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Gender and Ethnic Differences in Perceived Stress as a Predictor of Smoking Behaviors in Rural Adolescents

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A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

by

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Abstract

GENDER AND ETHNIC DIFFERENCES IN PERCEIVED STRESS AS A PREDICTOR OF SMOKING BEHAVIORS IN RURAL ADOLESCENTS

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Cross-sectional and longitudinal analyses were conducted to examine the impact of perceived stress on current and future smoking behaviors of rural Virginia middle school students. Data were analyzed for 685 sixth grade students and 554 seventh grade students. Sixth grade students were 52% male, 53% Caucasian American (CA), and 47% African American (AA). For 7th graders, the sample was 53% female and 56% CA (44% AA). Of the 685 sixth grade students, 7% reported that they had smoked cigarettes at least once during the past 30 days (n=46, 63% male and 67% CA). By the 7th grade, the percentage of smokers had increased to 13% (n=74, 56% female; 65% CA). A mean

perceived stress score for 6th graders was 4.7 (SD= 3.1, range = 0-12). By the 7th grade, students reported a mean perceived stress level of 5.3 (SD = 3.2, range 0-12).

A logistical regression revealed that 6th grade stress was predictive of 6th grade "current" smoking (odds ratio = 1.2, CI= 1.04-1.3), and "ever" smoking statuses (OR=1.1, CI=1.1-1.2). Results also revealed that 7th grade stress was predictive of 7th grade "current" smoking status (OR=1.1, CI=1.02-1.2). Prospective results revealed that 6th grade stress was predictive of 7th grade "current" smoking (OR= 1.2, CI=1.1-1.3). Results also revealed that gender was predictive of both 6th grade (OR = 2.0, CI=1.1-3.7) and 7th grade (OR =1.5, CI=1.1-2.5) "current" smoking, such that boys were more likely to smoke than girls for each grade. Also more 6th grade Caucasian Americans reported a "current" smoking status than did 6th grade African Americans (OR=2.0, CI=1.03-3.7). Surprisingly, more African-American 7th graders reported an "ever" smoking status than did 7th grade Caucasian Americans (OR=.55, .37-.82). These data appear promising in that smoking rates range from 7 to 13%. Nevertheless, smoking rates tend to increase with age; thus, adolescents are in need of interventions that prevent smoking initiation and increase cessation. Adolescents may benefit from the addition of stress management components in interventions aimed at teaching more positive ways of coping with perceived stress.

CHAPTER 1

INTRODUCTION

Smoking is one of the most serious teen health risk behaviors because of its link to an increased risk for various chronic diseases (Atav & Spencer, 2002). Cigarette smoking causes significant health problems among children and adolescents including coughing, respiratory illness, risk for cardiovascular disease, decreased physical fitness, and decreased lung growth (ACS, 2003a). In fact, smoking is a risk factor for the top two leading causes of death in America: heart disease and cancer (ACS 2003a; CDC, 2002a; United States Department of Health and Human Services [USDHHS], 2000).

In the United States, tobacco use accounted for approximately 440,000 deaths per year from 1995 to 1999 (ACS, 2003a; AHA, 2002a). It is estimated that approximately 33% of the smoking related deaths were cardiovascular mortalities and 30% were cancer related deaths (ACS, 2003a; AHA, 2002a). When examining the morbidity and mortality rates for both cancer and cardiovascular disease, it becomes apparent that efforts should be made to reduce adolescents' risk factors for diseases, especially those that are under young people's control like smoking initiation. Because smoking is a choice, it is considered the most preventable cause of death.

Smoking Behaviors

In 2000, forty-six million adults reported that they were current smokers (smoked in last 30 days). The Center for Disease Control and Prevention (CDC) reports that

almost all initial use of tobacco occurs before high school graduation, mainly between the ages of 14 and 15 (ACS, 2003a; AHA, 2002b; USDHHS, 1994). Research also suggests that the younger adolescents start smoking, the more likely they are to continue smoking into adulthood (USDHHS, 1994). The American Heart Association (2002b) reports that 80% of people who use tobacco begin before age 18, with the majority initiating smoking between ages 14 and 15.

When examining high school students (n=13,601), Youth and Risk Behavior Surveillance (YRBS) results revealed that 22% of students smoked a whole cigarette prior to age 13 and 28% had smoked a cigarette in the past 30 days (Grunbaum et al., 2002). Sixty-four percent reported that they had ever[1] tried a cigarette, even one or two puffs. Data from the National Youth Tobacco Survey (15,058) revealed that 12% of middle school students were current[2] tobacco users (CDC, 2000).

Rural adolescents appear to be at an increased risk for smoking initiation and maintenance. Cronk and Sarvela (1997) found that rural adolescents have a higher prevalence for excessive cigarette use than do urban adolescents. A 2002 study by Atav and Spencer found that 28% of rural adolescents reported frequent tobacco use compared with 17% of suburban and 15% of urban students (n=2,017 ages 12-17). A 2001 study of rural seventh graders (n=1,568) found that 21% of students reported lifetime cigarette smoking[3], 5% were current smokers, and 19% intended to smoke in the coming year (Griffen et al., 2001).

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[1] "Ever smoked" refers to whether an individual has ever smoked a cigarette during his or her lifetime, even just one or two puffs.
[2] Current smokers = smoked at least once in the past 30 days
[3] Same as ever smoked

Stress as a predictor of adolescent smoking

Several theories have been postulated to aid our understanding of stress as it relates to smoking behaviors in adolescents. For instance, Evan suggested (based on Bandura's social learning model) that adolescents may observe parents who smoke during stressful times and imitate this inappropriate coping behavior (Evans, 2001). Further, it is hypothesized that smokers believe that smoking has stress reducing properties and that these beliefs reinforce smoking behaviors (Parrott, 1995). Research has demonstrated a link between adolescent stress and smoking behaviors, as will be illustrated in the literature review. These studies emphasize the need for interventions aimed at teaching adolescents more positive coping strategies that will prevent smoking initiation or aid in smoking cessation.

The purpose of the current study is to investigate the impact of stress on the smoking behaviors of rural adolescents. Of particular interest is whether ethnicity and gender act as moderators for the relationship between stress and smoking. Moreover, this study seeks to determine if stress predicts future smoking behaviors of rural youth. The current study should provide an examination of important factors related to the development and maintenance of smoking behaviors in a population that is rarely studied, rural adolescents.

Overview

In Chapter 2, a literature review is provided that examines smoking behaviors of adolescents and rural adolescents, the link between stress and illness, stress and smoking, and stressors unique to the adolescent population. It also provides theoretical foundations

for the relationship between stress and smoking as well as factors that impact stress and smoking for adults and adolescents. Finally, the review presents evidence of ethnic and gender differences in stress, which may demonstrate the need for culture specific research on stress and smoking interventions. Chapter 3 summarizes the information provided in the introduction and literature review by presenting a statement of the problem and goals of the study. Chapter 4 presents the methods of the study including a description of the study design, participants, measures used, study hypotheses, and proposed analyses. Chapter 5 presents the results of the hypotheses tested in this study. Chapter 6 provides a discussion of the results found, strength and limitations of the study, and implications for future research.

CHAPTER 2

LITERATURE REVIEW

Adolescent smoking behaviors

As noted in the introduction, adolescents are at an increased risk for smoking initiation and maintenance. Findings from a 2003 study of 645, eighth to tenth-grade students revealed that 50% of students had ever smoked in their lifetime, 19% smoked within the last 30 days, 17% smoked weekly, and 15% smoked daily (Ma, Shive, Legos, & Tan, 2003). Studies have found that smoking initiation typically begins between the ages of 14 and 15 (AHA, 2002b; CDC, 2002b). Nevertheless, initiation rates across various studies demonstrate that about 10% of 8-year-olds, 18-24% of 10-year-olds, and 35-40% of 12-year-olds have initiated smoking (Cohen, Sattler, Felix & Brownell, 1987; DeMoor, Elder, Young, Wildey, & Molgaard, 1989; Henriksen & Jackson, 1999; Jackson, Henriksen, Dickinson, & Levine, 1997; and Johnston, O'Malley, & Bachman, 1993). Researchers examined data from the Teenage Attitudes and Practices Surveys to determine how many adolescents (n= 16,954) initiate smoking each day in the United States. Results indicated that 4,824 adolescents (ages 11-17) initiated smoking each day in 1991 and 1,975 became established smokers each day. The modal age of initiation was 12 (Gilpin, Choi, Berry, & Pierce, 1999).

A study by Chassin, Presson, Sherman and Edwards (1990) found that adolescent smokers (mean age 17) were 16 times more likely to become young adult smokers compared to adolescent nonsmokers and that even mere experimentation during adolescence significantly increased the risk of becoming an adult smoker. Because experimentation rates for adolescents have been as high as 64% (see introduction) and initiation occurs so early in adolescent development, interventions are needed to better understand and prevent smoking behaviors in adolescents (Gilpin et al., 1999; Grunbaum et al., 2002). These interventions may need to be culture specific due to between group differences as illustrated below.

In addition to current and experimentation smoking status, studies have also examined smoking refusal self-efficacy in adolescents. Research has demonstrated that low self-efficacy to refuse cigarettes increases adolescents' risk of initiating smoking, progressing in their smoking status (i.e. moving to higher stages of smoking based on frequency or quantity), and failing at cessation attempts. For instance, a 2002 longitudinal study of rural adolescents from the same population as that of the current study (2,247 6^{th} graders and 1,794 7^{th} graders) found that having low self-efficacy to refuse cigarettes slightly increased a student's odds of trying cigarettes and was predictive of higher-level smoking (e.g. smoked more than previously) (OR = 1.2 and 1.2, respectively, $p < .05$; Hogan, 2002). Another 2003 study examined 379 employed adolescents (ages 15-18) to determine the relationship between smoking refusal self-efficacy and smoking behaviors. Results revealed that daily smokers had lower smoking

refusal self-efficacy than those who smoked less frequently (33 vs. 43-55 respectively; range 15-60). Results also showed that as quit attempts and number of cigarettes smoked per day increased, smoking refusal self-efficacy scores decreased. Also, as friends encouraged cessation, smoking refusal self-efficacy scores increased (Fagan, Eisenberg, Frazier, Stoddard, Avrunin, & Sorensen, 2003).

A study by Brodeur (2002) investigated the impact of tobacco refusal self-efficacy on various health compromising behaviors in a sample of 1012 rural eighth grade students (from same population as that of the current study). Results revealed that higher tobacco refusal self-efficacy scores were related to lower rates of tobacco use, dietary fat consumption, and involvement in health compromising behaviors (Brodeur, 2002). Finally, Kremers, Mudde, and de Vries (2002) examined smoking refusal self-efficacy in relationship to smoking acquisition in a sample of European youth (n=21,535, mean age = 13. Smoking acquisition was categorized according to the following stages: preparers (intention to start in the next month), contemplator (next 6 months), precontemplator (no intention to start in the next 6 months), progressives (intention to start in the next 5 years), immotives (did not smoke, but lacked a strong decision to never start smoking), and committers (no intention to smoke in the future). Results revealed that Committers had higher smoking refusal self-efficacy than did Immotives who had higher refusal self-efficacy than did Progressives, Contemplators, and Preparers (Kremers et al., 2002).

The aforementioned studies demonstrate that smoking initiation and maintenance are definitely target behaviors in need of interventions for youth. Research also

demonstrates that low smoking refusal self-efficacy is related to initiation and maintenance of smoking behaviors. More research is needed to aid in the design and implementation of effective smoking prevention and cessation programs for youth. Since ethnic differences exist in smoking behaviors (as will be illuminated below), these prevention programs may need to be culture specific in nature.

Ethnic differences in smoking behaviors

Research has shown that African-American adolescents tend to smoke at lower rates than do Hispanic- and Caucasian-American adolescents. Nevertheless, by adulthood, smoking rates are similar between African Americans and other ethnic groups (Burns, Lee, Shen, Gilpen, Tolly, & Shanks, 1997). The Youth and Risk Behavior Surveillance (YRBS) results revealed that among high school students surveyed (n=13,601), Caucasian-American (31%) and Hispanic-American (26%) students were significantly more likely than African-American students (14%) to report current cigarette use (Grunbaum et al., 2002). Middle school data from the National Youth Tobacco Survey (NYTS; n=15,058) yielded similar results such that Caucasian- (32%) and Hispanic-American (27%) students were more likely to be current smokers (smoked at least one cigarette in the past month) than were African Americans (15%; CDC, 2000).

A 2003 longitudinal study of data collected in 1994 (n=8,865), 1995 (n=9,115), and 1996 (n=9,364), investigated smoking behaviors in middle school (6^{th}-8^{th} grade) students (Kelder et al., 2003). Researchers found that although ethnic differences in smoking behaviors were weak in the 6^{th} grade sample, these differences were well-established by the 8^{th} grade. Eighth grade Caucasian-American and Hispanic-American

students smoked at a rate of two to four times higher than that of African-American students (Kelder et al., 2003).

A 1998 longitudinal study examined variables related to smoking initiation in a sample of 1,970 students (46% male, 70% Caucasian American, 20% African American) surveyed in the 3rd and 4th grades and again in the 6th and 7th grades. Results revealed that pubertal development, ethnicity, and socio-economic status (SES) were all significant predictors of smoking initiation. Caucasian-American children and those from low SES homes were more likely to be experimental smokers and started smoking at an earlier age than did African-American children and children from high SES homes. Once smoking was initiated, Caucasian-American children advanced more rapidly to become current smokers than did other ethnic groups. Further, children at a higher pubertal level were more likely to experiment with smoking than were younger students (Harrell, Bangdiwala, Deng, Webb, & Bradley, 1998).

A 1996 study examined 3,484 non-smoking African-American and Caucasian-American adolescents (ages 11-18) to determine race differences in smoking initiation. Results demonstrated that after four years of follow-up, forty-three percent of Caucasian Americans became trial smokers compared to only 30% of African Americans (Faulkner, Escobedo, Zhu, Chrimson, & Merritt, 1996). Researchers also found that household smoking, smoking among same-sex friends, self-reported intention to smoke and school performance were all significant predictors of smoking initiation (Faulkner et al., 1996).

In addition to examining ethnic differences in smoking behaviors, researchers have studied ethnic differences in the predictors of smoking behaviors in adolescents. A

study of 1,795 mother-child dyads (47% African American, 34% Caucasian American, and 23% Hispanic American) examined race specific correlates of adolescent smoking. Results revealed that Caucasian-American children reported the highest rates of lifetime, current, and persistent smoking and initiated smoking at significantly earlier ages than did both Hispanic- and African-American children (Griesler & Kandel, 1998). It was also found that maternal smoking and cocaine use, low maternal religiosity, and negative scholastic attitudes were factors that increased smoking among Caucasian-American students, whereas positive parenting was protective for African-American students (Griesler & Kandel, 1998). A study by Alexander, Allen, Crawford, and McCormick (1999) used an ethnically diverse sample of 227 focus group respondents (ages 13-19) to investigate the factors related to smoking initiation. The researchers found that for African-American and Caucasian-American males, the motivation to initiate smoking resulted from strong coercive pressure to conform, such as threats of violence, and verbal attack on manhood. For Caucasian-American and Hispanic-American females, it was found that parents were the prompters for smoking behavior in that some parents offered cigarettes to their daughters hoping the aversive symptoms (e.g. coughing, choking, throwing up) would deter future smoking. Hispanic students also stated that they received exposure to cigarettes by their family members having the student light the cigarette or by using cigarettes to light fireworks. For African-American students, easy access to cigarettes in the home served as a trigger for smoking initiation (Alexander et al., 1999).

Landrine, Richardson, Klonoff, and Flay (1994) investigated ethnic differences in the predictors of cigarette smoking among 4,375 ninth grade students (41% Hispanic American, 30% Caucasian American, 17% Asian American, and 12% African American). They found that for Caucasian Americans, the best predictors of smoking behaviors were peers who smoked, which accounted for 23% of the variance. For African Americans, risk-taking tendency was the best predictor of smoking behaviors accounting for 15.9% of the variance. Within the Asian sample, truancy predicted smoking (15%), and for Hispanic Americans, peer smoking was the largest predictor comprising 13-17% of the variance, depending on acculturation level (Landrine et al., 1994).

As noted in the beginning of this section, although Caucasian Americans and Hispanic Americans tend to smoke more than African Americans during adolescence, by adulthood the smoking rates of African Americans are similar to or even surpass those of the aforementioned ethnic groups. For example, the 1998 Surgeon General Report revealed that American-Indian/ Alaskan men and women have the highest smoking prevalence (37% and 31% respectively), followed by African-American men (32%), Caucasian-American men (27%), Hispanic-American men (26%), Caucasian-American women (23%), and African-American women (14%; CDC, 1999). These studies demonstrate the need for adolescent smoking intervention aimed at reducing the number of adolescents who initiate smoking and thereby increase their risk of becoming adult smokers. Further, ethnic differences suggest that these interventions may need to be culture specific, as the factors related to smoking appear to vary by ethnic group.

Gender differences in smoking behaviors

In addition to ethnic differences, researchers have also investigated gender differences in smoking behaviors of adolescents. National Youth Tobacco Survey data yielded no gender differences in smoking rates among high school or middle school students. However, middle and high school boys were more likely to use smokeless tobacco, smoke cigars, and smoke pipe tobacco than were girls (CDC, 2000). Contrary to the National Youth Tobacco Survey, Youth Risk Behavior Surveillance data yielded gender differences in both smoking initiation and cigarette use among a sample of 13,601, 9th to 12th grade students. Male students (24.5%) were significantly more likely than female students (19.8%) to have smoked a whole cigarette before age 13. Further, male students were significantly more likely than females to report current cigarette use, to have ever tried smoking, and to have smoked more than 10 cigarettes per day (Grunbaum et al., 2002). A longitudinal study by Harrell et al. (1998) found that in an ethnically diverse sample of students (n=1,970; 3rd – 4th grade and 8-9th grade), boys had higher prevalence rates of experimental smoking than girls at each time point. Another study by Pederson, Koval, and O'Connor (1997) examined gender and smoking behaviors in a sample of 1,552 sixth grade students. Results revealed that more boys reported experimental smoking than did girls (18% vs. 14%; Pederson et al., 1997). A study by Coogan et al. (1998) examined factors associated with smoking among 31,861 children and adolescents. Overall, more females were current smokers than were males. Significantly more tenth to twelfth grade girls were current smokers than were boys (28% vs. 22%, respectively; Coogan et al., 1998). Although inconsistent at times, results

demonstrate that gender differences in smoking behaviors exist, with most studies finding that boys initiate and maintain these behaviors at higher rates than girls. Results demonstrate that gender specific interventions may be required to effectively address the prevention of smoking behaviors among adolescents.

