predicting willingness to try a cigarette if offered.

Variable	b (95% CI)	t	sr^2	ΔR^2	p	R^2	p
Step 1				**.04**	**> .20**	**.04**	**> .20**
Gender	.44 (-.32, 1.20)	1.18	.04				> .20
Step 2				**.51**	**< .01****	**.55**	**< .01****
Gender	.30 (-.36, .96)	.94	.01				> .30
Resistance SE	-.23 (-.39, -.08)	-3.07	.15				<.01**
Short-Term Risks	.03 (-.01, .06)	1.68	.04				> .10
Taste/Sens. Manipulation	.42 (.10, .75)	2.64	.11				< .05*
Negative Social Impressions	-.02 (-.18, .14)	-.26	.00				> .70
Weight Control	.06 (-.10, .17)	1.03	.02				> .30
Negative Affect Reduction	-.06 (-.12, .01)	-1.84	.05				>.05
Social Facilitation	.03 (-.08, .14)	.57	.01				> .50
Step 3				**.04**	**> .05**	**.59**	**< .01****
Gender	.21 (-.44, .86)	.66	.01				> .50
Resistance SE	-.24 (-.39, -.09)	-3.23	.15				< .01**
Short-Term Risks	.03 (.00, .06)	2.00	.06				> .05
Taste/Sens. Manipulation	.51 (.18, .85)	3.13	.14				< .01**
Negative Social Impressions	.02 (-.15, .18)	.25	.00				> .80
Weight Control	.03 (-.09, .14)	.48	.00				> .60
Negative Affect Reduction	-.05 (-.11, .02)	-1.48	.03				> .10
Social Facilitation	.04 (-.07, .15)	.68	.01				> .50
Experimental Condition	-.55 (-1.21, .11)	-1.71	.04				> .05

Note. b = Unstandardized regression coefficient, CI = Confidence Interval, and SE = Self-Efficacy, R^2 = % variance in intentions to smoke accounted for by the model, ΔR^2 = % variance in intentions to smoke accounted for by predictors added in each step above and beyond all previously entered predictors. Full Model: $F(9, 29) = 4.51$, $p < .01$.
*$p < .05$. **$p < .01$. ***$p < .001$.

A fourth hierarchical multiple linear regression analysis was conducted to predict participants' intentions to smoke cigarettes at post-test (Part 2). Step 1 included gender, which did not explain a significant proportion of the variance in intentions to smoke, $R^2 =$ .07, $F(1, 36) = 2.66$, $p > .10$. At Step 2, resistance self-efficacy, perceptions of the long term risks of smoking, perceptions of the benefits of smoking and the negative physical feelings, social facilitation, negative affect reduction and taste/sensorimotor manipulation subscales of the ASCQ were added to the model. Together, these variables accounted for an additional 52.9% of the variance in intentions to smoke cigarettes above and beyond the effect of gender, $F(7, 29) = 5.44$, $p < .001$. Finally, at Step 3 experimental condition was added to the model but did not account for any additional variance in intentions to smoke cigarettes above and beyond all previously entered predictors, $F(1, 28) = .09$, $p > .70$ The full model, including all nine predictors, was significant and accounted for 59.9% of the variance in participants' intentions to smoke cigarettes at post-test (Part 2), $F(9, 28) = 4.64$, $p < .01$ (see Table 9). Gender, resistance self-efficacy, and expectations of social facilitation were significant individual predictors of intentions to smoke. Female participants' self-reported intentions to smoke were on average .43 points greater than males. As resistance self-efficacy increased by one point, intentions to smoke decreased by .10 points. As expectations of social facilitation from smoking increased by one point, intentions to smoke increased by .10 points (after controlling for all other predictors).

Table 9. Hierarchical multiple linear regression analysis predicting intentions to smoke cigarettes.

Variable	b (95% CI)	t	sr^2	ΔR^2	p	R^2	p
Step 1				**.07**	**> .10**	**.07**	**> .10**
Gender	.36 (-.08, .81)	1.63	.07				> .10
Step 2				**.53**	**< .001*****	**.60**	**< .001*****
Gender	.45 (.06, .85)	2.35	.08				< .05*
Resistance SE	-.10 (-.18, -.01)	-2.21	.07				< .01**
Benefits	0 (-.01, .01)	-.75	.01				> .10
Long-Term Risks	-.01 (-.03, .01)	-.95	.01				> .10
Negative Physical Feelings	-.02 (-.12, .07)	-.51	.00				> .10
Social Facilitation	.09 (.02, .16)	2.75	.10				< .05*
Negative Affect Reduction	-.03 (-.10, .00)	-1.97	.05				>.05
Taste/Sens. Manipulation	.08 (-.09, .25)	.94	.01				>.10
Step 3				**.00**	**> .10**	**.60**	**< .01****
Gender	.43 (.02, .85)	2.12	.06				< .05*
Resistance SE	-.10 (-.18, .00)	-2.15	.07				< .01**
Benefits	0 (-.01, .01)	-.64	.01				> .10
Long-Term Risks	-.01 (-.03, .01)	-.82	.01				> .10
Negative Physical Feelings	-.03 (-.12, .07)	-.54	.00				> .10
Social Facilitation	.10 (.02, .16)	2.64	.10				< .05*
Negative Affect Reduction	-.03 (-.10, .00)	-1.83	.05				>.05
Taste/Sens. Manipulation	.08 (-.10, .26)	.96	.01				>.10
Experimental Condition	-.05 (-.42, .31)	-.30	.00				> .10

Note. b = Unstandardized regression coefficient, CI = Confidence Interval, and SE = Self-Efficacy, R^2 = % variance in intentions to smoke accounted for by the model, ΔR^2 = % variance in intentions to smoke accounted for by predictors added in each step above and beyond all previously entered predictors. Full Model: $F(9, 28) = 4.64$, $p < .01$.
*$p < .05$. **$p < .01$. ***$p < .001$.

Finally, independent samples *t*-tests indicated that there were no significant differences between the intervention or control group on key outcome variables of interest at post-test with the exception of outcome expectancies of taste/sensorimotor manipulation. Results indicated that the intervention group endorsed greater expectancies of taste/sensorimotor manipulation at post-test compared to the control group (see Table 10).

Table 10. Differences between intervention and control groups on outcome variables of interest at post-test.

