

Risk and Protective Factors for Adolescent Smoking in Rural versus Urban Environments

By

Lauren C. Shettler

Thesis submitted to the faculty of Virginia Polytechnic Institute and State University

In partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

IN

HUMAN DEVELOPMENT

Angela J. Huebner, Committee Chair

Sandra M. Stith
Committee member

Eric E. McCollum
Committee member

September 12, 2005
Falls Church, Virginia

Keywords: Adolescence, Risk Factors, Protective Factors, Smoking, Rural, Urban

Copyright 2005, Lauren C. Shettler

Risk and Protective Factors for Adolescent Smoking in Rural versus Urban Environments

Lauren C. Shettler
Dr. Angela J. Huebner, Committee Chair

Abstract

Although considerable literature can be found concerning the etiology of cigarette smoking, research suggests that a major gap exists pertaining to predictors of adolescent smoking for rural populations. The purpose of this study is to compare risk and protective factors for adolescents living in rural and urban environments. An ecological framework was used to examine variables from the individual, family, peer, school, and community contexts. The influence of these variables was assessed on a sample of (n=3,166) 8th, 10th, and 12th grade students from Virginia public schools. Linear regression analyses revealed that parental attitudes and best friends' smoking behavior was influential in the smoking behavior of both rural and urban adolescents. School and community level variables were only influential in smoking behavior among the urban adolescents.

ACKNOWLEDGEMENTS

As I complete the final requirement of this journey, I have many people to thank. First and foremost, endless thanks go to my committee chair, Dr. Angela Huebner. For the past three years, you have been a constant support for me. Many thanks for continuing to choose me as your GA and for your calm demeanor at times throughout this process when I felt anything but calm. I hope you know how much I admire you as an individual, professor, mentor, researcher, and advisor. To Dr. Eric McCollum, thank you for being on my committee, for your suggestions and guidance, and for making me laugh for the past three years. To Dr. Sandi Stith, thank you for being on my committee and for laying such a strong foundation to build from during my first year in the program. To Dr. Karen Rosen, thank you for making research methods bearable and for epitomizing what it means to be positive, strong, and hopeful.

To my parents, thank you for your constant love and support. You have always provided me with a safety net, without which I may have never begun this journey. For all you have done, I am forever grateful. To my sister, thank you for always seeing the best version of me through your eyes. I feel so fortunate to have my sister as my best friend. And to the rest of my family who took an interest in my studies and who came to visit me in VA- thank you. To Dan, thank you for sacrificing so much so that I could have this time, this experience, and this degree. Thank you for all your help along the way and for your unmatched sense of humor.

To Alicia at Alternative House, thank you for your guidance, for allowing me space to “vent” about this project, and for letting me leave early a few times so that I could get this thing done!

Lastly, thank you to the rest of my Virginia Tech family. To Pat, thank you for all your help and for all of our Pittsburgh conversations. I always felt a little closer to home after talking to you. To Meagan, Maggie, and Kathryn, I feel so privileged to have shared this MFT experience with all of you. Your insight, motivation, and determination continue to inspire me. And to the rest of my classmates who have been on this journey with me, you have enriched my life in ways you don't even know. Thank you for sharing your struggles during this process, for listening to mine, and then always laughing about them with me in the end. I feel very proud to have been part of such a wonderful program.

TABLE OF CONTENTS

ABSTRACT.....	ii
ACKNOWLEDGEMENTS.....	iii
TABLE OF CONTENTS.....	v
INDEX OF TABLES.....	vi
CHAPTER I: INTRODUCTION.....	1
Statement of the Problem.....	1
Rationale.....	3
Research Questions.....	5
CHAPTER II: LITERATURE REVIEW.....	6
Theoretical Framework.....	6
Individual Factors.....	7
Family/Parent Factors.....	12
Peer Factors.....	15
School Factors.....	21
Community Factors.....	23
CHAPTER III: METHODS.....	28
Study Participants and Procedures.....	28
Design of the Study.....	29
Data Collection Instrument.....	29
Measures.....	30
CHAPTER IV: RESULTS.....	35
Profile of the Sample.....	35
Bivariate Correlations.....	36
Independent Sample T-tests.....	37
Linear Regressions.....	40
CHAPTER V: DISCUSSION.....	42
Clinical Implications.....	47
Limitations and Future Designs.....	49
REFERENCES.....	60
APPENDICES.....	71