Rural adolescents

As emphasized in the introduction, research has demonstrated that rural adolescents are at an increased risk for tobacco use. Aloise-Young, Wayman, and Edwards (2002) conducted a study of 68,270 adolescents (7^{th}-12^{th} grade) sampled between 1996 and 2000 and found that rural adolescents and adolescents living in the South had the highest smoking rates. Rural adolescent smoking rates were 31% higher than urban smoking rates, whereas Southern smoking rates were 36% higher than Western rates and 22% higher than Midwestern rates. The study also found that males in most geographic regions (except the West) were more likely to smoke than were females (Aloise-Young et al., 2002). Two other studies compared rural and urban tobacco use and found significantly higher rates of substance use among rural adolescents (see Atav & Spencer, 2000 and Cronk & Sarvela, 1997 in introduction).

Research has found similar predictors of smoking among rural and urban samples. For instance, a study by Horn, Gao, Dino, and Kamal-Bahl (2000) investigated predictors of smoking behaviors in a sample of 883 rural ninth grade students. Results revealed that 20% of the sample reported current cigarette use. Results also demonstrated that smoking among close friends and siblings, having family problems, and possessing favorable attitudes toward tobacco were all significant predictors of cigarette smoking.

Similarly, a study by Hogan (2002) examined family and peer influence on the progression of smoking behaviors (moving from one smoking stage (i.e. non-smoking) to another (experimental) of 2,247 sixth grade and 1,794 seventh grade rural students. Results revealed that for 7th grade students, a student who had a best friend who smoked was 2.6 times more likely to initiate smoking in the next six months. For 6th grade students, having a mother who smoked doubled the students' likelihood of being an experimental smoker and having a higher overall level of smoking by the 7th grade (Hogan, 2002).

Another study conducted by Chopak, Vicary, and Crockett (1994) found that peer alcohol and tobacco use significantly predicted substance use in a sample of 548 rural adolescents (mean age 14). Within the sample, forty-four percent of students had used tobacco once or twice and 16% used tobacco daily. A study by Ritchey, Reid, and Hasse (2001) found that 40% of rural adolescents (n=630; mean age 16) were current smokers, and sixty-four percent drank alcohol within the past 30 days (Ritchey et al., 2001). These studies emphasize the need for substance related prevention programs in rural communities. Before these programs can be implemented, researchers need to seek a thorough understanding of the factors related to smoking in rural populations. This study seeks to determine if stress is a significant predictor of smoking in rural adolescents. Results from this study should illuminate the relationship between stress and smoking in a sample of rural adolescents and demonstrate whether ethnic and gender differences exist in the aforementioned relationship.

The literature demonstrates that numerous predictors of tobacco use have been investigated in both ethnic- and gender-diverse samples. This study aims to explore ethnic and gender differences in smoking by investigating stress as a predictor. As will be demonstrated below, the link between stress and smoking has been well established. Unfortunately, the present population, rural adolescents, remains understudied even though they are at an increased risk for adopting smoking behaviors. The remainder of the literature review will focus on stress and its relationship to smoking-related illnesses and smoking behaviors, particularly in adolescents.

Stress and Illness

Since as early as 1914, researchers have been investigating the impacts of stress on bodily systems (Cannon, 1914). However, there has yet to be a consensus on the definition of stress due to the different theorists and theories surrounding the concept. Researchers such as Selye, Baum, Lazarus, and Folkman have all contributed to the current conceptualization, research, and understanding of stress. For instance, Baum defines stress as "a negative emotional experience accompanied by predictable biochemical, physiological, and behavioral changes that are directed toward adaptation" (Baum, 1990, p. 635). Lazarus and Folkman (1984) added the notion of appraisal to the concept of stress. They defined stress as "the relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being" (p. 19).

Dougall and Baum (2001) note that stress can impact health in three main ways. First, physiological changes, such as impairment of immune functioning, can occur as a

result of stress-related arousal. Also, stress induced cognitive thoughts and behaviors can cause physiological changes, such as when ruminating thoughts or alcohol use negatively impact bodily systems/functioning. Finally, stress can impact behavioral changes related to illness, medical treatment, and disease exposure. For instance, increased stress may make a person less likely to abide by physician instructions, take prescriptions properly, or follow recommendations (Dougall & Baum, 2001). All of aforementioned factors can increase a person's risk for unhealthy behaviors and chronic disease.

Stress has been linked to an increased risk for various chronic diseases such as heart disease, diabetes, and numerous other illnesses (ACS, 2003a; AHA, 2002b). In terms of heart disease, stress affects both behavioral factors and activation of the autonomic nervous system (Guyton, 1991; Kamarck & Jennings, 1991). Specifically, stress activates the sympathetic nervous system, which causes an increase of epinephrine and norepinephrine, which in turn activates alpha (causes vasoconstriction of arteries and veins) and beta (increase cardiac output and blood pressure) receptor activity. These physiological responses may contribute to coronary heart disease (Guyton, 1991; Kamarck & Jennings, 1991). Research has found that stress may increase susceptibility to diabetes onset (ADA, 1997). For instance, in Type I diabetes stress may impair the pancreas' ability to properly produce insulin, which could result in an earlier onset of diabetes than if stress was not present (Dougall & Baum, 2001). Also, stress-related behaviors such as smoking, overeating, and inactivity can interfere with proper self-care behaviors and result in increased glucose levels (Dougall & Baum, 2001). One of the

most preventable impacts of stress is its relation to increased risk for engagement in health compromising behaviors, namely smoking.

Stress as it relates to smoking

Stress has been linked to smoking initiation and maintenance both theoretically and empirically. To illustrate, it is theorized that people believe that smoking has stress reducing properties and that these beliefs allow for behavior maintenance through reinforcement (Parrott, 1995; Spielberger, 1986; Wang, Fitzhugh, Cowdery, & Trucks, 1995; West & Hargreaves, 1995). Empirical study of smoking and stress is somewhat limited and has been mainly focused on chronic and adult smokers (Byrne, Byrne, & Reinhart, 1995). Nevertheless, links between stress and smoking behaviors have been documented. Research demonstrates that subjective or perceived feelings of stress typically precede cigarette consumption in regular smokers and stressful feelings are ameliorated immediately after smoking behaviors (Parrot, 1994a; Parrot, 1994b, & Parrot, 1995). Studies also show that adults who smoke are more likely to report stress than are nonsmokers (Naquin & Gilbert, 1996; McCann & Lester, 1996; Romano, Bloom, & Syme, 1996; Todd, Chassin, Presson, & Sherman, 1996). Further, they are more likely to smoke under stressful situations than in non-stressful situations (Warburton, 1988). Research also shows that those who have quit smoking are more likely to relapse under stressful conditions (Shiffman, 1986).

Theoretical links of stress to smoking

In addition to psycho-physiological associations of stress and smoking, researchers have also offered various theoretical links of stress and smoking. Some

research suggests that those with low personal resources such as self-esteem and social support may rely on substances as a means of coping with stress (Wills & Shiffman, 1985). For instance, researchers found that smokers reported lower levels of self-esteem, family support, and peer support than do nonsmokers (Bates & Pandina, 1991; Byrne & Mazanov, 1999; Dolcini & Adler, 1994; Pederson et al., 1997). Further, Koval and Pederson (1999) purport that once smoking has been adopted as a coping method, chronic smokers may be less likely to adopt and employ other, possibly more healthy, coping methods. Another hypothesis suggests that smoking may serve as a distraction, which diverts the smoker's attention from a negative stressor to the more affectively neutral behavior of inhaling a cigarette (Byrne et al., 1995, Kassel, 1997).

Evans (2001) posits that the social inoculation model may offer an understanding of smoking initiation during adolescence. This model asserts that as children reach early adolescence they become more vulnerable to social pressures to engage in risk-taking behaviors. Further, teenagers experience increased mobility and autonomy from adults. These factors may lead to experimentation with tobacco as the teenager struggles with personal identity issues, autonomy in life-style choices, and a desire to be accepted by peers. Bandura's social learning theory has also been suggested as a model for understanding adolescent smoking initiation. It has been suggested that children and adolescents adopt smoking expectations and behaviors through observation. For instance, they may learn vicariously that smoking appears to reduce tension and anxiety, which may make them more vulnerable to initiate smoking behaviors (Bandura, 1977; Evans, 2001).

Stress and Adolescents

Approximately half of all adolescents today admit difficulty in coping with stressful situations at home or at school (Gans, 1990). One main reason for adolescent stress may be that adolescence is a transitional developmental period and thus is filled with exposure to various stressful life events (Koval & Pederson, 1999; Jessor, 1993). For instance, adolescents experience school transitions, changes in self-identity, and physiological and psychological factors associated with puberty (Frydenberg & Lewis, 1993; Seiffge-Krenke, 1993, Steinberg, 2002). The struggle for autonomy may also prove stressful for adolescents. Holmbeck (1996) suggests that the physical changes of early adolescence generate changes in young people's emotional relationships at home. Adolescents now turn away from parents and toward peers for emotional support. This new desire for social support from peers may bring up issues of acceptance, in-group/out-group differences, and socialization/conformity (Steinberg, 2002; Kimmel & Weiner, 1995). Further, the changes in cognitive development and social roles also raise new concerns for independence such that the adolescent may have new perspectives on previously accepted norms or roles. This emotional autonomy (changes in social relationships, especially with parents) may be a source of stress for both parents and adolescents alike (Steinberg, 2002, chap.9).

A study by Byrne and Mazanov (1999) of 6,579 7-11 year old Australian children identified the following sources of stress for adolescents: attending school, family conflict, educational performance, future uncertainty, perceived educational irrelevance, and opposite sex interactions. A 1994 study examined stressful life events in a sample of

6th and 7th grade adolescent boys. Results revealed that adolescents (n=2,466) experienced the following stressors: school/academic (16%), death (15%), peer/relationship (12%), problems with family and/or parent (9%), family disruption (3%), and deviance/law (.5%; Biafora, Warheit, Vega, & Gil, 1994).

Although researchers emphasize that stressors experienced by adolescents are particular to that group, youth also experience many stressors that are common to adults. For example, adolescents have to navigate stressors such as major life changes (illness or death of a loved one), chronically stressful conditions (poverty, family conflict, and parental drug abuse), and day-to-day hassles (interpersonal conflict, deadlines, multiple roles, etc) (Compas, Orosan, & Grant, 1993; Steinberg, 2002). It should be noted that many of the stressors identified in the above studies have been linked to smoking behaviors as will be illustrated in the following section.

Stress in the rural community

It has also been argued that rural residents may experience stressors that are specific to their rural community. Conway identifies several problems that are specific to rural communities such as the difficulty in recruiting and retaining qualified health care workers, community specific barriers to health care (availability, accessibility, affordability), and the risk of personal injury (due to farm equipment) (Conway, 2001). The aforementioned stressors also pose difficulties for rural children and adolescents who comprise 15% of the US population aged 10-19 (US Census Bureau, 1995). Over the past years, rural areas have fallen victim to the loss of young, educated, talented, and skilled individuals (Lichter, McLaughlin, & Cornwell, 1995). This shift has resulted in

growing concentrations of unemployed and impoverished populations in rural communities (Crockett, Shanahan, & Jackson-Newsom, 2000; Fitchen, 1995). Also it is difficult to attain and retain qualified health care professionals (licensed doctors and nurses) in rural communities (Conway, 2001). Many rural health departments lack a licensed physician living in the area and rely heavily on nursing employees, some of who have not yet attained their bachelor's degree or nurse's license (Conway, 2001).

Abbott and Olness state, "children and adolescents living in rural areas have limited access to health care because of the lack of specialized personnel and facilities in rural clinic and hospitals" (Abbott & Olness, 2001, p158). Children with special needs (medical or otherwise) often have to be transported to urban or regional facilities, which cause extra expense, inconvenience, and stress for families. A 1990 study found that rural children were less likely to visit a physician, have health insurance, and were more likely to be hospitalized than urban children (McManus, Newacheck, & Weader, 1990). With regards to environmental hazards, rural children who live on farms are likely to be exposed to allergens from dust, soil and/or animals, as well as infectious diseases from animals (such as campylobacter diarrhea and Lyme disease) at a higher rate than urban children (Abbott & Olness, 2001). In terms of physical injuries, studies have shown that rural children are at an increased risk for firearm related mortality and risk from machinery accidents used both for work and recreation (Svenson, Sprulick, & Nypaver, 1996; Abbott & Olness, 2001). Another stressor for rural communities is economic stress related to farming and agriculture. A 1999 study of 77 adolescents who lived on farms or ranches found that the farm crisis (1970-1980 period of economic distress for farms) and

family transitions (addition, relocation, or change in role of a family member) were reported as significant stressors and that these stressors were predictive of individual and family stress for adolescents (Plunkett, Henry, & Knaub, 1999).

When examining stressors not specific to rural communities, research yields rural findings similar to those in urban studies. For instance, a 2000 study of 207 adolescents (mean age 15) from three different rural high schools revealed that the top three stressors reported by students were "death of a close friend or relative," "money problems experienced by the family," and "change in relationship with people you know" (Plunkett, Radmacher, & Moll-Phanara, 2000). These researchers also found that girls reported more stressful life events and higher levels of stress than did boys, with the most frequent stressors reported in the following areas: death of a close friend or relative, problems with friends, sexual events, money problems, and sexual abuse. Another study by William and Ruesink (1998) suggest that rural adolescents report higher incidences of some life events such as pregnancy, alcohol use, and poverty than do urban adolescents.

Stress as it relates to smoking in adolescents

As indicated in the introduction, youth are definitely at risk for initiating and maintaining smoking behaviors. The link between stress and smoking appears to be more established for adults than for adolescents. Nevertheless, available adolescent research has shown a link between stress and smoking behaviors, although some results have been inconsistent. Within the adolescent smoking literature, various aspects of stress have been examined such as perceived stress, life stress, social stress, family stress, and school stress. For instance Byrne et al. (1995) conducted a longitudinal study of personality, life

stress and smoking initiation in a sample of 6579 Australian adolescents (7-11th grade, 50% male). Results revealed that there were no differences in stress scores between those who were nonsmokers (at Time 1) and remained nonsmokers (at Time 2), those who were smokers and remained smokers, and those who were nonsmokers and became smokers. Gender differences were found in stress scores such that girls reported more life stressors than did boys. Analyses stratified by gender revealed that stress was predictive of smoking for boys. Male nonsmokers reported less stress than did those who initiated smoking, and those who had initiated smoking reported less stress than those who were regular smokers. This pattern was the same for girls. When examining personality (Neuroticism), it was found that those who were nonsmokers at both time-points had significantly lower neuroticism scores than the two other groups (Byrne et al., 1995).

Coogan et al. (1998) investigated the factors associated with smoking in sample of 31,861 children and adolescents (50% male). The study found that current smokers reported more stress, greater risk taking behaviors, and more depression than did nonsmokers (Coogan et al., 1998). A 2000 study of 954 adolescents (mean age 17.6, 83% female) found that current smokers (26%) reported more perceived stress, negative life events, and negative coping styles such as anger helplessness and avoidance than did "experimenters" (those who tried smoking a few times) (32%) and Nonsmokers (34%). More "never-smokers" reported positive coping styles such as cognitive methods and parent support than did the other groups. Also, "never-smokers" reported the lowest level of perceived stress (Siqueira, Diab, Bodian, & Rolnitzky, 2000).

Researchers have also found that stress may make younger adolescents more vulnerable to smoking initiation. For instance, a 2001 study of African-American adolescents (mean age 15) found that age of smoking initiation was negatively related to number of daily hassles, such that those who reported more daily hassles had earlier smoking initiation ages than those who reported less daily hassles (Guthrie, Young, Boyd, & Kintner, 2001). In addition, a longitudinal study of 1,543 Canadian students who were surveyed in the 6th then 8th grade found that increased stress was associated with an increased likelihood of smoking (Odds ration = 1.4) (Koval, Pederson, Mills, McGrady & Carvajal, 2000). These studies demonstrate that stress is indeed a risk factor for smoking initiation and maintenance in the adolescent population. Adolescents are in need of interventions that teach them the skills to navigate the stressors of adolescence and emphasize positive coping skills. In addition to age, ethnicity and gender have also been found to influence the relationship between stress and smoking.

Ethnic differences in stress

Ethnic differences exist in various aspects of a stress encounter and stress responses such as frequency, type, and severity. To illustrate, a 2000 study examined acute life events and experiences of unfair treatment of 397 African-American women and 296 Caucasian-American women. Results revealed that African-American women who lived in urban areas reported a greater number of acute life events than Caucasian-American women who lived outside the city. African-American women, regardless of area of residence, were also more likely to have been the victim of a physical attack and have experienced a recent death of someone close to them than were Caucasian-

American women (Schulz, Israel, Williams, Parker, Becker, & James, 2000). Another study of 109 African-American women and 225 Caucasian-American women found that African-American women reported more chronic stress and had higher carotid intima-media thickness (thickening of the arterial wall) than Caucasian-American women (Troxel, Matthews, Bromberger, & Sutton-Tyrrell, 2003).