Variable	Intervention (n = 26)	Control (n = 28)	p
	M (SD)	M (SD)	
Smoking Perceptions			
Short Term Risks	89.27 (10.51)	85.25 (19.99)	.23
Long Term Risks	91.34 (11.61)	87.07 (20.64)	.19
Benefits	29.52 (25.11)	18.77 (19.03)	.17
Understanding of Addiction			
Time to Regular Smoker	2.18 (2.34)	3.23 (2.66)	.10
Ease of Quitting	3.64 (1.47)	3.54 (1.39)	.92
Time to Addiction	2.23 (2.33)	3.12 (2.60)	.14
Outcome Expectancies			
Negative Affect Reduction	19.95 (7.45)	14.75 (5.12)	.14
Taste/Sens. Manipulation	3.13 (1.39)	2.31 (0.79)	< .001***
Social Facilitation	13.43 (4.58)	11.29 (3.69)	.40
Weight Control	10.13 (3.04)	10.40 (4.38)	.30
Negative Physical Feelings	13 (1.74)	12.81 (3.02)	.10
Boredom Reduction	4.65 (2.42)	4.19 (1.67)	.14
Negative Social Impressions	8.67 (1.81)	8.04 (2.44)	.39
Intentions to Smoke	1.24 (.51)	1.32 (.66)	.26
Willingness to Smoke	1.61 (1.03)	1.71 (1.31)	.61
Resistance Self-Efficacy	30.61 (2.55)	29.91 (5.28)	.24

*$p < .05$. **$p < .01$. ***$p < .001$.

CHAPTER FOUR

DISCUSSION

The present study examined the effectiveness of the ASPP intervention, which is a novel, web-based smoking prevention program targeted at adolescents aged 12-15 years. The ASPP intervention utilizes an education-based approach focused on increasing adolescents' knowledge of the process of nicotine dependence and is based on the sensitization-homeostasis theory (DiFranza, 2008). To our knowledge, this is the first program of its kind to incorporate this theory as the primary focus of smoking prevention efforts for adolescents.

Our hypothesis that participants who completed the ASPP intervention would report weaker willingness and intentions to smoke cigarettes compared to participants in the control condition was not supported. Given that this was a short-term pilot study, it was not feasible to track changes in actual smoking behavior over time; therefore, susceptibility to smoking, which encompasses willingness and intentions to smoke cigarettes, served as the most important outcome variable of interest in this study. Prior research shows that smoking initiation progresses from initial susceptibility, to smoking experimentation, to regular daily smoking and that once an adolescent is past this period of high susceptibility he or she is unlikely to take up smoking later in life (Forrester et al., 2007; Wang, Henley, & Donovan, 2004). Given that the CDC (2010) has not identified a major decline in adolescent smoking susceptibility, this remains a very important target variable for smoking prevention programs. Unfortunately, the ASPP intervention did not have a significant impact on smoking susceptibility. One possible explanation for the lack of significant findings is a floor effect: the total sample was very low in smoking

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susceptibility at baseline and thus there was little room for a detectable decrease in susceptibility scores (willingness to smoke $M = 2.03$, $SD = 1.02$; intentions to smoke $M = 1.63$, $SD = 1.04$). This was also a high achieving sample of adolescents, with an average overall GPA of 3.62 (Intervention Group average GPA = 3.60; Control Group average GPA = 3.64). Prior research has found that higher GPA serves as a protective factor against smoking (Ferguson & Meehan, 2011; Morin et al., 2011), with initiation of smoking behavior being associated with lower grades among adolescents (Forrester, Biglan, Severson, & Smolkowski, 2007). The high GPA of the adolescent participants in this study may support the idea that this sample was initially very low in smoking susceptibility, resulting in a lack of detectable changes at post-test.

In terms of other significant predictors of smoking susceptibility, results of the present study indicated that resistance self-efficacy was the most robust individual predictor of both willingness and intentions to smoke cigarettes, with participants who reported greater resistance self-efficacy endorsing less intentions to smoke cigarettes, less willingness to try cigarettes, and greater willingness to refuse a cigarette if offered. Being high in resistance self-efficacy has repeatedly been found to predict a lower likelihood of smoking initiation. More specifically, it has been found that if self-efficacy to resist smoking remains high over time, adolescents are less likely to initiate smoking (Hiemstra, Otten, de Leeuw, van Schayck, & Engels, 2011). Additionally, previous research has established that higher self-efficacy among non-smokers predicts lower intentions to smoke at baseline, which predicts lower intentions to smoke at follow up, which directly predicts actual smoking behavior at follow up (Thrul, Stemmler, Buhler, & Kuntsche, 2013). Resistance self-efficacy did not significantly predict participants'

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willingness to leave the situation if offered a cigarette. This may be due to the fact that this dimension of willingness to smoke does not directly tap into the participants' willingness to try or refuse a smoking offer, but assesses their willingness to physically remove themselves from the situation if a friend/peer offers them a cigarette at a party, which may be seen as a more extreme action that could result in more negative social impressions. Our results support these previous findings by showing that adolescents with greater confidence in their ability to resist offers of cigarette use at post-test were less willing to try smoking and had fewer intentions to actually engage in smoking behaviors in the future. In the current study we did not track long term smoking behavior, intentions, or self-efficacy. Future studies should track these outcomes over a longer follow-up period given the potentially complex and temporally dynamic relationship between self-efficacy, smoking intentions and smoking behavior. Furthermore, future studies may consider investigating whether strategies to increase/maintain self-efficacy impact smoking susceptibility.

Outcome expectancies of social facilitation significantly predicted participants' intentions to smoke cigarettes at post-test. This finding is in line with previous research, which has found that positive outcome expectancies, such as the belief that substance use will facilitate greater social interactions, are associated with greater future substance use (Josendal & Aaro, 2012). More specifically, it has been found that perceptions of the positive social consequences of smoking (such as "looking cool," having more friends, and friends acting friendlier) are associated with an increased risk of smoking susceptibility among adolescents (Unger, Rohrbach, Howard-Pitney, Ritt-Olson, & Mouttapa, 2001). Combined with the results from the present study, this suggests that

adolescents who perceive that smoking cigarettes will make it easier to engage in social interactions with others (e.g., they will not be shy, they will be more talkative and outgoing) may have greater intentions to smoke in the future. Results also indicated that as expectancies of negative social impressions increased, participants were more willing to leave this situation if offered a cigarette. This finding suggests that if adolescents believe smoking will cause others, especially peers, to view them in a more negative light they will be less willing to try smoking. This appears to be complementary to the above finding given that if adolescents believe that smoking will make them "look bad" to peers rather than making them "look cool" they will be less willing to try smoking because this will likely inhibit rather than facilitate social interactions.