INDEX OF TABLES AND FIGURES

Table 1	
<u>Relationship Between Individual Level Variables and Adolescent Smoking</u>	53
Table 2	
<u>Relationship Between Family Level Variables and Adolescent Smoking</u>	54
Table 3	
<u>Relationship Between Peer Level Variables and Adolescent Smoking</u>	54
Table 4	
<u>Relationship Between School Level Variables and Adolescent Smoking</u>	55
Table 5	
<u>Relationship Between Community Level Variables and Adolescent Smoking</u>	56
Table 6	
<u>T-test Results Comparing All Variables between Rural and Urban Adolescents</u>	57
Table 7	
<u>Regression Analysis of Risk and Protective Factors for Adolescent Smoking: Rural</u>	58
Table 8	
<u>Regression Analysis of Risk and Protective Factors for Adolescent Smoking: Urban</u> ...	59
Figure 1	
<u>Ecological Levels and Variables</u>	71

CHAPTER I

Introduction

Statement of the Problem

Experts say that tobacco use is the single most preventable cause of death and disease in our society today (CDC, 1999). Each year, tobacco use causes more than 430,000 deaths and costs the Nation approximately \$50–\$73 billion in medical bills alone. It is the leading cause of lung cancer, pulmonary disease, heart disease, stroke, vascular disease, and peptic ulcer disease (Slade, 1993). In addition, tobacco use is highly addictive. Close to 70 percent of smokers want to quit smoking, but only 2.5 percent are able to quit and remain tobacco free each year (CDC, 1999).

While smoking prevalence in adults had been steadily decreasing, adolescent cigarette use continues at an alarming rate. Research shows that nearly all smokers begin as adolescents (U.S. Department of Health and Human Services, 1994). While not all adolescents who try cigarettes continue to smoke as adults, those who smoke only a few cigarettes during their teens are twice as likely to become adult smokers as those who do not (Chassin, Presson, Sherman, & Edwards, 1990). This smoking activity is only the beginning of a lifetime of health problems for tens of thousands of people, considering that 60 percent of current smokers began by the age of 14 (Gold, 1995).

The purpose of this study is to compare risk and protective factors for adolescents living in rural and urban environments. Comparing adolescent smokers from urban and rural communities is of particular interest for several reasons. First, most adolescent smoking research has been focused on urban or suburban populations (Epstein, Botvin & Spoth, 2003). Second, the research that does look at rural populations shows that

adolescent smoking is indeed a large issue in rural settings. For example, results from a four-year national longitudinal U.S. study of smoking with 68,270 youth demonstrate that the highest levels of smoking were found for rural adolescents and adolescents living in the south (Aloise-Young, Wayman & Edwards, 2002). In their nationally representative longitudinal Monitoring the Future study, Johnston, O'Malley and Bachman (2002) report that cigarette use declined in large and smaller cities but continued to increase in non-metropolitan areas (those that do not contain a town of at least 50,000). Findings from the 1999 National Household Survey on Drug Abuse also demonstrate that cigarette use among teens tends to be higher in rural than in urban settings (Kopstein, 2001). Cronk and Sarvela (1997) reported that rural youth had higher rates of heavy alcohol and cigarette use when compared to their urban counterparts. Harrell, Bangdiwala, Deng, Webb and Bradley (1998) reported that youth in rural settings were more likely than youth in urban settings to start smoking after age 12. Another study reports that adolescents from rural areas are at greater risk of becoming new smokers (Horn, Dino & Momani, 1999).

In contrast however, there is one study (Scheer, Borden, & Donnermeyer, 2000) that reports no difference in adolescent substance use (which included smoking) based on the setting that the adolescent is in, rural, urban, or suburban. This study, however, only examined family factors as risk/protective factors to smoking and concluded that location may be relevant as a contextual variable when examining the influence of other ecological factors, including peers, school, and the community environment.