When examining adolescents, results showed similar ethnic group differences. A 1998 study examined ethnic differences in stressors in a group of 1179 African-American, Hispanic-American, and Caucasian-American 2nd to 6th grade students and their families (Kilmer, Cowen, Wyman, Work, & Magnus, 1998). Groups did not differ on the total number of stressful life events (SLE), but did differ on the frequency of SLEs. African Americans and Hispanic Americans experienced poverty (dearth of clothes and food) and family death (parent or sibling died) significantly more often than did Caucasian Americans. African-American children experienced family separation (placed in foster homes and cared for extended family) more often than did Caucasian Americans and Hispanic Americans. Caucasian Americans reported more family turmoil (members moving out or family arguments) and more family illness (hospitalization of a family member) than did other groups. This study demonstrates that although ethnic groups experience some of the same stressful life events, minority groups, particularly African Americans, tend to experience these events more frequently (Kilmer et al., 1998). Another study of 2,446 multi-ethnic 6th and 7th grade adolescent boys found similar results. African Americans reported that they had recently experienced the death of someone close to them significantly more often than did Hispanic Americans and

Caucasian Americans. Groups were similar on all other stressful life events (Biafora, Warheit, Vega, & Gil, 1994).

Contrary to the above findings, numerous studies demonstrate that Caucasian Americans experience more stressful events than other minority groups. For instance, a study of 103 African-American, 129 Hispanic-American, and 105 Caucasian-American high school students found that Caucasian Americans reported more stressful life events and lower levels of social supports than did other groups (Prelow & Guarnaccia, 1997). The current study seeks to further illuminate the relationship between ethnicity and stress by examining these variables in rural adolescents.

Ethnic differences in stress and smoking

The literature examining whether the stress and smoking relationship is moderated by ethnicity is sparse. Although research has established that there are ethnic differences in stress and smoking, these variables have rarely been examined together. Within the available literature, it was found that Vaccaro and Wills (1998) examined ethnic differences in the relationship between stress-coping variables and substance use in a sample of inner city 6^{th}-8^{th} graders (n=1,289) and metropolitan 7^{th}-9^{th} graders (n=1,702). The researchers found ethnic differences for various predictors of substance use (alcohol, cigarette, and marijuana use). When examining negative life events, race was a moderator for 7^{th}, 8^{th}, and 9^{th} graders such that negative life events were more likely to predict substance use for Caucasian Americans than African Americans, $p<.001$. The relationship was the same for negative affect as a predictor of substance use (Vaccaro & Wills, 1998).

As previously mentioned, Biarora et al. (1994) identified various stressors for 6th and 7th grade adolescent boys, many of which were related to substance use. For Hispanic- and Caucasian-American adolescents, using alcohol and cigarettes in the past 12 months was bi-directionally related to the following stressful life events: school/academic, family conflicts, and peer/relational. Peer/relationship stressors were positively related to increased alcohol use in Caucasian-American boys, and school/academic stressors were related to increased cigarette use. Stressors were not related to increased substance use in African-American boys. Another study examined the structure of high-risk behaviors among a sample of 5,537 9th – 12th grade students who participated in the 1990-1991 Texas YRBS study (Basen-Engquist, Edmundson, & Parcel, 1996). The researchers examined various risk behavior models and their goodness of fit in the samples. Results revealed that stress was a stronger predictor of smoking cigarettes and marijuana for Hispanic-American adolescents and Caucasian-American males than for African-American adolescents and Caucasian-American females.

Griesler and Kandel (1998) examined ethnic differences in correlates of smoking for a sample of 1,795 mother-child dyads. They found that negative mood (feelings of sadness, anxiety, stress, etc.) was predictive of cigarette use in Caucasian-American adolescents but not African Americans or Hispanic Americans. The aforementioned studies demonstrate a trend towards stress being a more significant predictor of smoking behaviors in Caucasian Americans than in other ethnic groups. It is important to understand ethnic differences in experiencing stressors and these stressor relationships to

potential substance use to design culture specific interventions for adolescents. Further, these results should not lead us to believe that Caucasian Americans experience more stressors or more major life events than other groups. Contrarily many studies demonstrate that this is not the case. African Americans and other ethnic groups may not perceive stressors as stressful because they may experience more severe stressors or encounter stressors more often, which could provide an inoculation effect. The current study seeks to determine if the aforementioned relationships are similar in a sample of ethnically diverse rural adolescents.

Gender differences in stress

Many studies have reported gender differences in stress response. Studies demonstrate that females exhibit an increased vulnerability to anxiety and depression compared to males. This vulnerability appears to begin during adolescence and continues throughout adulthood (Ge, Lorenz, Conger, Elder, & Simons, 1994; Nolen-Hoeksema, & Girgus, 1994; Petersen, Compas, Brooks-Gunn, Stemmler, Ey, & Grant, 1993). For example, research demonstrates that adolescent girls report more interpersonal stress and negative life events than do boys. A 2002 study examined gender differences in heart rate and reports of affect among 133 adolescents (73 girls and 60 boys, mean age16). Results demonstrated that boys exhibited a greater increase in heart rate in response to a stressful task than girls did. Girls reported more negative affect both at baseline and after talking about a stressful life event than did boys, whereas boys did not report negative affect despite their increased cardiovascular reactivity (Steiner, Ryst, Berkowitz, Gschwendt, & Koopman, 2002).

Another 2002 study examining the factors related to depression in a group of 543 adolescents (51% female, mean age 14) found the girls experienced a higher number of stressful events (as captured by the Life Events Questionnaire) during the past 12 months than did boys (Marcotte, Fortin, Potvin, & Papillon, 2002). A study by Ge et al. (1994) examined both age and gender as predictive factors for stress and depressive symptoms in a sample of 376 seventh-grade adolescents (50% male). They found that boys reported more stressful life events than did girls before age 12, but that this relationship reversed after age 13 such that girls reported more stressful events than boys as they aged (Ge et al., 1994). Research has also demonstrated that girls experience different sources of stress than boys. A 2002 study by Rudolph investigated the stressful experiences of 460 5^{th} – 8^{th} grade students. She found that girls experience higher levels of friendship stress (e.g. having problems with a friend) than did boys. Results also yielded that boys experienced more peer group stress (e.g. being teased or hassled) than did girls (Rudolph, 2002). Other studies have found similar results. A 1999 study of 460, 11-14 year old students (50% male) indicated that adolescent girls report more interpersonal stress than boys. These interpersonal stressors include negative events and problems that involve family, peer, and intimate relationships. Boys, on the other hand, reported experiencing more self-relevant stressors such as self-criticisms and feelings of guilt and inadequacy (Leadbeater, Kupermine, Blatt, & Hertzog, 1999).

Gender differences in stress and smoking

Research has also demonstrated gender differences in stress as a predictor of substance use. A study by McKee, Maciejewski, Falba and Mazure (2003) examined

gender differences in the effects of stressful life events on changes in smoking status of 1,512 adults (45% female). Results showed that for women, financial stress was associated with both relapse and failure to quit. Experiencing a significant health-related stressor was predictive of smoking cessation for men, but did not impact cessation for women. Another study by Stein and Nyamathi (1999) investigated gender differences in relationships between stress, coping, and health risk behaviors in a sample of 486 adults (54% female). Women in the study reported significantly more stress, avoidant coping, and depression than did men. Stress was also predictive of "escapist drug use" (i.e. the use of cocaine, marijuana, or alcohol) in women, but not in men.

Gender differences in stress and smoking have also been examined in adolescents. A study by Vaccaro and Wills (1998) investigated gender differences in stress and substance use in a sample of 2991, 6^{th} – 9^{th} grade adolescents. Results revealed that eight and ninth grade girls reported higher rates of cigarette use than did boys. Eighth grade boys reported higher rates of alcohol use than did girls, and ninth grade boys smoked more marijuana than did girls. For 7^{th} and 8^{th} graders, negative affect and major events were stronger predictors of substance use for girls than for boys. In 9^{th} graders, the pattern was such that negative affect was a stronger predictor of substance use for girls, and major events were a stronger predictor for boys (Vaccaro & Wills, 1998).

As noted above, both gender and ethnicity appear to be related to stress responses and smoking behaviors. The literature demonstrates the need to investigate further the factors related to smoking behaviors, especially in rural adolescents -- a typically understudied population. Although some of the results are inconsistent, these factors still

warrant investigation as they can potentially illuminate unique relationships between stress and smoking in adolescents.

CHAPTER 3

STATEMENT OF THE PROBLEM

Smoking is one of the most preventable risk factors for chronic diseases (Atav & Spenser, 2002). Nevertheless, Americans, especially youth, are at an increased risk for developing and dying from chronic diseases as a result of smoking behaviors. For example, approximately one third of the cardiovascular and cancer deaths that occurred between 1995 and 1999 were related to smoking behaviors (ACS, 2003a; AHA, 2002b). Smoking initiation occurs early on for adolescents with some initiating smoking as young as eight years old (CDC, 2002b; Henriksen & Jackson, 1999). Research suggests that the younger adolescents start smoking, the more likely they are to continue smoking into adulthood (US DHHS, 1994).

Research has also demonstrated that rural adolescents are at an increased risk for adopting and maintaining smoking behaviors. When compared to urban adolescents, rural adolescents reported higher smoking rates than do urban adolescents (Atav & Spencer, 2002; Cronk & Sarvela, 1997; Griffen et al., 2001). Further, research has shown that ethnic and gender differences exist in smoking rates, tobacco type used, and factors related to smoking behaviors (CDC, 2000; Grunbaum et al., 2002; Kelder et al., 2003).

Several factors have been investigated as predictors of smoking in adolescents. These factors range from peer pressure, to family modeling and interpersonal influences (Horn et al., 2000; Ritchey et al., 2001). One particular factor, stress, may increase an adolescent's risk for adopting and maintaining smoking behaviors, as smoking may be used as a method of coping with stress (Koval & Pederson, 1999; Parott, 1995). The current study explored the relationship between stress and smoking behaviors in a sample of ethnically diverse rural adolescents. The smoking behaviors investigated include current smoking status, smoking experimental smoking status, and cigarette refusal self-efficacy ratings. The study also explored whether ethnicity and gender moderated the relationships between stress and smoking behaviors. Further, the study investigated the longitudinal relationship of 6th grade stress to 7th grade smoking behaviors. Results from this study should illuminate whether students are in need of stress and coping interventions that minimize their risk for adopting unhealthy coping behaviors. The study should also demonstrate whether ethnic and gender specific interventions are warranted.

Preliminary Hypothesis (for both 6th and 7th grade students)

Hypothesis 1

There will be gender and ethnic differences in NPSS scores such that African Americans and girls will reports higher scores than will Caucasian Americans and boys. If differences are found, moderator effects will be examined as noted in the hypotheses below.

Cross-sectional Hypotheses

In 6th graders and 7th graders respectively

Hypothesis 1

There will be ethnic and gender differences in current smoking status ("nonsmoker" or "current" smoker), experimental smoking status ("ever" vs. "never" smoked) and cigarette refusal self-efficacy status. Specifically, more Caucasian Americans will report a "current" or "ever" smoking status and will have lower cigarette refusal self-efficacy scores than will African Americans. Gender differences will reveal that more boys will report "current" or "ever" smoking status and will have lower cigarette refusal self-efficacy scores than will girls.

Hypothesis 2.

There will be within group differences for African Americans such that more African Americans with high New Perceived Stress Scale (NPSS) scores will report a "current" smoking status, an "ever" smoking status, and lower cigarette self-efficacy refusal scores than will African Americans with low NPSS scores (See Figure 1.1). Additionally, there will be within group differences for Caucasian Americans in the same aforementioned direction for those with high or low stress (See Figure 1.2).

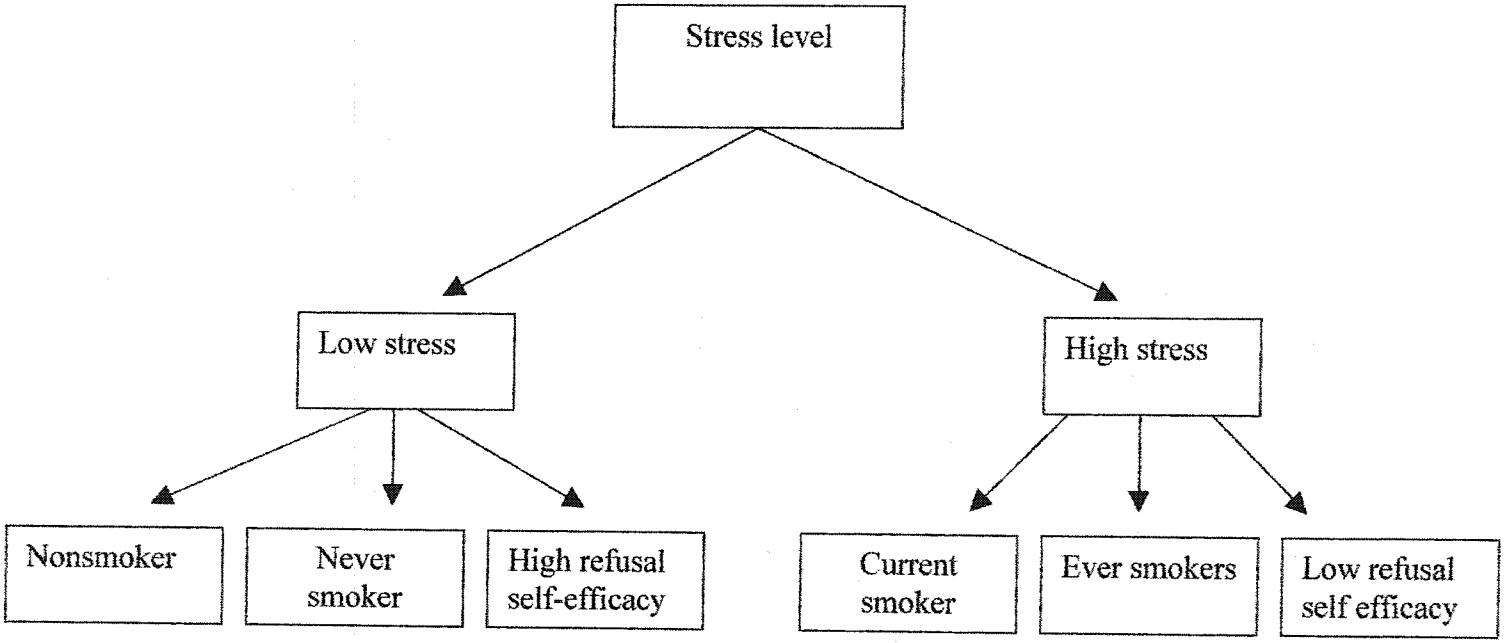

Figure 1.1

Within Group Differences for Level of Stress and Smoking Outcomes for *African Americans*

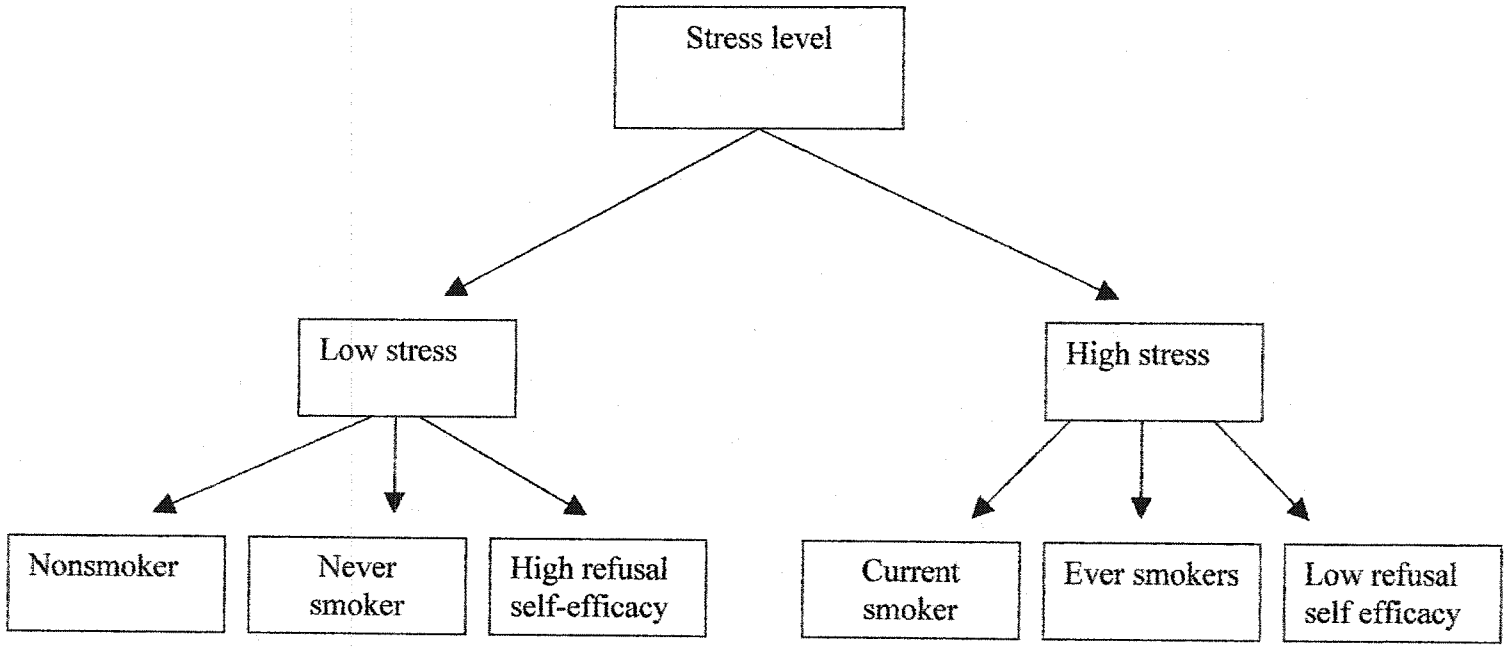

Figure 1.2

Within Group Differences for Level of Stress and Smoking Outcomes for *Caucasian Americans*

Hypothesis 3a

The New Perceived Stress Scale (NPSS) scores will predict current smoking status ("nonsmoker" or "current" smoker), experimental smoking status ("ever" vs. "never" smoked), and cigarette refusal self-efficacy scores of students when controlling for demographic variables (See Figure 2).