Another positive outcome expectancy that significantly predicted participants' willingness to try a cigarette if offered was expectancies of positive taste/sensorimotor changes resulting from smoking. Although, there is not a significant body of research on the association between taste/sensorimotor manipulation expectancies and smoking susceptibility, previous research consistently suggests that positive outcome expectancies from smoking are powerful predictors of future smoking behavior (Goldberg, 2002; Josendal & Aaro, 2012) and this finding appears to be in line with this previous research.

Additionally, results indicated that girls reported greater intentions to smoke cigarettes than boys in this sample. Previous research has typically found that boys initiate smoking behavior at a younger age than girls and that the setting in which smoking is initiated differs between the genders, with girls typically initiating smoking at home and boys typically initiating smoking at school (Okoli, Greaves, & Fagyas, 2013). However, to our knowledge there is not a significant body of research that specifically

examines the relationship between gender and intentions to smoke in the future, and thus the reasons for the results of the current study are unclear. It may be that the relationship between gender and smoking behavior is influenced by other variables that we did not examine in this study, such as body image, self-esteem, emotional/mental health factors (e.g., depression and anxiety), rebelliousness/rejection of authority, or exposure to high stress life events.

Some other potential explanations for the observed relationship between gender and intentions to smoke cigarettes in the future include parental monitoring and communication, cultural gender expectations, and greater susceptibility to the modeling behaviors of others. Girls are typically more closely monitored by their parents and communicate with their parents more often than boys (Office of Smoking & Health, 2001). Furthermore, male adolescent smokers tend to be more independent and have greater opportunities to engage in smoking behavior (Office of Smoking & Health, 2001). Both greater parental monitoring and greater communication between child and parent serve as protective factors against actual smoking behavior (Forrester, Biglan, Severson, & Smolkowski, 2007; Office of Smoking and Health, 2001). These gender differences may impact the likelihood that an adolescent's intentions to smoke cigarettes actually leads to engaging in smoking experimentation. As such, although girls' intentions may be greater, the opportunities for them to carry out these intentions may be fewer, which would explain why smoking rates are usually higher among boys than girls during adolescence.

Fear of social judgment among certain ethnic minority groups may be another factor that prevents females from engaging in smoking behavior despite having a high

level of intentions to smoke in the future. Over time in the United States, smoking rates between males and females have generally become more equal (Booker et al., 2008). However, in certain cultural groups, including Hispanic and Asian ethnic/racial groups, there are still disproportionate rates of smoking between males and females, which may be attributable to smoking being seen as less acceptable for females than for males (Booker et al., 2008). Our sample primarily comprised minorities, with 59.3% of participants self-identifying as Hispanic and 16.7% self-identifying as Asian, so it may be possible that this sample of girls was influenced by these aforementioned cultural factors.

Finally, previous research has shown that adolescent girls are more susceptible to the modeling behavior of others, with girls' smoking behaviors being more influenced by the smoking behavior of parents, siblings, peers and romantic partners compared to boys (Office of Smoking and Health, 2001). In the present study, there was a significant correlation between smoking intentions and having significant others that smoke, and it is possible that the impact of these relationships on smoking intentions was greater for girls than it was for boys; however, given limited power we were unable to explore all of these possible factors. In future studies researchers should explore the potential moderating effect of significant others' smoking on boys' and girls' intentions to smoke. Furthermore, in the current study we only assessed smoking behaviors of friends and family (or other individuals that live in the adolescent's home) of the participants; however, it may be important for researchers to also assess smoking behaviors of romantic partners (e.g., boyfriends or girlfriends). During the early adolescent years, boys and girls typically first develop romantic relationships and the behaviors of the significant

others in these relationships may be especially influential and worth exploring in terms of smoking intentions and actual smoking behaviors.

Common predictors of adolescent smoking (including gender, resistance self-efficacy, perceptions of the short and long term risks of smoking, perceptions of the benefits of smoking, outcome expectancies of taste/sensorimotor manipulation, negative social impressions, weight control, negative physical feelings, negative affect reduction and social facilitation) together explained the greatest amount of variance in willingness and intentions to smoke at post-test. These findings were expected and confirmed the results of previous studies. More specifically, results from prior research indicates that decreases in self-efficacy over time are associated with smoking initiation (Hiemstra et al., 2011); therefore, intervention/prevention programs may benefit from focusing on increasing and maintaining self-efficacy to refuse offers of tobacco use in order to effectively deter adolescents from experimenting with cigarette smoking. Self-efficacy's importance in resisting drug use of all types has been shown in previous research; however, explicit descriptions of how resistance self-efficacy is achieved appear to be lacking. Some possible ways that this may be achieved is through modeling or by having adolescents role-play scenarios where they may have to reject cigarette-smoking offers from peers or family members. It should be highlighted that although many of these common predictors (e.g., gender, outcome expectancies, and perceptions of long and short term risks) did not on their own significantly predict willingness and intentions to smoke, when combined they accounted for a substantial amount of the variance in willingness and intentions to smoke (47.3% and 55.5%, respectively). This is a very important finding in terms of determining predictors that should be targeted in future

intervention and prevention programs for adolescent smoking. It is well established that there is no single cause of adolescent smoking; therefore, intervention and prevention programs should target multiple risk and protective factors. Programs should attempt to affect multiple factors that influence smoking behavior including social influences, knowledge, attitudes, norms and resistance skills, given that these factors together appear to have a synergistic relationship that is greater than any of these factors alone in determining adolescents' susceptibility to smoking.

Finally, our results indicated that there were no significant differences in participants' levels of resistance self-efficacy, understanding of addiction, or outcome expectancies as a result of the ASPP intervention, with only three exceptions: participants in the intervention group endorsed greater expectations of negative affect reduction, taste/sensorimotor manipulation and social facilitation from smoking cigarettes compared to participants in the control condition, both before and after the intervention. We would expect that the intervention group would endorse fewer of these positive outcome expectancies given that they received considerable information about smoking consequences and addiction.