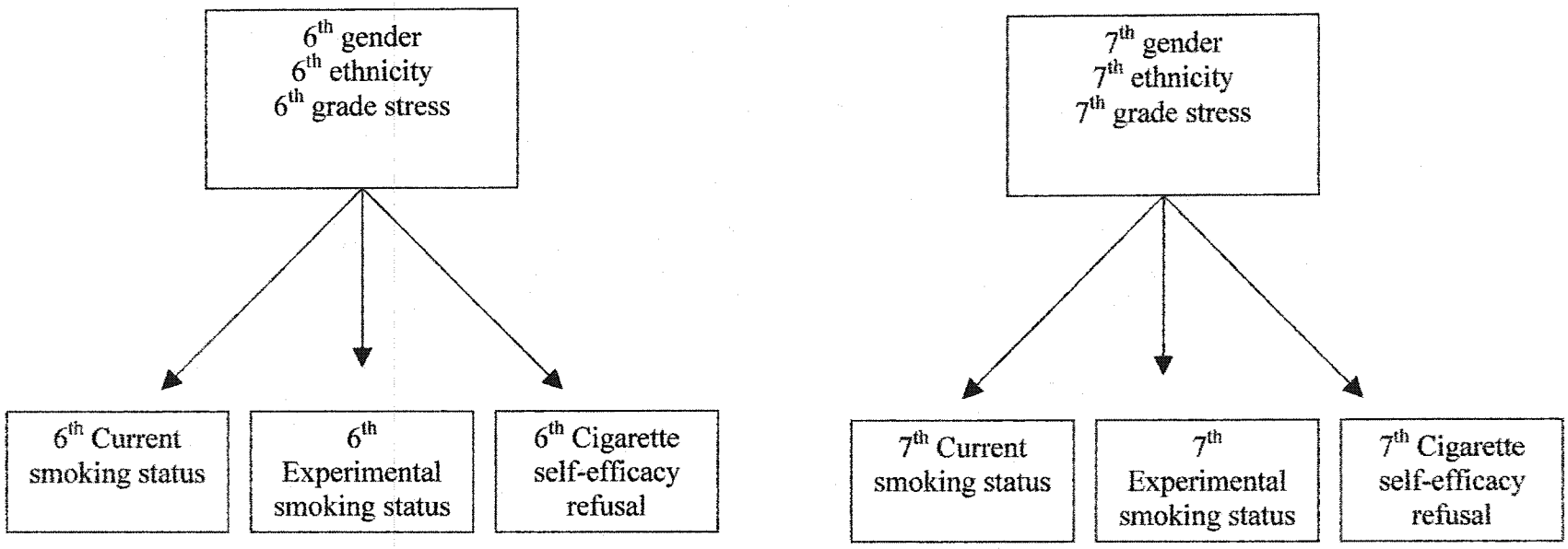

Figure 2

Cross-sectional Models for Predictors of Smoking Status

Hypothesis 3b

Ethnicity will moderate the relationship between NPSS scores and smoking status such that more Caucasian Americans with high stress scores will report a "current" or "ever" smoking status or lower cigarette refusal self-efficacy scores than will Caucasian Americans with low stress scores and African Americans regardless of stress level.

Hypothesis3c

Gender will moderate the relationship between NPSS scores and smoking status such that contrary to general smoking trends, girls with high stress scores will report a "current" smoking status, "ever" smoking status, and low cigarette refusal self-efficacy scores more often than will girls with low stress and boys regardless of stress level (See Figure 3).

Longitudinal Hypothesis (6th grade stress predicting 7th grade smoking behaviors)

Hypothesis 4a.

Sixth grade NPSS scores will be predictive of 7th grade current smoking status, experimental smoking status, and cigarette refusal self-efficacy respectively (See Figure 4).

Hypothesis 4b

Ethnicity will moderate the relationship between NPSS scores and smoking status such that more 6th grade Caucasian Americans with high NPSS scores will report a 7th grade "current" smoking status, an "ever" experimental smoking status, and lower cigarette refusal self-efficacy scores than will other groups.

Hypothesis 4c

Gender will moderate the relationship between NPSS scores and smoking such that more 6th grade girls with high NPSS score will report a 7th grade "current" smoking status, an "ever" experimental smoking status, and lower cigarette refusal self-efficacy scores than will other groups.

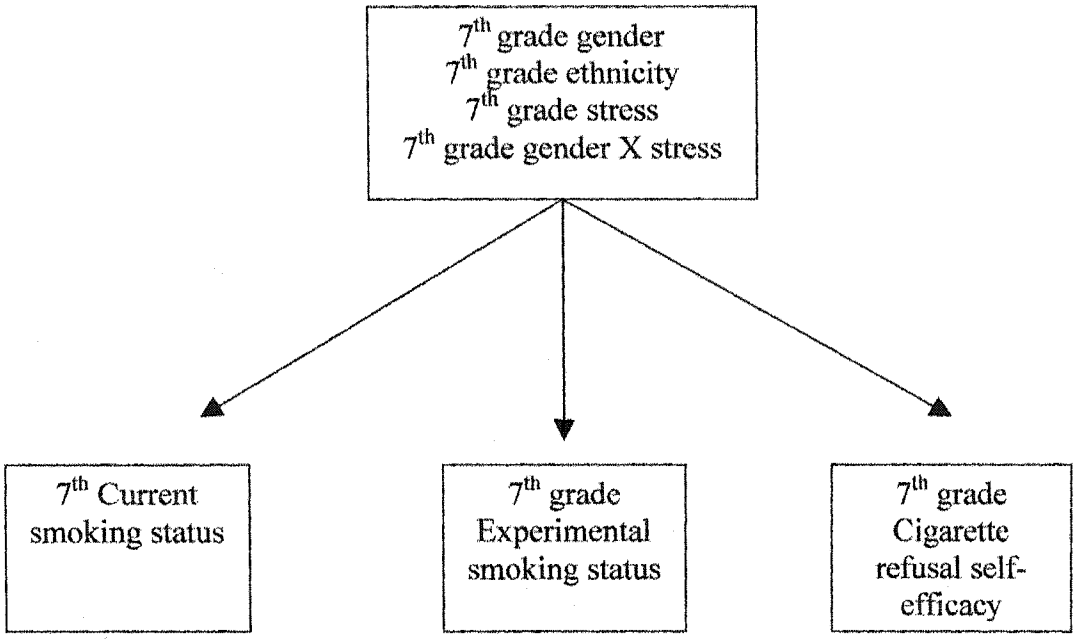

Figure 3

Gender as a Moderator Variable (examined in 7th grade only)

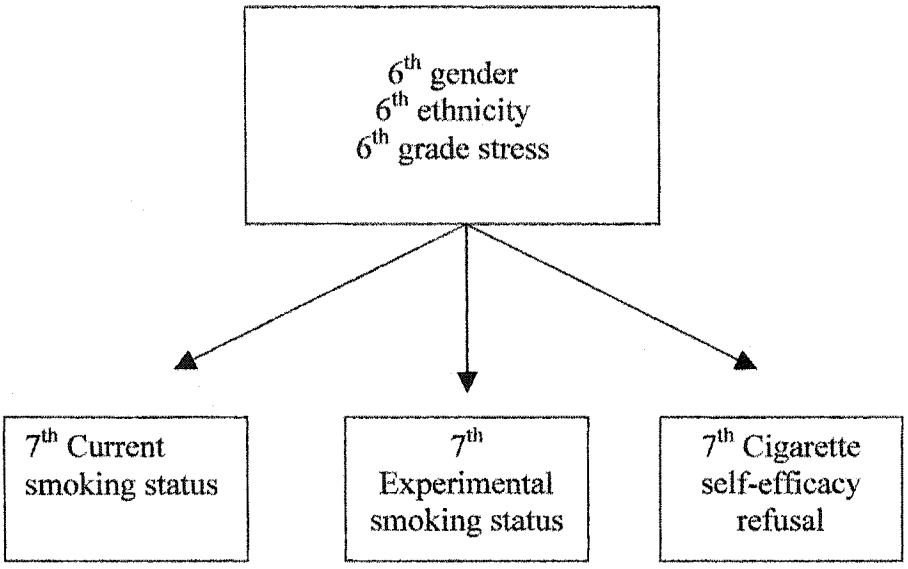

Figure 4.

Model of Longitudinal Hypotheses: 6th grade predictors of 7th grade smoking outcomes.

CHAPTER 4

METHOD

Participants

A total of 1,532 rural Virginia 6th grade students from both the intervention and control groups completed questionnaires. Data were analyzed from the control group only as to control for effects of the intervention on smoking outcomes. This yielded an N of 734 6th grade students (51% female). Data were also cleaned for outliers and infrequent/inconsistent responses, which yielded an N of 714. Although all ethnicities were allowed to participate in the study, only data from African Americans (AA) and Caucasian Americans (CA) were included in the analyses due to the small distribution of cases in other ethnic categories (n=29). Thus, the final N for the 6th grade sample was 685 students (52% male, 53% Caucasian American and 47% African American.

A total of 1267 students were surveyed one year later during the Spring of their 7th year. The 7th grade control group consisted of 607 students of which 52% were female. These data were also cleaned for outliers and infrequent/inconsistent responses, which resulted in the omission of fourteen cases. As in the 6th grade sample, only African-American and Caucasian-American students were included in the analyses. Due the small distributions, students from all other ethnic groups were omitted (n=39). The final N for the 7th grade sample was 554 students (53% female, 56% Caucasian American

and 44% African American. Analyses for attrition in student participation from 6th to 7th grade are included in the Results section.

County demographics

A total of seven rural Virginia counties were included in the current study (See Table 1). These counties include: Brunswick, Buckingham, Greensville, Halifax, King William, Lancaster, and New Kent. According to the 2000 census, the population sizes ranged from 11,560 to 37,355. The 1999 median incomes for the counties ranged from $29,882 to $53,595. The majority of county residents were Caucasian American and male. At least 60% (or greater) of residents in each county attained a high school education and between 8% and 24% had a bachelors degree or higher.

Table 1

County demographics

County	2000 Population size	Ethnicity	Female	High School graduate	Bachelors degree or greater	1999 Median Income
Brunswick	18,419	White = 42% Black = 57% Other = 1%	47%	63%	11%	$31,288
Buckingham	15,623	White = 59% Black = 39% Other = 2%	45%	63%	8%	$29,882
Greensville	11,560	White = 59% Black = 39% Other = 2%	39%	62%	11%	$32,002
Halifax	37,355	White = 60% Black = 38% Other = 2%	52%	64%	10%	$29,929
King William	13,146	White = 74% Black = 23% Other = 3%	51%	79%	15%	$49,876
Lancaster	11,567	White = 70% Black = 29% Other = 1%	54%	74%	24%	$33,239
New Kent	13,462	White = 80% Black = 16% Other = 4%	49%	81%	16%	$53,595

Procedures

Questionnaires were administered to students in rural middle schools as part of the Goal for Health (GFH)[4] trial. GFH is a randomized, school-based trial and the parent research project of this sub-study. GFH's aim is to reduce cancer risk among adolescents by implementing a teacher and peer-led training program for students that focuses on promoting health and cancer prevention behaviors in sixth and seventh graders in rural Virginia and New York. Only schools from rural Virginia will be included in this study.

Participating middle schools (n=15) in rural Virginia were randomly assigned to either the wait-list control or intervention condition. The program was stratified such that half of the schools in each condition (4 intervention and 3 control) began participation in 1998 and half (remaining 4 intervention and 4 control sites) began in 1999. Students in the intervention condition received the program during the spring of their 6th grade year. The following year as seventh graders, students in the intervention condition received a booster program. Evaluation for both intervention and control group students occurred at the end of their 6th grade year and again at the end of the 7th.

Questionnaires were administered and collected by GFH staff as a part of a classroom exercise. All staff was trained in survey administration by Project GFH's data management staff for consistency of data collection. Students were instructed that participation in the study would help provide a better understanding of the health behaviors of seventh graders. They were informed that their participation was completely voluntary, and they could refuse to participate at any time. They were also

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[4] GFH is funded by the National Cancer Institute. Grant #R01CA 69220-05S1 S. Danish (PI), E. Fries (Co-PI)

informed that all information provided would be confidential. Each student was assigned an identification number, which was pre-coded on his or her survey for tracking purposes. All classroom teachers remained present during the survey administration. Students absent on the day of questionnaire administration were administered a questionnaire by school personnel within the same week.

Measures

Demographics. Demographic variables such as race, gender, and birth month and year were collected. The item-format for the demographics section has been validated in other studies with adolescents (Farrell & Meyer, 1997; Farrell, Meyer, & Dahlberg , 1996; see Appendix A).

Smoking Variables

Note: All smoking questions were derived from the Virginia Middle School Youth Risk Behavior Survey (1993) Questionnaire (See Appendix B).

Current smoking item. One item assessing current smoking asked, "During the past month, on how many days did you smoke cigarettes?" Response choices included "I do not smoke", "1 or 2 days", 3 to 9 days", 10 to 29 days" or "all 30 days". The item was dichotomized into does not smoke/did not smoke in the past 30 days (Nonsmoker) and has smoked within the past 30 day (Current smoker).

Experimental smoking item. The experimental smoking item examined Experimental smoking status via the following question, "Have your ever tried cigarette smoking, even one or two puffs?" Responses choices included either "yes" (Experimenter) or "no" (Non-Experimenter). In order to calculate Experimental smokers

who were not "Current" smokers, students who responded yes to the Experimental smoking item but no the Current smoking item were categorized as "Ever" smokers (e.g. Ever = yes + Current = no, yields "Ever' smoker; Ever = no, Current = no, yields "Never smoker").

Age of initiation items. Two questions assessed the age at which students first smoked a whole cigarette and the age at which they became regular smokers[5]. The age of initiation for experimental smoking question read, "How old were you when you smoked a whole cigarette for the first time?" The age of initiation for regular smoking question read, "How old were you the first time you smoked cigarettes regularly?" The response format for these two questions was as follows: "I have never smoked a whole cigarette/cigarettes regularly," "less than 9 years old," "11 or 12 years old," "13 or 14 years old," "15 or more years old."

Cigarette self-efficacy refusal. The final smoking item examined students' refusal self-efficacy as it pertains to cigarette smoking. The item read, "I am sure I can refuse cigarettes if someone offered them to me." Responses choices were presented on a 5-point Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree).

Perceived Stress Scale. The Perceived Stress Scale (PSS) is a 5-item measure designed to assess the degree to which situations in one's life were appraised as stressful during the past month (Cohen, Kamarck, & Mermelstein, 1983). The first four items of the scale were obtained directly from the 4-item version of the PSS, which is a condensed version for data collection via telephone interviews (See Appendix C). The items

[5] Regular smoker is defined as someone who has smoked at least one cigarette every day for one month.

assessed how often during the past month students: a) perceived control over important things, b) perceived the ability to cope with what bothers them, c) felt that things were going their way, and d) perceived ability to overcome problems. The fifth item was added for construct validity purposes and assessed students' subjective stress or nervousness. The response choices were presented on a 5-point Likert scale ranging from 1= "Never," 2= "Almost never," 3= "Sometimes," 4= "Fairly often," to 5 = "Very often." In order to calculate PSS scores, all items are recoded to reflect the following score pattern: 1=0, 2=1, 3=2, 4=3, and 5=4. Positive items (items #2 and 3) are then reversed scored and the scale is summed across all five items. The higher the PSS score, the higher the student's perceived stress level. The Chronbach coefficient alpha for the four item PSS was .72 and the test-retest reliability over a two-month period was .55 (Cohen, Kamarck, & Mermelstein, 1983). The PSS was also correlated (.37) with the average number of cigarettes smoked per day, which supports its moderate reliability as a predictor of smoking behaviors (Cohen, Kamarck, & Mermelstein, 1983).

Factor analysis of PSS scale. An exploratory factor analysis (EFAs) was conducted using a direct oblimin principal component analysis on the PSS items. Factor analyses on the PSS were conducted separately for each grade. Table 2 contains the 6th and 7th grade factor loadings for items on the PSS. Analysis of the items yielded two factors. Items 1, 3, and 5, which appear to be stress related items, loaded on Factor 1. Factor loadings for Factor 1 were .76, .85, and .81 respectively in the 6th grade sample

and .80, .84, and .80 respectively in the 7th grade sample. Items 2 and 3[6], which appear to assess coping self-efficacy and optimism loaded on Factor 2. Factor loadings for these items were .83 and .83 respectively for 6th graders and .83 and .79 for 7th graders. Since this study is examining stress as a predictor of smoking, the items that loaded on Factor 1, the stress-related items, were used to calculate a new perceived stress variable labeled NPSS. (Note: The items that loaded on Factor 2 appeared to measure coping and optimism which were not key predictors in the current study; thus, these items were dropped from the measure.) The alpha for the three item NPSS within the 6th grade sample was .74 and within the 7th grade sample was .75.

[6] Items 2 and 3 were entered into the principal components analysis as reversed scored items, per their scoring criteria.

Table 2

Factor Analysis for Perceived Stress Scale Items

	6th grade		7th grade	
	Factor 1	Factor 2	Factor 1	Factor 2
Item Freq out of control	.765	.141	.803	.055
Item Freq too many troubles	.855	-.074	.840	-.082
Item Freq felt stressed	.813	-.082	.805	.016
Item . Freq felt able to handle what bothers you	.045	.835	.124	.829
Item Freq felt things were going your way	-.052	.830	-.136	.792

Factor one measures stress
Factor two appears to measure coping self-efficacy or optimism

Analysis and Synthesis

By gathering data from a culturally diverse sample of rural adolescents, the current study sought to understand the relationship between stress, smoking status (Nonsmoker[7] or Current smoker[8] and Experimenter[9] vs. Never Smoker[10]), and cigarette refusal self-efficacy. The study examined gender and ethnicity as moderating variables in each of the aforementioned relationships. It also sought to determine whether there were within group differences on outcome and predictor variables for African American and Caucasian American subjects. Finally, the study examined the prospective relationship between 6th grade stress and 7th grade smoking status and cigarette refusal self-efficacy.

Descriptive and Preliminary Analyses

Descriptive statistics such as frequencies and means/standard deviations were calculated for all study variables (See Table 3). A correlation matrix was conducted for the NPSS scale (See Tables 4.1 and 4.2). Distributions of continuous variables were analyzed to look for abnormalities in the data. Examination of study variables confirmed that assumptions were met for all analyses. Data were analyzed using the Statistical Package for the Social Sciences (SPSS, 2003).

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[7] For the purposes of this study, Non-smoker is defined as someone who has not smoked during the last 30 days.
[8] Current smoker is defined as someone who has smoked in the last 30 days.
[9] Experimenter is defined as someone who has ever tried a cigarette, even one or two puffs.
[10] Non-experimenter is defined as someone who has never tried a cigarette, even one or two puffs.

Table 3

Demographics and Descriptives for 6th and 7th Grade Students

Variable	6th grade	7th grade
N	685	544
Gender		
Boys	52%	47%
Girls	48%	53%
Ethnicity		
Caucasian Americans	53%	56%
African American	47%	44%
*Mean NPSS		
(range 0-12)	4.7 (SD =3.1)	5.3 (SD = 3.2)
*Mean cigarette refusal self-efficacy		
(range 0-5)	4.2 (SD = 1.2)	4.1 (SD = 1.2)

*The higher the score, the more stress or refusal self-efficacy

Table 4.1

Intercorrelations and Point Bi-serial Correlations for Study Variables (6^{th} grade sample)

	6^{th} grade					
	1	2	3	4	5	6
1. Stress (NPSS) (cont)	1	-.17**	.09***	-.12**	.10**	.15**
2. Experimental smoking (cont)		1	-.37**	.22**	-.44**	-.1.0**
3. Current smoking (cont)			1	-.23**	.85**	a
4. Refusal self-efficacy (cont)				1	-.27**	-.12**
5. Current smoking. (dicht)					1	a
6. Experimental smoking (dicht)						1

* Correlation is significant at the .05 level
** Correlation is significant at the .01 level
a= could not be calculated because both variable are categorical

1. Stress= Factored PSS scores (NPSS) (range 0-12)
2. Categorical experimental smoking = *Have you ever tried cigarettes even one or two puffs?* "yes = 1" "no = 0"
3. Continuous current smoking item= *During the past month, on how many days did you smoke*? "I do not smoke", "1 or 2 days", 3 to 9 days", 10 to 29 days" or "all 30 days".
4. Current smoking = dichotomized into did not smoke in last 30 day (Nonsmoker = 0) and did smoke in last 30 days (Current smoker =1)
5. Experimental smoking = dichotomized into has never tried cigarettes even one or two puff (Never smoker = 0) and has tried cigarettes, even one or two puffs (Ever smoker = 1). Note: Experimental smokers do not overlap with current smokers.

Table 4.2

Intercorrelations and Point Bi-serial Correlations for Study Variables (7th grade sample)

	7th grade					
	1	2	3	4	5	6
1. Stress (NPSS) (cont)	1	-.08	.13**	-.07	.11*	.04
2. Experimental smoking (cont)		1	-.37**	.29**	-.44	-1.0**
3. Current smoking (cont)			1	-.37**	.86	a
4. Refusal self-efficacy (cont)				1	-.35**	-.17
5. Current smoking. (dicht)					1	a
6. Experimental smoking (dicht)						1

* Correlation is significant at the .05 level
** Correlation is significant at the .01 level
a= could not be calculated because both variable are categorical

1. Stress= Factored PSS scores (NPSS) (range 0-12)
2. Categorical experimental smoking = *Have you ever tried cigarettes even one or two puffs?* "yes = 1" "no = 0"
3. Continuous current smoking item= *During the past month, on how many days did you smoke*? "I do not smoke", "1 or 2 days", 3 to 9 days", 10 to 29 days" or "all 30 days".
4. Current smoking = dichotomized into did not smoke in last 30 day (Nonsmoker = 0) and did smoke in last 30 days (Current smoker =1)
   Experimental smoking = dichotomized into has never tried cigarettes even one or two puff (Never smoker = 0) and has tried cigarettes, even one or two puffs (Ever smoker = 1). Note: Experimental smokers do not overlap with current smokers.

CHAPTER 5

RESULTS

Descriptive and Preliminary Analyses

Table 5 contains the descriptive data for smoking behaviors assessed for the sample as 6th grade students and one year later as 7th grade students. The modal age for both smoking initiation and regular smoking[11] was "11 or 12" for both samples. Within the 6th grade sample (n=685), seven percent of students reported a "Current"[12] smoking status (n=46, 63% boys, 67% Caucasian American). During the 7th grade (n=556), thirteen percent of students reported a "current" smoking status (n=74, 56% female, 65% Caucasian Americans). The breakdown of 7th grade current smokers was as follows: twenty-two students who were 6th grade current smokers remained current smokers at 7th grade; twenty-four students who reported a 6th grade "ever" smoking status became current smokers at 7th grade; and twenty-eight students who reported a 6th grade "nonsmoker" status reported a "current" smoking status at 7th grade. Within the 6th grade sample, twenty percent of students were "experimental"[13] or "ever" smokers,

[11] Regular smoking is defined as smoking at least one cigarette everyday for one month.
[12] Current smoker is defined as someone who reported that they smoked in the last 30 days.
[13] Experimental smoking status refers to students who reported that they have ever smoked in their lifetime. These smokers were calculated separately from the Current smokers.

(n=141, 55% boys, 54% African American). By 7th grade, twenty-nine percent of students reported an "experimental" or "ever" smoker status (n=162, 53% male, 53% African American). The breakdown of 7th grade "ever" smokers was as follows: sixty-five students who reported a 6th grade "ever" smoker status remained ever smokers at 7th grade; ninety-seven students who reported a 6th grade "never" smoker status were "ever" smokers by 7th grade. The mean cigarette self-efficacy refusal score for 6th graders was 4.2 (SD= 1.2). Sixth grade girls had a mean cigarette refusal self-efficacy score of 4.3 (SD=1.2) and boys 4.2 (SD= 1.3). Sixth grade African-American students had a mean refusal self-efficacy score of 4.1 (SD=1.4), whereas Caucasian Americans had a mean of 4.4 (SD=1.0). For the 7th grade sample, the mean cigarette refusal self-efficacy score was 4.1 (SD=1.2). Seventh grade girls had a mean cigarette refusal self-efficacy score of 4.2 (SD=1.2) and boys 4.1 (SD= 1.3). Seventh grade African-American students had a mean refusal self-efficacy score of 4.2 (SD=1.3), whereas Caucasian Americans had a mean score of 4.2 (SD=1.2). Chi-square statistics for ethnic and gender differences in current and experimental smoking status is presented in the Cross-sectional Hypotheses sections.

Table 5

Smoking Status of 6th and 7th Grade Participants

	Ever Smoked	Current Smoker
6th grade	20%	7%
Boys	55%	63%
Girls	45%	47%
African American	54%	33%
Caucasian American	46%	67%
7th grade		13%
Boys	53%	44%
Girls	47%	56%
African American	53%	55%
Caucasian American	47%	65%

-Current smoker = A person who reported that they have smoked a whole cigarette in the last 30 days.
-Ever smoker = A person who is not a current smoker and has tried cigarettes in his/her lifetime, even one or two puffs

Consistency of Self-reported Smoking Behaviors

Students who reported a current smoking status appeared to report their smoking behavior consistently across years. No students who reported a current smoking status at 6th grade reported a never smoking status at 7th. A total of 17 students who reported an "ever" smoking status at 6th grade reported a "never" smoking status at 7th grade. These students were not reported on in most of the analyses as the results in the present study are presented for students with a "current" or "ever" smoking status. Further, ten students who reported a "current " smoking status at 6th grade reported a "non-smoker" status at 7th grade. When examining non-smokers, a total of 433 reported a non-smoker status at both time points. A total of 269 students reported a "never" smoking status at both time points.

Stress

The NPSS mean score for 6th grade students was 4.7 (SD=3.1) (range 0-12). Sixth grade girls had a mean stress score of 4.8 (SD=3.0) and boys 4.5 (SD= 3.2). For both African-American and Caucasian-American 6th graders, the mean stress score was 4.7 (SD = 3.2 and 3.0 respectively.). The 7th grade NPSS mean stress score was 5.3 (SD=3.2). The mean NPSS score for 7th grade girls was 5.6 (SD=3.1) and for 7th grade was 5.0 (SD=3.2). For 7th grade Caucasian Americans, the mean NPSS score was 5.4 (SD=3.2) and 5.3 (SD=3.2) for African Americans.

Ethnic and gender differences in NPSS scores

It was hypothesized that there would be gender and ethnic differences in NPSS scores such that girls and African Americans would report higher scores than would boys

and Caucasian Americans. T-tests were conducted to examine gender and ethnic differences in NPSS scores in the 6th and 7th grade samples. Contrary to hypotheses, results yielded no gender or ethnic differences in NPSS scores for 6th grade students (t (671)= 1.53, p>.05 and t (662)=-.09, p>.05, respectively). Similar to the 6th grade sample, hypotheses were not supported for ethnic differences in NPSS scores for the 7th grade sample (t (529)= -.16, p>.05). Nevertheless, gender differences in stress were found for the 7th grade sample such that girls reported higher stress scores than did boys (M = 5.6 vs. 5.0 respectively; t (540)= 2.44, p<.05). Since ethnic differences were not found in NPSS scores and gender differences were found only for 7th grade students, moderator effects for gender will be examined in 7th graders only. No other moderator effects were examined. For the 7th grade cross sectional analyses, moderator effects were investigated in a separate regression analyses, as the gender by stress interaction term was found to eliminate the modest effect of the NPSS score on each smoking outcome for the 7th grade sample. (See analyses and explanation below in section 3a, 3b, and 3c.)

Analysis of Attrition

A total of 166 students did not respond at both time points. These students were compared to those 519 students who responded at both time points. Results revealed no gender or ethnic differences in those students who responded at one time-point versus those who responded at both time points (χ^2 (1,685) = 1.48, p>.05; χ^2 (1,676) = .51, p>.05, respectively). There were also no differences between students who responded at both time-points versus those who responded at only one time-point for Ever smoking status, mean stress scores, or cigarette refusal self-efficacy scores (χ^2 (1,680) = .00,

$p>.05$; t (673)= -1.10, $p>.05$; t (680)= .62, $p>.05$ respectively). More non-smokers (484) responded at both times than did non-smokers at 1 time-point (145) and current smokers at both time-points (T1 only = 17; T1 and T2 = 39; χ^2 (1,685) = 4.6, $p<.05$).

Cross-sectional Hypotheses[14]

In 6th graders and 7th graders respectively

Current Smoking Status hypotheses

Hypothesis 1

There will be ethnic and gender differences in current smoking status ("nonsmoker" or "current" smoker), experimental smoking status ("ever" vs. "never" smoked) and cigarette refusal self-efficacy status. Specifically, more Caucasian Americans will report a "current" or "ever" smoking status and will have lower cigarette refusal self-efficacy scores than will African Americans. More boys will report "current" or "ever" smoking status and have lower cigarette refusal self-efficacy scores than will girls.

Analysis of Hypothesis 1 in the 6th and 7th grade sample

Ethnic and gender differences in current smoking status

A chi-square analysis was conducted in the 6th grade sample to explore gender and ethnic differences in current smoking status. Results revealed ethnic differences in current smoking status for 6th grade students, such that more 6th grade Caucasian Americans (n=31) were "current" smokers than 6th grade African Americans (n=15) (χ^2 (1,669) = 3.98, $p< .05$). Results also revealed gender differences in current smoking

[14] *Note all cross-sectional hypotheses were conducted in both the 6th and 7th grade samples separately.

status such that more 6th grade boys (n=29) were "current" smokers than were 6th grade girls (n=17) (χ^2 (1, 678) = 3.91, p< .05). Results revealed no gender or ethnic differences in current smoking status for 7th grade students (χ^2 (1, 548) = .18, p>.05; χ^2 (1, 536) = 2.69, p>.05, respectively).

Ethnic and gender difference in experimental smoking status

A chi-square analysis was conducted in the 6th and 7th grade samples to explore gender and ethnic differences in experimental smoking status. Contrary to hypotheses, results for the 6th grade sample revealed no gender or ethnic differences in experimental smoking status (χ^2 (1,632) = 3.23, p>.05; χ^2 (1,623) = 2.68, p >.05, respectively). For the 7th grade sample, results revealed both gender and ethnic differences in experimental smoking status (χ^2 (1, 472) = 5.85, p< .05; χ^2 (1, 461) = 6.99, p<.05, respectively). Results revealed that more 7th grade African Americans (n=181) and 7th grade male students (n=134) reported an "ever" smoking status than did 7th grade Caucasian Americans (n=74) and 7th grade female students (n=89), p< .05.

Ethnic and gender differences in cigarette refusal self-efficacy

Independent samples t-tests were conducted to examine ethnic and gender differences in cigarette refusal self-efficacy scores in both the 6th and 7th grade samples. Results revealed that the gender hypothesis was not supported, as the data yielded no gender differences in the 6th grade sample (t (678)= 1.55, p>.05). However, ethnic differences were found such that contrary to the proposed hypothesis, sixth grade Caucasian Americans (M=4.42, SD=1.0 range 0-5) reported higher cigarette refusal self-efficacy scores than did 6th grade African Americans (M = 4.09, SD = 1.4) (t (669) = -

3.52, $p < .01$). Data for the 7th grade sample yielded no ethnic or gender differences in cigarette refusal self-efficacy scores (t (544)= .85, $p > .05$; t (534)= .07, $p > .05$ respectively).

Hypothesis 2.

There will be within group differences for African Americans such that more African Americans with high New Perceived Stress Scale (NPSS) scores will report a "current" smoking status, an "ever" smoking status, and lower cigarette refusal self-efficacy scores than will African Americans with low NPSS scores. Additionally, there will be within group differences for Caucasian Americans in the same aforementioned direction for those with high or low stress.

Within group differences for level of stress and current smoking

A median split was performed on the NPSS scores, such that all scores below the median were categorized as "low stress" and scores above the median were categorized as "high stress". A Chi-square analysis was conducted to examine ethnic specific differences in level of stress (low or high) and current smoking status (See Table 6). For 6th grade students, there were within group differences on level of stress and current smoking status for both African Americans and Caucasian Americans. More 6th grade African Americans with high stress were "current" smokers than were those with low stress (11 vs. 4) and more 6th grade African Americans with low stress were nonsmokers than were those with high stress (176 vs. 117); [15]χ^2 (1, 308) = 6.55, $p < .05$). For 6th grade Caucasian Americans, more students with high stress reported a "current" smoking status

[15] It should be noted that the low cell count of 4 for "current" smoking status suggests that this Chi Square statistic is valid for the non-smoker groups rather that the "current" smoker groups.

than did those with low stress (18 vs. 13) and more 6th grade students with low stress reported a "non-smoking" status than did those with high stress (196 vs. 123) (χ^2 (1, 350) = 4.46, p<.05).

For 7th grade students, African Americans' level of stress was not related to current smoking status (χ^2 (1, 227) = .03, p>.05). Seventh grade Caucasian Americans' level of stress was related to current smoking status, such that more 7th grade Caucasian Americans with high stress (n=31) reported a "current" smoking status than did 7th grade Caucasian Americans with low stress (n=17) (χ^2 (1, 299) = 5.4, p<.05). Also, more 7th grade Caucasian Americans with low stress reported a "nonsmoker" status than did 7th grade Caucasian Americans with high stress(n= 135 vs. 116).

Table 6

Within Group Differences for Level of Stress and Smoking Behaviors

Smoking Status	Low Stress	High Stress
	African Americans	
Current (counts)		
*6th	4	11
7th	13	12
Experimental (counts)		
*6th	31	43
7th	37	47
Refusal Self-efficacy (mean)		
**6th	4.3	3.8
7th	4.2	4.1
	Caucasian Americans	
Current (counts)		
~6th	13	18
*7th	17	31
Experimental (counts)		
6th	32	32
7th	35	37
Refusal Self-efficacy (means)		
6th	4.4	4.3
*7th	4.3	4.0

~p=.05, *p<.05, **p<.01

Within group differences for level of stress and experimental smoking status

A Chi-square analysis was conducted to examine within group differences in level of stress and experimental smoking status (See Table 6). For 6th grade African Americans, level of stress was related to experimental smoking status, such that more 6th grade African Americans with high stress (n=43) reported a "ever" smoking status than did 6th grade African Americans with low stress (n=32) (χ^2 (1, 293) = 13.67, p<.05). For 6th grade Caucasian Americans, level of stress was not related to experimental smoking status, (χ^2 (1, 319) = 4.42, p>.05). For 7th grade students, there were no within group differences on level of stress and experimental smoking status for either African Americans or Caucasian Americans (χ^2 (1, 202) = 2.03, p>.05; χ^2 (1, 249) = .93, p>.05, respectively).

Within group differences for level of stress and cigarette refusal self-efficacy.

An independent samples t-test was conducted to examine within group differences on level of stress and cigarette refusal self-efficacy (See Table 6). Results revealed within group differences for 6th grade African Americans such that 6th grade African Americans with high stress had lower cigarette refusal self-efficacy scores than did 6th grade African Americans with low stress. (M= 3.82 vs. 4.29; t (309) = 2.96. p<.01). For 6th grade Caucasian Americans, results yielded no within group differences for stress and cigarette refusal self-efficacy (t (350) = 1.66, p>.05). For 7th grade students, there were no within group differences in stress level and cigarette refusal self-efficacy for African American students (t (224) = .52 p>.01). Results revealed that 7th grade stress level was related to cigarette self-efficacy refusal scores for Caucasian-American 7th graders such

that, Seventh grade Caucasian Americans with high stress reported lower cigarette refusal self-efficacy scores than did 7th grade Caucasian Americans with low stress (M=4.0 vs. 4.3, respectively; t (297) = 2.15 p<.05.

Hypothesis 3a

The New Perceived Stress Scale (NPSS) scores will predict current smoking status ("nonsmoker" or "current" smoker), experimental smoking status ("ever" vs. "never" smoked), and cigarette refusal self-efficacy scores of students when controlling for demographic variables.