While random assignment ensures that there are no systematic differences within or between study groups, participants in the current study dropped out after being randomly assigned to either the intervention or control group. As a result, participants who chose to continue in the intervention condition may have been different than those who chose to continue in the control condition, and these differences may have affected study outcomes, such as the observed increase in several positive outcome expectancies in the intervention group. Although we did not observe significant differences between

the intervention and control groups on a number of demographic variables at baseline, including previous smoking history and the number of significant others who smoke, it is possible that there were pre-existing factors that we did not measure that influenced the intervention group's positive expectancies about smoking. In previous studies, researchers have noted distinct differences between those who "drop out" of studies or do not complete all phases of a study and those who complete the full study. For example, those adolescents who do not yet have a substance use problem and have little incentive for engaging in an intervention or prevention program may be less likely to follow through with study participation (Gross, 2006). On the other hand, adolescents who drop out or do not complete substance use specific prevention/intervention studies often display more serious problem behavior and poorer long term outcomes in alcohol/drugs, juvenile justice, family and educational domains (Meyers et al., 2003). Given these potential differences between our initial pool of participants and those who completed the actual intervention, our results may only reflect the impact of ASPP on a group of adolescents that was very motivated to complete the intervention for one reason or another.

Furthermore, our results indicated that there were a number of significant differences between participants who dropped out of the study and those who completed the full study (those who completed either the intervention or control condition). We found that study dropouts had on average a lower GPA, reported fewer perceived short and long term risks associated with smoking, and had lower resistance self-efficacy to refuse offers of smoking than those who completed the full study. Additionally, study dropouts also endorsed belief in a longer time to becoming a regular smoker, a longer

time to becoming addicted to cigarettes and greater ease of quitting smoking. All of these aforementioned variables increase an adolescent's susceptibility to cigarette smoking. Given that the study dropouts appear to have had a greater susceptibility to smoking, if they had remained in the study it is possible that we may have observed a greater reduction in susceptibility to smoking in those who completed the intervention compared to those who were in the control group. If these participants had remained in the study, the floor effect observed in the current results may have been eliminated and there may have been a greater likelihood for significant changes in participants' intentions and willingness to smoke as a result of the ASPP intervention.

Previous studies have examined predictors of adolescent participation in smoking cessation programs; however, to our knowledge there is little research on what predicts non-smoking adolescents' participation in smoking prevention programs, making it difficult to determine factors that may have influenced our sample to participate in the full study. In previous studies adolescents with greater perceptions of adverse health effects of smoking, greater positive smoking outcome expectancies (specifically social outcomes), and greater exposure to friends were more likely to complete smoking cessation programs (Patten et al., 2009; Thrul, Stemmler, Goeke, & Buhler, 2015; Turner, Mernelstein, Berbaum, & Veldhuis, 2004). Research suggests that young people with greater positive smoking outcome expectancies may recognize the need for assistance or intervention in helping them change these beliefs (Lindsey, Mernelstein, Berbaum, & Veldhuis, 2004). Although the sample in the present study did not consist of adolescent smokers, it is possible that the adolescents that chose to participate in the intervention

were aware of their positive expectancies and were motivated to participate based on this fact. As such, this would also explain the higher positive expectancies among this group.

Limitations and Directions for Future Research

The fact that the ASPP program did not significantly affect outcomes typically associated with reduced smoking behavior (e.g., resistance self-efficacy) may be due to several factors and may not be the result of a true lack of effectiveness of the ASPP program. First, the intervention was delivered completely online and we were unable to track participant engagement. Given that this was an initial pilot study, the intervention was designed as a simple point-and-click webpage, where participants were expected to read through the information and click on and view links to additional information (e.g., cost calculator, adolescent smoking testimonials about smoking, etc.). We were unable to determine whether participants actually read through all of the information or viewed all of the links. It is possible that some participants were not fully engaged with the material, and therefore the magnitude of the impact of this new information was attenuated. A number of studies on online interventions have found that engagement with online programs directly underlies the impact of the program on key outcome variables (Stretcher et al., 2008; Couper et al., 2010). These studies also show that tailored interventions result in more participant engagement and greater outcomes.

Given the importance of tracking participant engagement, future studies on the ASPP intervention should incorporate an analysis of engagement with the intervention material, which could include tracking time spent viewing intervention material, including specific intervention components, and an assessment of understanding or

retention of the material presented. Finally, a tailored intervention approach should also be considered. This could include tailoring information based on participants' personal experience with smoking or exposure to significant others that smoke, as well as tailoring the program according to their baseline outcome expectancies, resistance self-efficacy, and beliefs about addiction. For example, if a participant endorses a high level of positive smoking outcome expectancies at baseline, the program could be tailored so that the participant receives more information focused on disproving the perceived benefits the adolescent expects to result from smoking. Similarly, if a participant endorses low resistance self-efficacy, their program content may focus on teaching them how to refuse smoking offers through modeling the process in video clips, or giving participants scenarios and having them formulate resistance responses, as previously mentioned.

Another potential limitation of the present study was sample size. Although we had an adequate sample size to detect a medium to large effect, we could not include all of the potential covariates of interest in our analyses due to sample size limitations. In future studies on the ASPP intervention, a larger sample size of at least 100 participants (50 per condition) is recommended, as this will allow researchers to control for more important covariates, as well as draw conclusions about the effectiveness of the program that will be more generalizable to the larger adolescent population.

Attrition from pre- to post-test was also a significant issue in the current study. At baseline we had 179 participants; however, only 54 participants (30.2% of the total sample) completed both pre- and post-test measurements. Attrition is a common problem with repeated measures designs and is even more problematic with adolescent samples (Perez, Ezpeleta & Domenech, 2007). Previous research suggests that adolescents who

drop out of substance use intervention studies have poorer outcomes and greater prevalence of substance use (Odierna & Schmidt, 2009), which is challenging when these are the very constructs researchers are attempting to assess. In future studies researchers will likely want to consider including a longer follow-up period to assess actual smoking behavior, and therefore the issue of attrition may be even more problematic in that situation. Unfortunately, prior research has found that even with many of the tools we used in the present study, including incentives, web-based questionnaires, and repeated reminder phone calls and emails, the success rate for retaining participants is still low (Stephens, Thibodeaux, Sloboda & Tonkin, 2007). However, researchers may be able to reduce attrition in future studies by offering better incentives, such as paying every participant for survey completion. Given funding limitations, we were unable to offer a monetary incentive to all participants who completed the full study and this may have resulted in lower motivation or desire to complete the post-test intervention and measurement. Another option for retaining participants may be to connect with adolescent participants through a social networking site or through text messaging, instead of via email as in the current study. It has previously been found that only 6% of adolescents ages 13-17 exchange emails daily, while 63% of adolescents use text messaging daily and 29% of adolescents use some form of social media for communication purposes daily (Pew Research Center, 2012).