Hypothesis 3b

Ethnicity will moderate the relationship between NPSS scores and smoking status such that more Caucasian Americans with high stress scores will report a "current" or "ever" smoking status or lower cigarette refusal self-efficacy scores than will Caucasian Americans with low stress scores and African Americans regardless of stress level. This hypothesis was examined using the factored NPSS scale rather than a median split as in hypothesis 2.

Hypothesis3c

Gender will moderate the relationship between NPSS scores and smoking status such that contrary to general smoking trends, girls with high stress scores will report a "current" smoking status, "ever" smoking status, or low cigarette refusal self-efficacy scores more often than will girls with low stress and boys regardless of stress level.

Stress as a predictor of current smoking status

A logistic regression was conducted in the 6th and 7th grade samples (separately) to determine the predictive value of stress on current smoking status. For the 6th grade sample, the 6th grade gender variable was entered in Step 1, 6th grade ethnicity in Step 2, and the 6th grade NPSS in Step 3 (See Table 7). (Note: As noted above in the preliminary analysis section, moderator variables were not entered in this analysis because there were no ethnic or gender differences in NPSS scores for 6th grade students). Results revealed that the 6th grade full model was statistically significant (χ^2 (3, 658) = 16.00, p< .01). Sixth grade gender, ethnicity, and the NPSS significantly predicted current smoking status in the 6th grade sample. Sixth grade boys and Caucasian Americans were more likely to report a "current" smoking status than were sixth grade girls and African Americans (Wald= 4.65, p< .05, odds ratio= 2.0, CI=1.1-3.7; Wald= 4.23, p< .05, odds ratio= 2.0, CI=1.03-3.7 respectively). Results also demonstrated that the likelihood that a 6th grade student would report a 6th grade "current" smoking status increased slightly for every unit of increase in 6th grade NPSS scores (Wald= 7.04, p< .05, odds ratio= 1.2, CI=1.04-1.2).

For the 7th grade sample, 7th grade gender variable was entered in Step 1, 7th grade ethnicity in Step 2, and the 7th grade NPSS in Step 3 (see Table 8). The 7th grade full model was also statistically significant (χ^2 (3, 526) = 9.29, p<.05). Consistent with hypotheses, the 7th grade NPSS was predictive of current smoking status in 7th grade students (Wald= 5.97, p<.05, odds ratio= 1.1, CI=1.02-1.2). Results suggest that 7th grade students are slightly more likely to report a "current" smoking states for every unit of increase in 7th grade stress scores.

Table 7

Logistic Regression for Predictors of Current Smoking Status in 6th Grade Students (n=658)

Predictor	B	SE	Odds	95% CI	Wald	Step df	Step X^2
Step 1 6th grade gender	.69	.32	2.0	1.1-3.7	4.66*	1	4.0*
Step 2 6th grade ethnicity	.68	.33	2.0	1.03-3.7	4.3*	1	4.0*
Step 3 6th grade NPSS score	.14	.05	1.2	1.04-1.3	8.0*	1	8.0**

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

Table 8

Logistic Regression for Predictors of Current Smoking Status in 7th Grade Students (n=526)

Predictor	B	SE	Odds	95% CI	Wald	Step df	Step X^2
Step 1 7th grade gender	-10	.26	.90	.54-1.49	.16	1	3.7
Step 2 7th grade ethnicity	.43	.27	1.5	.91-2.6	2.6	1	2.8
Step 3 7th grade NPSS score	1.0	.04	1.1	1.02-1.2	6.0*	1	6.0*

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

Affect of gender by stress moderator on current smoking status in the 7th grade sample

As noted in Hypothesis P1, t-test analyses revealed no ethnic differences in NPSS scores for 6th or 7th grade students. However, gender differences in NPSS score were found for 7th grade students. Thus, gender and ethnicity were not examined as moderator variables in the 6th grade sample, nor was ethnicity examined as a moderator variable in the 7th grade sample. Only the gender by stress interaction term was examined and only in the 7th grade sample, as this was the only sample with gender differences in stress. Therefore, a separate logistic regression was conducted to examine the gender by stress interaction term in the 7th grade sample. This logistic regression was calculated separately because results revealed that the interaction term eliminated the modest effect of stress as a predictor in the final model. Thus, in order to examine any unique contribution of stress and the stress by gender interaction term, separate analyses were conducted.

A logistic regression, which included 7th grade gender in Step 1, 7th grade ethnicity in Step 2, 7th grade NPSS in step 3, and the 7th grade gender by NPSS interaction terms in Step 4, was conducted for the 7th grade sample (See Table 9). Although the full model was significant (χ^2 (4, 526) = 9.60, $p< .05$), the 7th grade gender by stress interaction term was not a significant predictor of 7th grade current smoking status (Wald= .30, $p>.05$, odds ratio= .95, CI=.81-1.1).

Table 9

Logistic Regression Examining Gender as a Moderator Variable for Stress and Current Smoking Status in 7th Grade Students (n=526)

Predictor	B	SE	Odds	95% CI	Wald	Step df	Step X^2
Step 1 7th grade gender	-.37	.55	.69	.23-2.0	.46	1	.37
Step 2 7th grade ethnicity	.43	.27	1.5	.92-2.6	2.6	1	2.8
Step 3 7th grade NPSS score	.17	.13	1.2	.92-1.5	1.63	1	6.0*
Step 4 7th grade Stress X Gender	-.05	.08	1.0	.82-1.1	.31	1	.30

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

Analysis of Hypotheses 3a, 3b, 3c in the 6th and 7th grade samples

Stress as a predictor of experimental smoking status

A logistic regression was conducted in the 6th and 7th grade samples to determine the predictive value of stress on experimental smoking status. For the 6th grade sample, 6th grade gender was entered in Step 1, 6th grade ethnicity in Step 2, and the 6th grade NPSS was entered in Step 3 (See Table 10). Results for the 6th grade sample revealed that the full model was statistically significant (χ^2 (3, 612) = 20.99, p<.01). Sixth grade boys were more likely to be have ever tried smoking than were 6th grade girls (Wald= 3.8, p=.05, odds ratio= 1.5, CI=1.0-.2.1). Consistent with hypotheses, sixth grade stress was a significant predictor of 6th grade experimental smoking status. Results revealed that for every unit increase in 6th grade stress, students were slightly more likely to have experimented with cigarette smoking (Wald= 15.02, p< .05, odds ratio= 1.1, CI=.1.1-1.2).

Table 10

Logistic Regression for Predictors of Experimental Smoking Status in 6th Grade Students (N = 612)

Predictor	B	SE	Odds	95% CI	Wald	Step df	Step X^2
Step 1 6th grade gender	.39	.20	1.5	1.0-2.2	3.8~	1	2.9
Step 2 6th grade ethnicity	-.31	.20	.74	.5-1.1	-.31	1	2.4
Step 3 6th grade NPSS score	.12	.03	1.1	1.1-1.2	.12**	1	15.5**

~p = .05,*p<.05, ** p<.01

For the 7th grade sample, 7th grade gender was entered in Step 1, 7th grade ethnicity in Step 2, and the 7th grade NPSS was entered in Step 3 (See Table 11). Results for the 7th grade sample revealed that the full model was statistically significant (χ^2 (3, 451) = 15.42, p<.01). Results revealed that 7th grade boys were more likely to report ever trying a cigarette than were 7th grade girls (Wald= 6.63, p<.05, odds ratio= 1.7, CI=1.1-2.5). Seventh grade Caucasian Americans were less likely to report "ever" smoking than were 7th grade African Americans (Wald= 8.57, p< .05, odds ratio= .55, CI=.37-.82). Contrary to predictions, 7th grade stress was not a significant predictor of 7th grade experimental smoking status (Wald= 1.44, p>.05, odds ratio= 1.0, CI=.96-1.1).

Table 11

Logistic Regression for Predictors of Experimental Smoking Status in 7th Grade Students (n=451)

Predictor	B	SE	Odds	95% CI	Wald	Step df	Step X^2
Step 1 7th grade gender	.53	.20	1.7	1.1-2.5	6.6*	1	5.3
Step 2 7th grade ethnicity	-.60	.20	.55	.37-.82	8.6*	1	13.97
Step 3 7th grade NPSS score	.04	.03	1.04	.96-1.1	1.4	1	15.4

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

Affect of gender by stress moderator on experimental smoking status in the 7th grade sample

Note: As indicated above, only the gender by stress moderator variable for the 7th grade sample was explored, as this was the only sample with gender differences in stress. No ethnic differences in stress were found for either sample.

A logistic regression was conducted to explore gender as a moderator of stress and experimental smoking status in the 7th grade sample. The model was such that 7th grade gender was entered in Step 1, 7th grade ethnicity in Step 2, 7th grade NPSS in step 3, and the 7th grade gender by NPSS interaction term in Step 4 (See Table 12). Results revealed that the full model was significant in the 7th grade sample (χ^2 (4, 451) = 17.66, $p < .05$). Contrary to hypotheses, the 7th grade gender by stress interaction term was not significant a predictor of 7th grade current smoking status (Wald= 2.2, $p > .05$, odds ratio= 1.1, CI=.97-1.2.)

Table 12

Logistic Regression Examining Gender as a Moderator of Stress and Experimental Smoking Status in 7th Grade Students (n=451)

Predictor	B	SE	Odds	95% CI	Wald	Step df	Step X^2
Step 1 7th grade gender	1.0	.40	2.8	1.2-6.1	6.7*	1	5.3
Step 2 7th grade ethnicity	-.60	.20	.55	.75-1.1	8.8**	1	13.98
Step 3 7th grade NPSS score	-.10	.10	1.1	.98-1.3	1.1	1	15.43
Step 4 7th grade Stress X Gender	1.0	.06	2.2	.97-1.25	1.2	1	17.67

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

Analysis of Hypothesis 3a, 3b and 3c for 6th and 7th grade students

Stress as a predictor of cigarette refusal self-efficacy

A multiple regression was conducted to examine stress as a predictor of cigarette refusal self-efficacy scores. Sixth grade gender was entered in Step 1, 6th grade ethnicity in Step 2, and 6th grade NPSS in Step 3 (See Table 13). The 6th grade full model was significant (R^2= .04, F (3, 662)= 8.3, p< .05). Both 6th grade ethnicity (R^2= .02) and 6th grade stress (R^2= .02) were predictive of 6th grade cigarette refusal self-efficacy (F (1,659)= 11.91, p< .01; F (1,658)= 10.58, p< .01).

Table 13

Hierarchical Regression Examining Predictors of Cigarette Self-efficacy Refusal (6th grade sample) (N = 662)

Steps and Variables	R	R^2	ΔR^2	ΔF	B	SE B	β	t
Step 1	.06	.00	.00	2.3	-.14	.10	-.06	-1.5
6th grade gender								
Step 2	.15	.02	.02	11.9**	.33	.09	.13	3.45**
6th grade ethnicity								
Step 3	.20	.04	.02	10.58**	-.05	.02	-.13	-3.3**
6th grade NPSS								

*p<.05, **p<.01 Note: Coefficients represent values obtained in each step.

The same aforementioned predictors were examined for the 7th grade sample (See Table 14). The 7th grade full model was not significant (R^2= .00, F (1, 525)= .411, p>.05). Seventh grade demographic variables and 7th grade NPSS were not significant predictors of 7th grade cigarette self-efficacy refusal scores (F (1, 521)= .13, p>.05).

Table 14

Hierarchical Regression for Predictors of Cigarette Self-efficacy Refusal (7th grade sample) (n=525)

Steps and Variables	R	R^2	ΔR^2	ΔF	B	SE B	β	t
Step 1	.04	.00	.00	.70	-.09	.11	-.03	-.82
7th grade gender								
Step 2	.04	.00	.00	.00	-.00	.11	-.00	-.042
7th grade ethnicity								
Step 3	.07	.01	.00	.2.2	-.03	.02	-.07	-1.5
7th grade NPSS								

*p<.05, **p<.01 Note: Coefficients represent values obtained in each step.

Gender by stress moderator effects on cigarette refusal self-efficacy scores in the 7th grade sample

A multiple regression was conducted to explore gender as a moderator for stress and cigarette refusal self-efficacy in the 7th grade sample. For the 7th grade sample, 7th grade gender was entered in Step 1, 7th grade ethnicity in Step 2, 7th grade NPSS in step 3, and 7th grade gender by NPSS interaction terms in Step 4 (See Table 15). The full model was not significant (F (4, 524)= .72, p>.05). Contrary to hypotheses, the 7th grade

gender by stress interaction term was not a significant predictor of 7th grade cigarette refusal self-efficacy scores (F (1, 520)= .98, p>.05).

Table 15

Hierarchical Regression of Gender as Moderator for Stress and Cigarette Self-efficacy Refusal (7th grade sample) (n=525)

Steps and Variables	R	R^2	ΔR^2	ΔF	B	SE B	β	t
Step 1	.04	.00	-.00	.70	-.09	.11	-.03	-.82
7th grade gender								
Step 2	.04	.00	-.00	.00	-.01	.11	-.00	-.04
7th grade ethnicity								
Step 3	.07	.01	.000	2.2	-.03	.02	-.07	-1.5
7th grade NPSS								
-								
Step 4	.07	.01	-.00	.00	-.00	.03	-.00	-.02
7th grade Gender X NPSS								

*p<.05, **p<.01 Note: Coefficients represent values obtained in each step.

Longitudinal Hypothesis (6th grade stress predicting 7th grade smoking behaviors)

Longitudinal current smoking status hypotheses

Hypothesis 1.

Sixth grade NPSS scores will be predictive of 7th grade current smoking status, experimental status and cigarette refusal self-efficacy, respectively.

Hypothesis 2

Ethnicity will moderate the relationship between NPSS scores and smoking such that more 6th grade Caucasian Americans with high NPSS scores will report a 7th grade "current" smoking status, an "ever" experimental smoking status, and lower cigarette refusal self-efficacy scores than will other groups.

Hypothesis 3

Gender will moderate the relationship between NPSS scores and smoking such that more 6th grade girls with high NPSS score will report a 7th grade "current" smoking status, an "ever" experimental smoking status, and lower cigarette refusal self-efficacy scores than will other groups.

Analysis of Longitudinal Hypotheses 3 a, 3b, and 3c

6th grade stress as a predictor of 7th grade current smoking status

A logistic regression was conducted to determine the predictive value of 6th grade stress on 7th grade current smoking status. Sixth grade gender was entered in Step 1, 6th grade ethnicity in Step 2, and the 6th grade NPSS in Step 3 (See Table 16). (**Note**: As noted above in the preliminary analysis section, moderator variables were not examined as there were no gender or ethnic differences in stress scores for the 6th grade sample).

Table 16

Logistic Regression Examining 6th grade Stress as a Predictor of 7th Grade Current Smoking (n=501)

Predictor	B	SE	Odds	95% CI	Wald	Step df	Step X^2
Step 1 6th grade gender	-.01	.26	1.0	.58-1.6	.00	1	.09
Step 2 6th grade ethnicity	.46	.27	1.5	.92-2.7	82.8	1	2.6
Step 3 6th grade NPSS score	.18	.04	1.2	1.1-1.3	17.04**	1	17.76**

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

Results revealed that the full model was statistically significant (χ^2 (3, 501) = 20.47, p<.05). Consistent with hypothesis, 6th grade stress predicts 7th grade current smoking status. For every one unit increase in 6th grade stress scores, 7th grade students were slightly more likely to report a "current" smoking status (Wald= 17.04 p<.05, odds ratio= 1.2, CI=1.1-1.3).

6th grade stress as a predictor of 7th grade experimental smoking status

A logistic regression was conducted to examine 6th grade stress as a predictor of 7th grade experimental smoking. Sixth grade gender was entered in Step 1, 6th grade ethnicity in Step 2, and 6th grade NPSS in Step 3 (See Table 17). Results revealed that the full model was statistically significant (χ^2 (3, 431) = 12.86, p<.01). Sixth grade boys were more likely to be have ever tried smoking during the 7th grade than were 6th grade girls (Wald= 5.2, p<.05, odds ratio= 1.6, CI=1.1-.2.3). Sixth grade Caucasian Americans were less likely than 6th grade African Americans to report an "ever" smoking status during the 7th grade (Wald= 6.0, p<.05, odds ratio= .69, CI=.40-.90). Contrary to hypothesis, 6th grade stress was not a significant predictor of 7th grade experimental smoking status (Wald= 2.6, p>.05, odds ratio= 1.05, CI=.98-1.1).

Table 17

Logistic Regression Examining 6th Grade Stress as a Predictor of 7th grade Experimental Smoking (n=431)

Predictor	B	SE	Odds	95% CI	Wald	Step df	Step X^2
Step 1 6th grade gender	.47	.20	1.6	1.1-2.3	5.2*	1	4.2*
Step 2 6th grade ethnicity	-.50	.20	.69	.40-.90	86.0*	1	5.9*
Step 3 6th grade NPSS score	.05	.03	1.1	.98-1.1	2.6	1	2.6

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

6th grade stress as a predictor of 7th grade cigarette refusal self efficacy

A multiple regression was conducted to examine 6th grade stress as a predictor of 7th grade cigarette self-efficacy refusal scores. Sixth grade gender was entered in Step 1, 6th grade ethnicity in Step 2, and 6th grade NPSS in Step 3 (See Table 18). The full model was not significant (R^2= .00, F (3, 499)= 1.5, p> .05). Neither sixth grade demographic variables nor stress was predictive of 7th grade cigarette self-efficacy refusal (F (1,497)= .14, p> .05; F (1,496)= 3.66, p> .05).

Table 18

Hierarchical Regression Examining 6th Grade Stress as a Predictor of 7th Grade Cigarette Refusal Self-efficacy (n=525)

Steps and Variables	R	R^2	ΔR^2	ΔF	B	SE B	β	t
Step 1	.04	.00	.00	.70	-.09	.11	-.04	-.84
6th grade gender								
Step 2	.04	.00	.00	.14	.04	.11	.02	.37
6th grade ethnicity								
Step 3	.09	.01	.01	3.6	-.03	.02	-.09	-1.9
6th grade NPSS								
-								

*p<.05, **p<.01 Note: Coefficients represent values obtained in each step.

6th grade gender as a moderator for 7th grade stress and cigarette self-efficacy refusal

As previously noted, results yielded no gender of ethnic differences in stress scores for 6th grade students. Therefore longitudinal moderator variable hypotheses were not examined.

Summary of Major Findings

Ethnic and gender differences in smoking behaviors

- More 6th grade Caucasian American reported a "current" smoking status than do 6th grade African Americans.
- More 6th grade boys reported a "current" smoking status than do 6th grade girls.
- More 7th grade African Americans reported an "experimental" smoking status than do 7th grade Caucasian Americans.
- More 7th grade boys reported an "experimental" smoking status than do 7th grade girls.
- Sixth grade Caucasian Americans had a higher mean cigarette self-efficacy refusal score than did 6th grade African Americans.

Within group differences in level of stress and smoking behaviors

- More 6th grade African Americans with high stress reported a "current" smoking status than did 6th grade African Americans with low stress.
- More 6th grade Caucasian Americans with high stress reported a "current" smoking status than did 6th grade Caucasian Americans with low stress.
- More 7th grade Caucasian Americans with high stress reported a "current" smoking status than did 7th grade Caucasian Americans with low stress.

- More 6th grade African Americans with high stress reported an "experimental" smoking status than did 6th grade African Americans with low stress.
- Sixth grade African Americans with high stress had lower self-efficacy refusal scores than did 6th grade African American with low stress.
- Seventh grade Caucasian Americans with high stress had lower self-efficacy refusal scores than did 7th grade Caucasian Americans with low stress.

Stress as a predictor of smoking behavior (Cross-sectional hypotheses)

- Sixth grade gender, ethnicity and stress predicted 6th grade current smoking status.
- Seventh grade stress predicted 7th grade current smoking status.
- Sixth grade gender and stress predicted 6th grade experimental smoking status.
- Seventh grade gender and ethnicity predicted 7th grade experimental smoking status.
- Sixth grade ethnicity (2%) and stress (1%) accounted for variance in cigarette self-efficacy refusal scores.

Sixth grade variables as predictors of 7th grade smoking behaviors. (Longitudinal hypotheses)

- Sixth grade stress predicted 7th grade current smoking status.
- Sixth grade gender and ethnicity predicted 7th grade experimental smoking status.

CHAPTER 6

DISCUSSION

The present study examined stress as a predictor of current and experimental smoking status as well as cigarette refusal self-efficacy in a sample of 6th and 7th grade rural adolescents. The study also examined the longitudinal relationship of 6th grade stress to 7th grade current smoking status, experimental smoking status, and cigarette self-efficacy refusal. Numerous studies have found that students typically begin smoking between the ages of 14 and 15 (ACS 2003a; AHA 2002b; USDHHS, 1994). Nevertheless, students in the present study reported a modal age of "11 or 12" for both smoking initiation and becoming a regular smoker. Results also revealed that 7% of the 6th grade sample and 13% of the 7th grade sample reported a "current" smoking status, meaning they reported smoking a cigarette in the past 30 days. Percentages for current smoking status in our 6th grade sample were slightly less than the 11% NYTS 2000 national average for middle school students, while those for our 7th grade students were slightly above the national average (CDC, 2001).

When examining experimental smoking status, twenty percent of 6th grade students in the present sample reported that they have ever tried a cigarette, even one or two puffs. Twenty-nine percent of 7th grade students reported being experimental

smokers. Again, the present 6th grade sample had an "ever" smoking rate that was less than the national average (23.9%) for middle school students, and the present sample's 7th grade "ever" smoking rates were slightly above the national average (CDC, 2000). It may be that our 7th grade students are being exposed to environmental factors early on, which increase their likelihood of experimenting with cigarettes. For instance, Hogan (2002) examined rural adolescents from the same parent study (GFH) as the present study. The researcher found that having a best friend who smoked made a 6th grade "never" smoker twice as likely to be an "ever" smoker by the 7th grade (Hogan, 2002). The researcher also found that having a mother who smoked made a 6th grade "never-smoker" four times more likely to report an "ever" smoking status during the 7th grade (Hogan, 2002).

Results from the current study demonstrate that by the 7th grade, both current and experimental smoking rates have increased, even beyond the national average for middle school students. The present sample appears to be at an increased risk for becoming adult smokers and for the health -related consequences associated with smoking.

Cigarette refusal self-efficacy

The average smoking self-efficacy refusal score was 4.2 (SD=1.2) for 6th and 4.1 (SD=1.2) for 7th graders (range 0-5), indicating that on average students strongly agreed that they could refuse smoking cigarettes. These results were similar to another study of 379 employed adolescents (ages 15-18), which found that students had a cigarette mean self-efficacy rating of 48.8 (15-60) indicating that they were quite confident in their ability to refuse cigarettes (Fagan et al., 2003). Another study of adolescents found that

approximately 75% of the sample (n=2,646 7th graders) felt that they could refuse a cigarette if it was offered them (Barkin, Smith, & DuRant, 2002). Although students appear confident in their ability to refuse cigarettes, current and experimental smoking rates remain high for adolescents.

Studies have demonstrated that tobacco refusal self-efficacy is strongly related to stage of initiation, smoking status, and even situational factors (Fagan et al., 2003; Hogan, 2002; Kremers et al., 2002). Thus, students who have not yet initiated smoking may have high refusal self-efficacy, but may also be lured into a false sense of security that they can refuse cigarettes regardless of the situation. Students may not be aware of the factors that increase their vulnerability to smoking such as genetics, social environment, peer influence, and parental modeling. Further, 6th and 7th grade students in the present who were "current" or "ever" smokers had lower cigarette refusal self-efficacy scores than did nonsmokers or never smokers (Mean refusal self-efficacy scores were as follows: 6th "current" (3.4) vs. "nonsmoker" (4.6); 7th "current" (3.0) vs. "nonsmoker" (4.4); 6th "ever" (4.0) vs. "never" (4.4); 7th "ever" (4.1) vs. "never" (4.5); respectively, all $p<.05$) . These differences suggest that the low refusal self-efficacy scores may make it difficult for current smokers to quit and experimenters to avoid progressing to current smoker status in the future. Efforts should be made to help students increase their tobacco refusal self-efficacy across various settings, social interactions, and developmental stages.

Stress

Students in our sample had a mean stress score of 4.7 in the 6th grade and 5.3 during the 7th grade. The range of stress scores was 0-12, indicating that, on average, students in the present study experienced a moderate amount of stress.

Gender and Ethnic differences in Stress scores

Contrary to predictions, there were no gender or ethnic differences in NPSS scores for the 6th grade sample. There were also no ethnic differences in NPSS scores for the 7th grade sample. Gender differences in NPSS scores were found only for the 7th grade sample such that 7th grade girls reported a higher NPSS score than did 7th grade boys (M= 5.6 vs. 5.0 respectively). This result is consistent with previous research, which demonstrates that girls report higher stress scores and more stressful life events than do boys. For instance, a meta-analytic review of 119 studies (83,559 participants) reported that adolescent and adult females encountered more stress and appraised more events as stressful than did adolescent and adult males (Davis, Matthews, & Twamley, 1999). When examining specific types of stress, females experienced more work stress, interpersonal stress and emotional stress than did men (Davis et al., 1999). The present study as well as previous research demonstrates that girls tend to experience more stress than do boys. Females may benefit from gender-specific interventions that target types of stressors that are significant for females such as interpersonal stress, body image stress, and other psychosocial factors. Creating gender-specific stress-related interventions may

lower females' risk of engaging in negative coping behaviors such as smoking and other substance use.

In regard to the lack of ethnic differences in stress scores for our sample, other studies have found similar results. For example, both a 1997 study and a 1994 study reported no ethnic differences in perceived stress or daily hassles in adolescent samples (mean ages 16 and 13, respectively; Baldwin, Harris, & Chambliss 1997; Biafora et al., 1994). Nevertheless, research suggests that African Americans tend to report a higher frequency of some negative life events (death of a loved one, violence, poverty) and daily hassles than do their Caucasian-American counterparts (Kilmer et al., 1998). One reason for the lack of ethnic differences in the present study and aforementioned studies may be due to a stress inoculation effect for African-American adolescents. Biafora et al. (1994) suggest that because African Americans experience stressful events earlier in life and more frequently than other groups, they may learn to appraise or perceive them as less threatening/stressful than would other groups (Biafora et al., 1994). Therefore the lack of ethnic differences in perceived stress does not necessarily signify that the groups are similar in their stress experiences. More research is needed to understand the inconsistent results of ethnic differences in stress research studies. The field of stress research may benefit from more culturally appropriate measures of stress or a stress scoring system that takes into consideration any attenuated effects or perceptions of stress in the African-American community. For instance, Troxel et al. (2003) employed both an "unfair treatment scale" and a "racial discrimination scale" when investigating chronic stress burden in a sample African-American and Caucasian-American women. Researchers

should test the utility of these types of measures in adolescents, which may lead to a more thorough examination of ethnic differences in perceived stress.

Ethnic differences in smoking status and cigarette refusal self-efficacy.

Current smoking. Consistent with predictions, more 6th grade Caucasian Americans reported a "current" smoking status than did 6th grade African Americans. These results were consistent with research in similar age adolescents (ages range from 9-14 across studies), which demonstrates that Caucasian Americans tend to report higher current smoking rates than do African Americans (Faulkner et al., 1996; Griesler et al., 1998; Harrell et al., 1998). Kelder et al. (2003) found that 8th grade Caucasian Americans and Hispanic Americans smoke at a rate of two to four times higher than that of African Americans.

Contrary to hypotheses, there were no ethnic differences in the 7th grade sample for current smoking status or cigarette refusal self-efficacy. These results are similar to NYTS data, which found that current cigarette smoking rates were similar among ethnic groups in middle school students (CDC, 2003b). Nevertheless, the current study and previous research has demonstrated that ethnic differences exist in smoking status.

The above results demonstrate that 6th grade ethnic differences exist in current smoking, but by 7th grade these differences disappear. It may be that 6th grade African Americans are being influenced to try cigarettes or smoke regularly by their 6th grade peers who smoke, such that by 7th grade these behaviors are now more established. It should be noted that the number of current smokers increased from 47 at 6th grade to 74 at 7th grade. This increase represents the fact that 15 African Americans and 13

Caucasian Americans who reported a "nonsmoker" status at 6th grade reported a "current" smoking status at 7th grade. Thus, although more Caucasian Americans were current smokers during the 6th grade, more African Americans than Caucasian Americans became current smokers by the 7th grades. This increase in African-American smokers from 6th to 7th grade made the current smoking rates even out such that there were no ethnic differences in current smoking status for 7th grade students.

One could speculate that this same trend could be observed as African Americans move from 7th to 8th grade. For instance, seventh grade African Americans had higher experimentation rates than did 7th grade Caucasian Americans (demonstrated below). This may make African Americans more vulnerable to becoming regular smokers by the 8th grade. Smoking prevention interventions may need to be culture specific to address the unique factors related to smoking adoption and maintenance across cultures.

Culture-specific smoking interventions could be modeled after programs designed by Botvin et al. (1997) and Belgrave et al. (in press). Botvin et al. 1997 designed a drug prevention program that incorporated ethnically similar peer leaders and a culturally enhanced curriculum. The curriculum includes modalities of learning that are specific to the African American culture (i.e. story telling, peer clustering) and characters in the curriculum stories are matched on race and age for the population of interest (Botvin, Schinke, Epstein, & Diaz, 1994). Belgrave et al. (in press) created a culturally enhanced curriculum designed to prevent and decrease risky behaviors in the areas of sexual activity and substance use. The program uses culturally similar psycho-education leaders who are matched on gender and race. Africentric principles are (e.g. verve,

communalism, cultural pride, etc) infused into the curriculum such that skills are taught from an Africentric perspective. Another program by Hecht et al. (2003), called *Keeping it R.E.A.L.* is a culturally enhanced drug prevention intervention targeting substance use among urban middle school students. The researchers examined the effectiveness of culture-specific versions of the drug-prevention program for Mexican Americans, African Americans and Caucasian Americans, and a Multicultural version. Results revealed that the Mexican American and Multicultural versions impacted the most drug outcomes. Either of the aforementioned culturally enhanced programs could serve as a model for designing a culture-specific smoking prevention or cessation program.

Experimental smoking. When examining experimental smoking status, there were no ethnic differences for 6th graders, but more 7th grade African Americans reported an "experimental" smoking status than did 7th grade Caucasian Americans. As noted above, these results are inconsistent with previous studies that tend to find Caucasian-American adolescents reporting higher "experimental" and "current" smoking rates than African-American adolescents (Griesler et al., 1998; Kelder et al., 2003). A study by Brauman and Ennet (1994) found that African-Americans adolescents tend to under-report and Caucasian-American adolescents tend to over-report cigarette use as evidenced by biochemical indicators. Results from the current study may suggest that African-American adolescents are reporting their experimentation rates more accurately than are African-American students in other studies. This may indicate that African Americans are not as immune from the early adoption of smoking habits as was once believed.

Cigarette Refusal self-efficacy. For 6th grade students, ethnic differences exist such that Caucasian American reported higher cigarette refusal self-efficacy scores than did African Americans. By 7th these differences disappeared. It may be that student are overestimating their refusal self-efficacy as evidenced by the fact that current smoking rates increased from 6th to 7th grade. Students may be unaware of the situational or interpersonal factors that make them more vulnerable to try cigarettes. When completing a survey in a classroom setting it may be easy to report refusal self-efficacy. Nevertheless in a social environment where peers are smoking and encouraging others to smoke, students may become vulnerable to the social cues and peer influence to smoke. Students are in need of interventions that focus on skills building in the area of cigarette refusal self-efficacy.

Gender differences in smoking status and smoking self-efficacy refusal.

Current smoking. Results revealed that more 6th grade boys reported a "current" smoking status than did 6th grade girls. These results are consistent with previous research findings. YRBS data revealed that male high school students were significantly more like than female high school students to report a "current" smoking status, an "ever" smoking status, and to have smoked more than 10 cigarettes per day (Grunbaum et al., 2002). In the current study, seventh grade males and females reported similar rates of "current" smoking. These results suggest that from 6th to 7th grade, female smoking rates increased as evidenced by the increases in current smoking rates for the full sample (from 7% to 13%) and the lack of gender differences in current smoking rates by the 7th grade. This increase may be due to body image issues as research shows that females often

smoke cigarettes as a means of weight control (Tomeo, Field, Berkley, Colditz, & Frazier, 1999; Wee, Rigoti, Davis, & Phillips, 2001). Girls also may be influenced to smoke by boys within the confines of a dating relationship. Research demonstrates that adolescent girls experience more interpersonal stress than do adolescent boys (Baldwin et al., 1997). It may be that girls have adopted some of the same behaviors as boys to be accepted by or attractive to the opposite sex. Girls in the current sample are in need of smoking prevention programs, as they appear to be smoking more than their same-aged female peers nationwide.

Experimental smoking. Contrary to prediction, gender differences were not found for 6th grade experimental smoking status. The lack of gender differences in experimental smoking status suggests that 6th grade girls are experimenting with cigarettes at similar rates as 6th grade boys. Consistent with predictions, results revealed that more male 7th grade students reported an "experimental" smoking status than did female 7th grade students. These results were consistent with previous studies of similar age samples, which demonstrate that boys report higher experimentation rates than do girls (Harrell et al., 1998; Pederson et al, 1997; USDHHS, 1994). These findings demonstrate that rural adolescent boys are demonstrating similar smoking prevention and cessation needs as urban adolescent boys. Interventions are warranted that will help rural adolescent boys become and remain tobacco-free, even in areas (such as rural tobacco producing counties) where tobacco products may be a mainstay.

Cigarette self-efficacy refusal. Results revealed no gender differences in 6th or 7th grade cigarette refusal self-efficacy scores. By the 7th grade, girls reported more stress

than did boys, which may explain the lack of cigarette refusal self-efficacy in girls. Although the current researcher was unable to locate studies examining stress as a predictor of cigarette refusal self-efficacy, studies have shown that negative affect and negative coping skills are inversely related to tobacco refusal and abstinence self-efficacy (Gwaltney et al., 2001; Rabois & Haaga, 2003).

Based on study results, rural females appear to be at an increased risk for practicing other negative health behaviors due to their stress level and the fact that health-compromising behaviors tend to cluster (Brodeur, 2002; Chopak et al., 1994; Escobedo, Reddy, & Durant, 1997). For instance a study by Wilson and Nietert (2002) found that cigarette smoking was related to a decreased odds of consuming milk, fruit, fruit juice, and vegetables in Caucasian-American females adolescents (Wilson & Nietert, 2002). Because stress may play a role in the health-related behavior choices of female adolescents, research that includes gender-relevant measures of stress are warranted as well as interventions designed to improve coping and increase tobacco refusal self-efficacy. As noted above females experienced more work stress, interpersonal stress and emotional stress than do males (Davis et al., 1999). Therefore, stress-related interventions should take into consideration these and other gender-related factors when targeting female for health promotion.

Within group differences in smoking status and cigarette self-efficacy refusal

African Americans

Within group differences exist for 6th grade African Americans, but not for 7th grade African Americans, when examining the impact of stress level (high vs. low) on

smoking status and cigarette-refusal self-efficacy. African-American 6th grade students with high stress were more likely to report a "current" or "ever" smoking status and had lower cigarette self-efficacy refusal scores than did 6th grade African Americans with low stress. These results add further support to the conclusion that stress may impact smoking status in adolescents, but the impact may change based on age as demonstrated by the lack of within group differences for 7th grade students (presented below).

Seventh grade African-American students did not show within group differences for stress level as related to current, experimental smoking status, cigarette refusal self-efficacy. Results suggest that by seventh grade, African Americans' stress is not as strongly related to smoking as it was during their 6th grade year. It may be that 6th grade African Americans with high stress adopt smoking behaviors (as indicated above) and these smoking behaviors serve as a coping mechanism for stress. Thus, by the 7th grade, the students with low stress who would normally report low smoking behaviors are now reporting similar rates of smoking as those with high stress because they may be using smoking as a coping mechanism. These results suggest that students are in need of coping skills that will help them manage their stress in more appropriate ways.