Poor reliability among some of our measures may also have resulted in attenuated relationships among the variables of interest in the current study. If internal consistency is poor or unacceptable for a scale, the items that make up that scale may not be measuring the construct of interest in the same way. In the current study, internal consistency

reliability (Cronbach's alpha) was in the unacceptable range for Willingness to Smoke (α = .48) and two subscales of the ASCQ (α = .44 for Negative Physical Feelings, and α = .49 for Boredom Reduction). In previous studies, Cronbach's alpha was also in the poor to unacceptable range for the Boredom Reduction and Negative Physical Feelings subscales of the ASCQ (α = .31 and α = .52 respectively; Lewis-Esquerre, Rodrigue, Kahler, 2005). These findings suggest that these scales may not have reliably measured participants' willingness to smoke cigarettes in the future, or their expectations of boredom reduction or negative physical feelings from smoking. Willingness to smoke was one of the primary outcome variables in this study, making this an especially serious concern. Future studies should consider developing more reliable measures of these constructs.

Conclusions

In this study, participants' perceptions of the benefits of smoking and beliefs in positive smoking outcome expectancies significantly predicted susceptibility to future smoking behavior, which suggests that these variables need to be targeted in prevention/intervention efforts in order to reduce adolescents' willingness and intentions to smoke in the future. These results combined with findings from previous research support the idea that prevention/intervention programs such as ASPP should focus on health and social risks and expectancies of smoking by teaching adolescents that risks are more likely to occur than they may have previously thought, while benefits are less likely to occur. Additionally, continuing to improve adolescents' understanding of addiction

and how likely it is to occur may decrease their willingness and intentions to smoke, thus potentially leading them to forego actual smoking experimentation.

Additionally, findings from the current study indicate that, when taken together, common predictors of adolescent smoking together explained the greatest amount of variance in participants' susceptibility to smoking behavior. When designing and implementing future smoking prevention programs researchers should keep these findings in mind and develop program content that does not focus solely on changing/impacting a single factor as the mechanism of change (e.g., only focusing on increasing resistance self-efficacy or only increasing knowledge about the risks of smoking), but instead implement programs that target multiple factors in order to have a significant impact on smoking behavior of adolescents.

The goal in conducting this pilot study was to test the utility and effectiveness of a new approach to adolescent smoking prevention. Although we found that participants who completed the ASPP web-based intervention did not report weaker willingness/intentions to smoke, belief in a shorter latency to addiction, more negative smoking outcome expectancies, or greater resistance self-efficacy than participants in the control group, the effectiveness of this program and similar programs of this type should continue to be examined with larger and more diverse samples of adolescents.

Although feasibility was not a direct aim of this study, qualitative feedback was obtained from participants (see Appendix B) regarding their impressions of the program, ease of use and suggestions for improvement. Some participants noted that navigating through the various pages/screens of the intervention was cumbersome, but overall participants had positive responses to the intervention and noted that it is important that

other adolescents their age receive this type of information, especially the information about addiction. The primary suggestions for improvement included adding more personal examples and messages from adolescents about how smoking has affected them or having adolescents deliver the information to participants (via video, etc.) so that it connects more to the target audience. Another suggestion included tailoring the program to the participants' current knowledge base about cigarettes and drugs. Based on this information, we can deduce that there are several improvements that can be made to make the intervention more effective and more user friendly. The study investigators originally sought to conduct focus groups in order to develop program content, but due to recruitment difficulties these focus groups were not conducted. Future studies should include conducting more formal feasibility studies and focus groups to improve both the content and structure of the intervention.

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STUDY QUESTIONNAIRE

Demographics

Instructions: *Please choose the one response that best describes you or write in your response for each of the questions below:*

1. What is your age? _____

2. What is your sex?
    a. Male
    b. Female

3. What best describes your ethnicity (choose one)?
    a. Hispanic or Latino
    b. Not Hispanic or Latino

4. What best describes your race (choose one)?
    a. American Indian/Alaska Native
    b. Asian or Asian American
    c. Native Hawaiian or Other Pacific Islander
    d. Black or African American
    e. White
    f. Other (please specify):_____
    g. Mixed Race (please specify):_____

5. What is your current grade level?
    a. Elementary School (specify grade level):_____
    b. Middle School/Junior High
        i. 6th Grade
        ii. 7th Grade
        iii. 8th Grade
    c. High School
        i. 9th Grade
        ii. 10th Grade
        iii. 11th Grade
        iv. 12th Grade
    d. Other (please specify):_____

6. Which best describes you biological parents' current situation:
    a. Married to each other.
    b. Co-habitating (living together but never married).
    c. Never lived together.

d. Used to live together, but were not married.
　　　e. Separated (still married, but no longer living together).
　　　f. Divorced.
　　　g. Mother is deceased.
　　　h. Father is deceased.
　　　i. Other:_____

7. If your parents are separated or divorced, with which parent do you spend the most amount of time with?
　　　a. Mom
　　　b. Dad
　　　c. About equal

8. What is your current living situation?
　　　a. With both of your biological or adoptive parents.
　　　b. With foster parents.
　　　c. With your father only.
　　　d. With your mother only.
　　　e. Sometimes with mom, sometimes with dad.
　　　f. With your father and stepmother/father's girlfriend.
　　　g. With your mother and stepfather/mother's boyfriend.
　　　h. With one or both grandparents.
　　　i. With a brother.
　　　j. With a sister.
　　　k. With another relative (e.g., aunt, uncle, cousin, etc.)
　　　l. With a friend or with roommates
　　　m. On your own
　　　n. Other:_____

9. Which of the following best describes your grades in school last semester? (Please check only ONE)

[] I am not currently in school　　　[] mostly A's　　　　　　　　[] mostly B's

[] I am not sure　　　　　　　　　　[] about half A's & half B's　[] mostly C's

[] about half B's & half C's　　　　[] about half C's & half D's　[] mostly D's

[] mostly below D

10. What is your cumulative grade-point average (GPA) since you started Jr. High/High school? (give your best estimate.)

11. Do you participate in organized sports?

Smoking Behavior

12. Have you ever tried smoking a cigarette, even one puff?

13. Have you ever smoked a whole cigarette?

14. Have you ever smoked 100 whole cigarettes in your lifetime?

15. How old were you when you first tried smoking a cigarette, even one puff?

16. How old were you when you first smoked a whole cigarette?

17. Since the last survey on DATE, have you tried smoking a cigarette, even one puff?

18. Since the last survey on DATE, have you smoked a whole cigarette?

19. In the last 30 days, have you tried smoking a cigarette, even one puff?

20. In the last 30 days, have you smoked a whole cigarette?

Others' Smoking

21. Has your mother ever smoked cigarettes?

22. Does your mother smoke cigarettes **now**?

23. Has your father ever smoked cigarettes?

24. Does your father smoke cigarettes **now**?

25. Have any of your brothers or sisters ever smoked cigarettes?

26. Do any of your brothers or sisters smoke cigarettes **now**?

27. Besides your mother, father, brothers, and sisters, has anyone you have ever lived with been a smoker? If so, who?

28. Besides your mother, father, brothers, and sisters, does anyone you live with **right now** smoke cigarettes? If so, who?

29. How many of your closest friends smoke?

30. Now think of your five closest friends (don't worry if you can't think of that many):

    a. For Friend # 1:

        i. How long have you been close friends with this person?

        ii. Has Friend # 1 ever tried a cigarette, even one puff?

        iii. Has Friend # 1 ever smoked a whole cigarette?

        iv. Has Friend # 1 smoked 100 cigarettes in his or her lifetime?

v. How many times per month does Friend # 1 smoke?

vi. How many times per week does Friend # 1 smoke?

vii. How many cigarettes does Friend # 1 smoke per day?

b. For Friend # 2…Friend # 5

Addiction

31. If you smoke about 2 or 3 cigarettes each day, how easy will it be for you to quit smoking?
   a. Very easy
   b. A little easy
   c. Somewhat easy
   d. Not very easy
   e. Not at all easy

32. If you smoke about 2 or 3 cigarettes each day, how long will it take until you become addicted to cigarettes?
   a. Will not happen
   b. Less than a month
   c. 1-6 months
   d. 7-11 months
   e. 1-2 years
   f. 3-4 years
   g. 5 or more years

33. If you smoke about 2 or 3 cigarettes each day, how long will it take until you become a regular smoker?
   a. Will not happen
   b. Less than a month
   c. 1-6 months
   d. 7-11 months
   e. 1-2 years
   f. 3-4 years
   g. 5 or more years

Perceptions

Imagine that you JUST BEGAN SMOKING. You smoke about 2 or 3 CIGARETTES EACH DAY. Sometimes you smoke alone, and sometimes you smoke with friends.

If you smoke about 2 or 3 cigarettes each day, what is the chance that . . . (Use a number from 0%-100%)

34. …You will look cool?   _____%

35. …You will get into trouble   _____%
36. …You will feel relaxed after smoking? _____%
37. …You will smell like an ashtray? _____%
38. …You will get a bad cough from smoking? _____%
39. …You will have a lot of trouble catching your breath? _____%
40. …You will be more popular? _____%
41. …You will have many really bad colds? _____%
42. …You will look more grown up? _____%
43. …You will have bad breath? _____%
44. …Your friends will be upset with you? _____%
45. …When you feel down, a cigarette will make you feel really good? _____%

Now imagine that you continued to smoke about 2 OR 3 CIGARETTES EACH DAY for the REST OF YOUR LIFE. What is the chance that… (Use a number from 0%-100%)

46. …You will get lung cancer? _____%
47. …You will get a bad cough from smoking? _____%
48. …You will have a lot of trouble catching your breath? _____%
49. …You will have a heart attack? _____%
50. …You will get wrinkles on your face? _____%

Smoking Outcomes

Instructions: *Below is a list of statements. We would like you to tell us what you expect to or believe will happen as a result of smoking cigarettes. If the consequence seems like it would never happen, circle number 1. If the consequence seems like it would always happen, circle number 5. However, if you expect that a consequence might happen, circle number 2; or if you expect that the consequence often happens as a result of smoking cigarettes, circle number 4.*

I believe/expect that. . . . .

	Never------------------------Always				
51. Cigarettes taste good.	1	2	3	4	5
52. Smoking controls a person's weight or eating habits.	1	2	3	4	5
53. Smoking helps calm an angry person down.	1	2	3	4	5
54. Cigarettes help with concentration.	1	2	3	4	5
55. Smoking burns a person's throat.	1	2	3	4	5
56. Smoking helps a person forget about a problem at home.	1	2	3	4	5
57. Smoking helps when a person is worried.	1	2	3	4	5
58. People look up to those who smoke.	1	2	3	4	5
59. Smoking keeps a person from eating too much.	1	2	3	4	5
60. Smoking helps a person stay slim.	1	2	3	4	5
61. Cigarettes make a person's lungs hurt.	1	2	3	4	5

62. Smoking helps if a person feels bad about him/herself.   1   2   3   4   5

	1	2	3	4	5
62. Smoking helps if a person feels bad about him/herself.	1	2	3	4	5
63. People gain weight when they stop smoking.	1	2	3	4	5
64. Smoking can help kill time if there is nothing to do.	1	2	3	4	5
65. The look and feel of a cigarette in the mouth is good.	1	2	3	4	5
66. Smoking will make a person cough.	1	2	3	4	5
67. Smoking makes a person more friendly or outgoing.	1	2	3	4	5
68. Smoking makes a person seem less attractive.	1	2	3	4	5
69. Parties are more enjoyable when a person is smoking.	1	2	3	4	5
70. When someone is sad, smoking helps him/her feel better.	1	2	3	4	5
71. When someone is feeling cranky or annoyed, smoking will help.	1	2	3	4	5
72. Smoking makes a person feel older or more mature.	1	2	3	4	5
73. Smoking makes a person less hungry.	1	2	3	4	5
74. Smoking gives a person something to do with his/her hands.	1	2	3	4	5
75. When a person is upset, a cigarette helps him/her deal with it.	1	2	3	4	5
76. Hanging out with friends is more fun if everyone is smoking.	1	2	3	4	5
77. Smoking makes people look ridiculous or silly.	1	2	3	4	5
78. Smoking makes people look cool or tough.	1	2	3	4	5
79. Most popular people smoke cigarettes.	1	2	3	4	5
80. Smoking makes a person feel more comfortable around others.	1	2	3	4	5

Intentions

81. What is the chance that you will try smoking a cigarette, even one puff, sometime within the next six months?

Definitely Will Not---*Definitely Will*
   1   2   3   4   5   6   7

82. What is the chance that you will try smoking a whole cigarette sometime within the next six months?

Definitely Will Not---*Definitely Will*
   1   2   3   4   5   6   7

83. What is the chance that you will ever try smoking a cigarette, even one puff, in your life?

Definitely Will Not--*Definitely Will*
1   2   3   4   5   6   7

84. What is the chance that you will ever try smoking a whole cigarette in your life?

Definitely Will Not--*Definitely Will*
1   2   3   4   5   6   7

Willingness

85. Suppose you were with some friend and one of them offered you a cigarette. How likely is it that you would do each of the following:
    a. Take it and try it.