Caucasian Americans

Consistent with hypotheses, 6th and 7th grade Caucasian Americans with high stress reported higher current smoking rates than did Caucasian Americans with low stress. Again, this supports the hypothesis that stress is related to smoking behaviors for Caucasian American adolescents. Contrary to hypotheses, there were no within group differences for 6th or 7th grade Caucasian Americans on stress level and experimental

smoking. These results suggest that Caucasian Americans are experimenting with cigarettes independent of their stress level. It appears that stress is more strongly related to engaging in consistent smoking behaviors (i.e. current smoking), rather than merely trying a cigarette. Students may benefit from interventions that teach more positive coping responses to stress as well as increase their cigarette self-efficacy refusal.

There were no within group differences between level of stress and cigarette self-efficacy refusal for 6th grade Caucasian Americans. Nevertheless, 7th Caucasian Americans with high stress also had lower cigarette refusal self-efficacy scores than did Caucasian Americans with low stress. This demonstrates that stress may make it difficult for students to refuse cigarettes, which may directly impact whether or not they experiment with or currently use tobacco.

Stress as a predictor of smoking status and smoking self-efficacy refusal (Cross sectional)

As hypothesized, stress was a predictor of current smoking above and beyond demographic variables in both the 6th and 7th grade samples. Results revealed that the likelihood of being a current smoker increased slightly for every unit of increase in stress. Stress results in the current study are consistent with previous studies that demonstrate stress as a predictor of smoking behaviors. A study by Wills, Sandy, & Yaeger (2002) tested the directional relationship of stress and smoking in a sample of adolescents (mean age 12). The researchers found that stress increases smoking behaviors, but smoking behaviors do not increase stress (Wills et al., 2002). These results suggest that students may indeed receive some perceived benefit (reduced arousal or feelings of stress) from smoking cigarettes and therefore smoking is reinforcing for them. Interventions are

needed that focus on skills building to help students discover more productive ways of coping with stressful feelings/experiences.

When examining experimental smoking status, stress was a significant predictor above and beyond demographic variables for the 6th grade sample, but not the 7th grade sample. Sixth grade students were slightly more likely to report an "experimental" smoking status as stress scores increased. This result is also consistent with previous research. A study by Siqueira et al. (2000) found that negative life events and perceived stress were significantly related to current and experimental smoking status in a sample of adolescents ages 12-20. Adolescents in the aforementioned study identified stress relief as the main reason for having experimented with tobacco or become current smokers (Siqueira et al., 2000). Adolescents are in need of educational interventions that focus on the negative impacts of nicotine (i.e. health risks, dependence, tolerance) and emphasize more positive ways to cope with stress such as cognitive restructuring, increased self-efficacy to refuse cigarettes, and relaxation techniques (e.g. exercise, deep breathing, etc).

The fact that stress was no longer a predictor of experimental smoking for the 7th grade sample is also observed in the correlations matrix (see Tables 4.1 and 4.2). Correlations reveal that stress was related to experimental smoking in the 6th grade sample, but not in the 7th grade sample. This may demonstrate that for 7th graders, stress has more of an effect on actually using cigarettes rather than merely trying them. This result is consistent with the above finding demonstrating that although there were within group differences for 6th grade African Americans on level of stress and experimentation

status, these differences disappeared for 7th grade African Americans (who were the largest group of experimenters in that grade). Thus, stress was a predictor of 7th grade current smoking (which were relatively equal across ethnic groups), but not 7th grade experimental smoking (which were predominantly African American).

Results suggest that for 7th grade African Americans, this increase in experimentation during the 6th grade lead to an increase in current smoking during their 7th grade year. For instance although Caucasian Americans reported higher current smoking rates than African Americans during the 6th grade, these differences disappeared by the 7th grade year. Additionally, "current" smoking rates increased from 6th to 7th grade. Results demonstrate that of the 28 students who were nonsmokers at 6th grade and became current smokers during the 7th grade, 15 were African American. This may support the progression of smoking stages in the African-American population. For instance, although African-American adolescents are smoking less than Caucasian-American adolescents overall, the African-American students in this study demonstrate that their experimentation increases as they age (i.e. in the 7th grade). Thus, Caucasian-American adolescents may lead in current smoking rates nationally, but if experimentation continues to rise among African-American adolescents, it may lead to more established smoking behaviors in the future. Results suggest that the progression of adolescents smoking in African Americans and Caucasian Americans needs to be examined over time (e.g. from middle school through adulthood). This may illuminate the factors related to an increase in smoking by adulthood for African Americans.

When examining cigarette refusal self-efficacy for the 6th grade sample, ethnicity accounted for 2% of the variance in self-efficacy refusal scores and stress accounted for an additional 2% of the variance. Demographic variables and stress accounted for no variance in refusal scores for the 7th grade sample. No previous research was found examining the relationship of stress and cigarette self-efficacy. Nevertheless, one could speculate based on the findings that a more age-appropriate measure of stress might better assess the impact of stress on cigarette refusal self-efficacy. For instance, Byrne and Mazanov (1999) created a 31-item questionnaire that assessed adolescent stressors in the following areas: attending school, family conflict, parental control, school performance future uncertainty, perceived educational irrelevance (education not related to their future goals), and interactions with the opposite sex several studies have employed. They used the stress measure to predict smoking behaviors in 2,625 Australian adolescents (mean age 15). The researchers found that all of the factors, except educational performance and future uncertainty, predicted cigarette smoking in boys. All of the factors except opposite sex interactions predicted cigarette smoking in girls (Byrne & Mazanov, 1999). Stress scales that include the same type of age-related domains may be more effective at predicting smoking related behaviors in the current sample and other adolescent populations.

Moderator effects for Cross-sectional hypotheses

Contrary to predictions, gender was not a moderator for the relationship between stress and smoking status or self-efficacy refusal scores. Although there were gender differences in stress for the 7th grade sample, with girls reporting more stress, the

relationship between stress and the outcome variables was so modest that the interaction was not a strong enough predictor to account for significant variance.

Sixth grade stress as a predictor of smoking status and cigarette self-efficacy refusal (Longitudinal)

Consistent with predictions, sixth grade stress was a significant predictor of 7th grade current smoking status. Although 6th grade stress only increased the odds of being a 7th grade smoker slightly, it appears that stress may make students more likely to smoke as they age. These results corroborate the findings of a study by Coogan et al. (1998) that investigated the factors associated with smoking among children (grades 4-6) and adolescents (grades 7-8, and grades 9-10). Results revealed that "current" smokers experienced more psychological distress than did nonsmokers at each grade level. More "current" smokers reported suicidal ideation or attempts, depressed feelings, and felt stress at home and school than did nonsmokers (Coogan et al., 1998). Further, a study by Byrne et al. (1995) found that as students age, their level of stress increases due to future uncertainty and school performance. These stressors were directly related to increased smoking behaviors in a sample of 7th - 11th graders (n= 6,410, Byrne et al., 1995). The current study's results, as well as previous research, suggest that stress does impact whether students report a "current" smoking status. As previously emphasized, students experience stress and begin smoking at an early age. It is crucial that interventions focus on skills building at the elementary school level so that students are equipped to cope with age-related stressors in positive manners.

When examining experimental smoking, results revealed that 6th grade demographic variables, but not stress, were a significant predictor of 7th grade experimental smoking. These results are similar to the aforementioned result that stress was not a predictor of experimental smoking in the 7th grade sample. It appears that stress does not have the same impact on experimental smoking for 7th graders as it does for 6th graders. This result is not surprising in that smoking behaviors appear to be more established by the 7th grade. Students are now actively participating in smoking behaviors rather than merely experimenting with cigarettes.

Strengths

The present study included a random and ethnically diverse sample of rural adolescents. This allowed for both between group and within group examination of variables across ethnic groups. Also, the study was both cross-sectional and longitudinal in design (although the examination of more age groups over time is needed to draw causal conclusions). Additionally, the study examined a large rural sample, which is a typically an underserved, understudied population. Finally, in terms of stress, the new stress measure had good reliability in the present sample.

Limitations

Certain limitations in the present study should be addressed. For instance, although a part of the study was longitudinal, data should have been analyzed across a broader spectrum of ages. The fact that this study only analyzes predictions from 6th to 7th grade outcomes and cross-sectional hypotheses signifies that causality cannot be

assumed. Nevertheless, this study does fill a gap in the literature by exploring longitudinal relationships of stress and smoking outcomes in an underserved population.

Further, the stress measure may have been a limitation. Stress accounted for a small, but significant, percent of the variance in smoking outcomes. A more age-appropriate measure of stress may better predict smoking behaviors in our sample. For instance, Byrne and Mazanov used a 31-item adolescent stress measure to assess various areas of adolescent stress (e.g., attending school, parental control, school performance, etc.) The measure had good reliability and was a predictor of smoking behaviors in Byrne and Mazanov's adolescent sample (Byrne & Mazanov, 1999). Other studies examining the relationship of stress and smoking behaviors in adolescents have used the negative life events questionnaire (LES), the 10-item Perceived Stress Scale, adapted versions of the Assessment of Stressful Life Events for Adolescents Questionnaire (Siqueira et al., 2000; Vaccaro & Wills, 1998).

The general nature of the stress items in the current study may not have allowed students to truly represent their stress experience. Stress questions related to school and family stress, stressful life events, interpersonal stress, and future uncertainty may have been more age-relevant measures of stress for our adolescent sample. Nevertheless, measures for the current study were chosen with consideration for respondent fatigue and limited questionnaire space. Thus, a stress measure that was short but suitable for the sample with good reliability was most appropriate within the current study.

Additionally, an ethnically specific measure of stress may have been beneficial for studying stress in our diverse sample. The lack of ethnic differences in stress scores

may have been due to culture specific interpretations of stress, which were not assessed by the current stress measure. Some studies suggest that ethnic differences exist in the frequency rather than type of stressor. Therefore, a life events questionnaire may have been more fitting. Life event questionnaires assess the occurrence of events that the average person, regardless of race, might deem stressful. Nevertheless, they still omit the culture specific stress-related factors such as perceived racism, prejudice, sexism, conformity, and in-group out-group biases experienced by minority groups. A culture specific measure including the aforementioned factors could be used with both African Americans and Caucasian Americans, but still isolate the unique stressors experienced by African Americans and other minority groups.

Also the student survey did not include a measure of socio-economic status (SES). Thus the researcher was unable to examine the effects of stress on smoking behaviors while controlling for SES. According to the census data for the rural counties included in the current study, the population's 1999 median income ranged from $29,882 to $53,595, which suggests that the majority of counties were low-income. Also the study did not contain a measure of family structure, which is directly related to both SES and stress. Future research should assess the impact of SES on the relationship between stress and smoking behaviors in rural adolescents.

Finally, adolescents smoking behaviors were self-reported which may generate underreporting of unacceptable behaviors. However, although self-reported data tends to be underestimated or reported, anonymous surveys, like those used by GFH may generate a higher, more accurate report of cigarette use than in-person interviews (Miller & Slap,

1989; Nelson et al., 1995). A 1999 test-retest reliability study found that children as young as elementary school age (ages 8-11) reliably reported their lifetime cigarette use via questionnaires at baseline and one year follow-up (Henriksen & Jackson, 1999).

Implications

The current study demonstrates that rural adolescents are in need of smoking and stress interventions. Students are progressing in their current and experimental smoking habits as they age. Both experimental and current smoking rates increased from 6th to 7th grade. By the 7th grade, these rates were above the national average for smoking behaviors in adolescents. An objective of Healthy People 2010 is to reduce the rate of current smoking to 16% for 9th – 12th students. Fortunately, our sample is below that goal, nevertheless because the data are suggesting that smoking behaviors increase with age, students in our sample are at risk for reaching or surpassing the identified reduction rate of the CDC (CDC, 2003). Furthermore, since research suggests that smoking is a gateway to use and abuse of other substances, adolescents warrant interventions at an early age to minimize the adoption or progression of smoking behaviors (Torabi, Bailey, Majd-Jabbari, 1993). Since gender and ethnicity were predictors of smoking behaviors in the present sample as well as previous studies, interventions may need to be both gender- and ethnically-specific to address the differences in stress and smoking behaviors for different groups.

Results from this study demonstrate that African-American adolescents are not as protected from adopting smoking behaviors as was once believed. As African Americans advanced in grade, their cigarette experimentation rates increased, such that they even

surpassed Caucasian Americans in their rate of trying cigarettes. African-American rural adolescents warrant smoking prevention programs because research demonstrates that merely trying cigarettes during adolescence more than doubles the relative risk for becoming an adult regular smoking (Chassin et al., 1990).

Also, sixth grade stress was indeed predictive of 7th grade smoking behaviors. Although the clinical significance of this finding is modest, it does suggest that young people (elementary age students) would benefit from interventions that take stress level into consideration. It should be noted that these findings are specific to cigarette smoking behaviors and may not generalize to other smoked substances such as cigars, pipe tobacco, or marijuana.

Nevertheless, even with a non-culture-specific (i.e. not age, gender or ethnic specific) measure of stress, the study found that stress scores moderately predicted smoking behaviors. The current results imply that if students are targeted early in their development, they may be less likely to try cigarettes and thereby progress to more advanced smoking stages. Young people should be taught the skills to refuse tobacco in the face of environmental factors such as peer or parental cigarette use. Also, smoking interventions should include a coping-skills building components to minimize students' risk of negative coping behaviors and help them manage the difficulties/stressors that are inevitable at their stage of development as they encounter developmental, environmental, and interpersonal stressors.

Future research should investigate the impact of stress on smoking behavior by including more age-, gender-, and ethnic-appropriate measures of stress. Also, studies

should investigate how these behaviors change across ages and cohorts. Examining an ethnically diverse sample over time (from adolescents to adulthood) should illuminate factors related to the increase in smoking behaviors for African Americans by adulthood. Additionally, smoking should be examined in the context of other health compromising behaviors, as these behaviors tend to cluster. Finally, rural populations should be considered when designing studies and interventions. Rural adolescents are definitely in need of smoking interventions, and as evidenced in the present study, rural adolescent smoking outcomes may manifest differently than do smoking outcome in urban adolescents (e.g. African Americans' high experimental smoking rates).

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APPENDIX A

DEOMGRAPHICS QUESTIONNAIRE

Please answer these questions as honestly as possible. Remember, all of your answers are PRIVATE.

Q-1.Please check if you are a BOY or a GIRL.

[1] ☐ Boy
[2] ☐ Girl

Q-2. Please check the one that best describes YOU.

[1] ☐ Asian American or Oriental
[2] ☐ African American or Black
[3] ☐ Hispanic or Latino
[4] ☐ White, Caucasian American or European
[5] ☐ American Indian
[6] ☐ Other

Q-3. What YEAR were you born? _____

Q-4. What MONTH were you born? _____

APPENDIX B

SMOKING ITEMS

Please check the answer that best describes what you do.

Directions: Check only one answer for each question.

1. Have you ever tried cigarette smoking, even one or two puffs?

[1] ☐ Yes
[2] ☐ No

2. How old were you when you smoked a whole cigarette for the first time?

[1] ☐ I have never smoked a whole cigarette
[2] ☐ less than 9 years old
[3] ☐ 9 or 10 years old
[4] ☐ 11 or 12 years old
[5] ☐ 13 or 14 years old
[6] ☐ 15 or more years old

3. How old were you the first time you smoked cigarettes regularly (*at least one cigarette every day for one month*)?

[1] ☐ I have never smoked cigarettes regularly
[2] ☐ less than 9 years old
[3] ☐ 9 or 10 years old
[4] ☐ 11 or 12 years old
[5] ☐ 13 or 14 years old
[6] ☐ 15 or more years old

4. During the past month, on how many days did you smoke cigarettes?

[1] ☐ I do not smoke
[1] ☐ I did not smoke a cigarette during the past 30 days
[2] ☐ 1 or 2 days
[3] ☐ 3 to 9 days
[4] ☐ 10 to 29 days
[5] ☐ all 30 days

5. I am sure I can refuse cigarettes if someone offered them to me.

1) Strongly Disagree	2) Disagree	3) Not sure	4) Agree	5) Strongly Agree

APPENDIX C

PERCEIVED STRESS SCALE

The purpose of this section is to find out how you feel about certain things.

Directions: Circle only one answer for each question.

1. In the last month, how often have you felt you could not control important things in your life?	Never [1]	Almost Never [2]	Sometimes [3]	Fairly Often [4]	Very Often [5]
2. In the last month, how often have you felt sure you would be able to handle what bothers you?	Never [1]	Almost Never [2]	Sometimes [3]	Fairly Often [4]	Very Often [5]
3. In the last month, how often have you felt things were going your way?	Never [1]	Almost Never [2]	Sometimes [3]	Fairly Often [4]	Very Often [5]
4. In the last month, how often have you felt your troubles were piling so high you could not get over them?	Never [1]	Almost Never [2]	Sometimes [3]	Fairly Often [4]	Very Often [5]
5. In the last month, how often have you felt nervous and "stressed"?	Never [1]	Almost Never [2]	Sometimes [3]	Fairly Often [4]	Very Often [5]

Vita

Ms. LaShanda R. Jones was born in Illinois and grew up in Texas. She earned her Bachelor of Arts degree from San Diego State University (SDSU) where she graduated with distinctions in her major (Psychology) in 1998. Her Master of Science degree was earned in 2002 from Virginia Commonwealth University (VCU) where she majored in Counseling Psychology with a subspecialty in Health Psychology. She received numerous awards while at SDSU and VCU. Her achievements include: Quest for the Best Student Service Award (SDSU), Outstanding Counseling Psychology Student Award (VCU), Black History in the Making Award (VCU), and two NIH funded research grants (SDSU and VCU). She is also the co-founder of the African American Graduate Association of VCU. Ms. Jones plans to conduct research and design interventions in the areas of disease prevention and health promotion for minority and at-risk populations.