    Not at All Likely--*Very Likely*
    1   2   3   4   5   6   7

    b. Tell them "no thanks."

    Not at All Likely--*Very Likely*
    1   2   3   4   5   6   7

    c. Leave the situation.

    Not at All Likely--*Very Likely*
    1   2   3   4   5   6   7

Drug Use Resistance Self-Efficacy (Cigarettes)

86. How sure are you that you can refuse if a friend offers you a cigarette at a party and you do not want it?

Not Sure at All--*Definitely*
1   2   3   4

87. How sure are you that you can refuse if an older friend, brother or sister, offers you a cigarette at a party and you do not want it?

Not Sure at All--*Definitely*
1   2   3   4

88. How sure are you that you can refuse if a friend offers you a cigarette at his/her home when no adults are home and you do not want it?

Not Sure at All---*Definitely*
      1   2   3   4

89. How sure are you that you can refuse if an adult (parent, aunt/uncle, neighbor) offers you a cigarette at your home and you do not want it?

Not Sure at All---*Definitely*
      1   2   3   4

90. How sure are you that you can refuse if a brother, sister, or cousin offers you a cigarette at your home when no adults are home and you do not want it?

Not Sure at All---*Definitely*
      1   2   3   4

91. How sure are you that you can refuse if a friend offers you a cigarette at your home when no adults are home and you do not want it?

Not Sure at All---*Definitely*
      1   2   3   4

92. How sure are you that you can refuse if a friend offers you a cigarette outside of your home (at a park, field, street) and you do not want it?

Not Sure at All---*Definitely*
      1   2   3   4

93. How sure are you that you can refuse if a friend offers you a cigarette at school when no adults are around and you do not want it?

Not Sure at All---*Definitely*
      1   2   3   4

Marketing, Media, & Education

94. Have you ever attended a school program that taught you about cigarette smoking and told you not? Y/N
95. Have you ever learned about cigarette smoking and why it is dangerous in one of your classes? Y/N
96. Have you ever seen or heard information about the dangers of smoking and why you shouldn't smoke. . .
    . . . on TV? Y/N
    . . . on the radio? Y/N

. . . in a printed magazine or newspaper? Y/N
. . . on the internet? Y/N
. . . in a pamphlet, poster, or brochure? Y/N
. . . on a billboard or sign? Y/N

97. Have you ever seen or heard an advertisement trying to sell cigarettes (for example, an advertisement for Marlboro or Camel cigarettes). . .
. . . on TV? Y/N
. . . on the radio? Y/N
. . . in a printed magazine or newspaper? Y/N
. . . on the internet? Y/N
. . . in a pamphlet, poster, or brochure? Y/N
. . . at a party? Y/N
. . . at a sporting event? Y/N
. . . on a display in a store? Y/N
. . . on a billboard or sign? Y/N

Nicotine Dependence

Instructions: *Please answer the following questions if you have ever tried smoking a cigarette, even one puff.*

98. Have you ever tried to quit, but couldn't? Y/N
99. Do you smoke now because it is really hard to quit? Y/N
100.   Have you ever felt like you were addicted to tobacco? Y/N
101.   Do you ever have strong cravings to smoke? Y/N
102.   Have you ever felt like you really needed a cigarette? Y/N
103.   Is it hard to keep from smoking in places where you are not supposed to, like school? Y/N

When you tried to stop smoking . . . (or when you haven't used tobacco for a while. . .)

104.   Did you find it hard to concentrate because you couldn't smoke? Y/N
105.   Did you feel more irritable because you couldn't smoke? Y/N
106.   Did you feel a strong need or urge to smoke? Y/N
107.   Did you feel nervous, restless or anxious because you couldn't smoke? Y/N

PARTICIPANTS' COMMENTS ON THE ASPP PROGRAM

Question	Selected Participant Comments
Did you enjoy taking part in this online intervention?	• *"Yes, my favorite part was learning how addiction started at the first cigarette."* • *"Yes, I did enjoy taking part in this intervention. My favorite parts were all of the pictures."* • *"Yes, my favorite part was the treats and learning about the dangers of smoking because my mom still smokes."* • *"Honestly not really, it was a lot of questions."* • *I did enjoy taking part in this online intervention. One of my favorite parts of the intervention was I found out more about addiction.* • *"Yes I did. My favorite part was when I got to see the stories of other young people who are smokers."*
Was there anything that you had difficulty understanding?	• *"No, nothing. Everything was clear."* • *"No, there was nothing I had difficulty understanding."* • *"There were some things I didn't understand such as, if you didn't smoke then why did you keep on asking questions that ask for numbers. Then I had to put like a bunch of zeroes. You should really put like a sign that says "If you don't smoke at all, you can skip these questions." Or like put a select all button and only push the zero button once."*
Did you think it was a helpful intervention? Did you learn anything new?	• *"I think it was helpful because it extended my knowledge and understanding of the dangers of smoking."* • *"I didn't have any reason for it to help me, so I don't know. I did not learn anything new."* • *"I learned how serious and how deadly smoking addiction could actually be, I will not be smoking anytime in my life."*

	• *"I learned how fast it is to get addicted to a drug, how addiction happens, and the complications of withdrawal."*
How do you think this intervention could be better?	• *"I think that this intervention could be better by adding more personal examples from different people."* • *"Ask the student some of what they already know about cigarettes and drugs."* • *"I think this prevention could be made better by having a short video or performance using kids our age to show how smoking is harmful."* • *"If there were less questions. They are all repetitive. If I said no to one question, why would I say yes to the other ones that are exactly the same questions except with different numbers."*
Would you recommend that other kids your age take part in this intervention?	• *"Yes because being aware is very important, especially at this age."* • *"Depends if any family member smokes."* • *"Yes, it's a eye opener of how bad smoking is."*
Do you think the intervention was easy to navigate?	• *"It was very easy and fun to use."* • *"No, took a while to get to the bottom of each page."* • *"Sorta. I didn't have trouble, just wish there was an easier way to navigate."* • *"This intervention was easy to navigate and get through different pages, I did not have any trouble with the external links."*

INTERVENTION CURRICULUM

Objective	Program Content
Introduce relationship between adolescent smoking experimentation and addiction	• <u>Question:</u> *How many kids who try smoking do you think go on to become regular smokers when they are adults?* • 60-80% of adult smokers began smoking as teens • <u>Question:</u> *Why do so many kids who try smoking become adult smokers?* • One reason you may not have thought of is addiction

Introduce the Sensitization Homeostasis Theory of nicotine addiction	• *"Hooked from the First Cigarette"*
	   o Addiction occurs a lot earlier on and faster than you may have thought
	   o You have never really learned about this before
	   o You probably have heard that addiction happens after a person smokes over and over again for a long time, but science tells us that this is not really the case
	   o New scientific studies show us that addiction to cigarettes actually happens long before you become a regular everyday smoker
	   o Research now shows us that people can become hooked as soon as they smoke their first cigarette because that is when they first have withdrawal symptoms
	   o Research has found that 10% of teens (that's 1 out of every 10 teens) your age show signs of being hooked on cigarettes after smoking their first cigarette and 1 out of every 4 teens show signs of being hooked within 2 weeks of starting to smoke
	   o So, even after maybe just trying one cigarette, your brain can be changed by changing neurons,
	       ▪ Neurons are the special cells in your brain that send messages and tell your brain and the rest of your body what to do and feel
	       ▪ These changes in your brain cause you to have cravings and they lead to getting hooked (or dependent)
	   o You have probably been taught that smoking more and more over time leads to addiction {DIAGRAM - TRADITIONAL VIEW OF ADDICTION}
	   o But now we know that those first cigarettes lead to dependence and this makes people keep smoking over time {DIAGRAM - SENSITIZATION HOMESTASIS THEORY}

	- What this means for you: - Even as a kid, you too can become addicted to cigarettes and the addiction might actually kick in very shortly after trying your first cigarette
Provide an overview of the addiction process	*"How Addiction Works"* ***What happens in the body that causes someone to become addicted?*** - Nicotine is a stimulant, which means that it improves mood, increases feelings of well-being, and increases energy and alertness - Nicotine does this by attaching to special molecules on your brain cells called **<u>receptors</u>**, and then your brain cells release a chemical called dopamine - When dopamine is released, it makes you feel good. - However, if your brain is already working like it should, then you already have dopamine naturally attached to your receptors on your brain cells - Then when you smoke even more receptors get filled up with nicotine, so you feel an extra "buzz" or sense of pleasure you wouldn't normally feel. - Once your brain feels this extra amount of pleasure, it wants to keep it up, and so addiction begins because you want cigarettes to keep making you feel good. - Withdrawal happens when you stop smoking and you start feeling bad because your brain and body is missing the nicotine it's used to **Symptoms Are Unpleasant** - Really bad mood swings that might include anger, frustration, feeling annoyed, and depression - Frequent and terrible headaches that may also include being unable to fall asleep and nightmares - Difficulty concentrating and focusing - This will make it hard for you to do well in school, do your chores, play video games, perform well in sports, and more - Tiredness, weakness, and low heart rate - A bigger appetite, which might cause you to gain weight - Tingling in hands and feet - You might feel like you have a pretty bad cold with a lot of coughing and sneezing

- o Kids might experience addiction a little differently than adults
- Addiction occurs very early on, when you first start smoking
- New research shows that signs of dependence happen right after smoking the first cigarette, but they can be hard to notice and many people don't notice until it is too late!
- You do not have to be an everyday, pack a day smoker to become addicted!
- Maybe you just smoke socially with your friends
- Maybe you just smoke once a week
- Maybe you just smoke once a day
- You might be thinking that's not too bad, you probably have to smoke a ton of those things to become addicted
- Well, this actually isn't true!
- After just smoking a few times, sometimes even ONCE, you start becoming hooked, because the chemicals in cigarettes are already acting on your brain and the cycle of addiction has begun
- {PERSONAL TESTIMONIES ABOUT ADOLESCENTS AND THEIR EXPERIENCE WITH ADDICTION} www.WhyQuit.com

Teach adolescents how to recognize physical/psychological symptoms of addiction

- Here are some of the signs and symptoms that might help you to realize that you are becoming hooked on cigarettes/nicotine:
- *Cigarette Cravings*
  - o {DIAGRAM OF PROCESS}
  - o You feel like you need a cigarette, similar to how you might crave a soda throughout your day at school to "keep you going"
  - o You might want to get up in the middle of class just to smoke or when you first wake up in the morning
  - o You aren't smoking because it feels good, instead you are smoking to avoid feeling bad
  - o You tell yourself you want to quit, you don't like the way smoking is making you feel, but you just can't seem to put those things down no matter how hard you try
- *What Does Addiction Feel Like?*
  - o Withdrawal - which are the feelings a person experiences after they haven't smoked for a little while, is a sign of addiction.
  - o You may feel the following when you haven't had a cigarette…
  - o "I feel like I really need a cigarette."
  - o "I get a lot of cravings to smoke."
  - o "I feel nervous, restless or anxious."
  - o "I feel irritable, annoyed or bothered."
  - o "I have a hard time concentrating."
  - o "It's hard to not smoke in places where it is not allowed, like at school."

	o "I feel sad, blue or depressed."

Provide evidence of addiction as a problem that occurs across the lifespan	• Question: *Isn't addiction an adult only problem?*
	• Many teens think addiction is **<u>ONLY</u>** an adult problem
	    o They have a false sense of confidence in their ability to quit or a false sense of control
	    o Just because you do not plan on becoming a regular smoker doesn't mean it will not happen
	    o There is no difference between a habit and being addicted or dependent
	    o Smoking to "fit in" and smoking to "feel better" still involve the same physical process and have the same impact on your body