Rationale

Many studies include both urban and rural populations but tend only to report results by gender or ethnicity rather than locale. Although considerable literature can be found concerning the etiology of cigarette smoking, Epstein, Botvin, and Spoth, (2003) suggest that a major gap exists pertaining to predictors of adolescent smoking for rural populations. Thus, an important contribution to the literature on adolescent smoking would be to compare rural and urban populations within the same study.

It is important to know if differences exist between these two populations so that prevention programs can be tailored to target specific risk and protective factors for adolescents living in certain environments. According to Scheer, Borden, and Donnermyer (2000), the environment that the adolescent grows up in should be taken into consideration when designing prevention, education, and intervention programs. It is also worthwhile to compare risk and protective factors for both an urban and rural population because findings from one environment might not generalize to adolescents in a different environment (Epstein, Botvin, & Spoth, 2003).

In terms of the sample of Virginia adolescents, this study is of particular interest in Virginia because the state is predominately rural. Virginia is also the fourth largest tobacco producing state and the second largest tobacco manufacturing state in the United States. Tobacco is Virginia's largest cash crop and is grown in forty-four of the state's counties (Virginia Farm Bureau Federation, n.d.). Thus, it is important to examine risk and protective factors for adolescents living in a state where tobacco is prevalent and vital to the economy.

Identifying risk and protective factors by ethnicity is also of importance because most research on adolescent smoking has been conducted using predominately White samples (Unger, 2003). It is imperative to examine risk and protective factors from an ethnically diverse sample because cultural norms could influence adolescents' reasons for smoking. In addition, Dent, Sussman, Ellickson, Brown, and Richardson (1996) state that future research should examine both the common and unique risk and protective factors for drug use among ethnic groups, as well as whether or not these factors differ across ethnic groups.

Information concerning ethnicity is both useful and important because if risk and protective factors are identified for specific populations, smoking prevention programs could be tailored to best serve the ethnic population that will be utilizing the prevention program (Unger, 2003). Finally, examining ethnicity in terms of adolescent smoking will allow us to know, in general, who is smoking, so that prevention programs can be implemented early and address cultural issues around smoking with that population (Unger, Ritt-Olsen, Teran, Huang, Hoffman, & Palmer, 2002).

As its theoretical framework, this study will use an ecological framework (Bronfenbrenner, 1979). This theoretical framework is appropriate because many previous studies have suggested that future research should utilize a more complex model by incorporating multiple levels of an adolescent's life, such as individual, family, school, peer, and community instead of looking at only one or two of these levels in isolation (Scheer, Borden, & Donnermeyer, 2000).

Research Questions

- 1) Are there mean level differences in ethnicity, rebelliousness, parental attitudes, family conflict, friends' smoking behavior/attitudes, peer pressure/popularity, academic performance, commitment to school/teachers, perceived availability of social activities, and perceived availability of cigarettes between urban and rural adolescents?
- 2) Are the predictors of adolescent smoking behavior different for urban versus rural adolescents and if so, in what ways are they different?

CHAPTER II

Literature Review

The choice to smoke or abstain from smoking during adolescence is likely to be influenced by multiple risk and protective factors. It is also probable that abstaining from smoking will protect adolescents from a variety of risks, including numerous health risks as they become older. In this chapter, I will introduce ecological theory as the theoretical framework used in this study. I will also review the literature on adolescent smoking behaviors, focusing on variables that represent a range of traditional risk and protective factors from each of the ecological levels that are associated with adolescent smoking.

Theoretical Framework

Ecological Theory

According to Bronfenbrenner, the definition of human ecology is as follows:

The ecology of human development involves the scientific study of the progressive, mutual accommodation between an active, growing human being and the changing properties of the immediate settings in which the developing person lives, as this process is affected by relations between these settings, and by the larger contexts in which the settings are embedded. (p.21)

In accordance with this definition, the basic assumption of Bronfenbrenner's ecological model is that an individual's behavior is influenced by a host of factors, both internal and external. Such factors include family, friends, school, work, neighborhood, community, and culture, all acting as interconnected systems with the capability to influence one another (Bronfenbrenner, 1979). According to Bronfenbrenner's theory, the whole person is made up of a set of components, each building off of one another.

Bronfenbrenner proposes that the inner and most influential component concerning an individual is the *microsystem*, consisting of settings such as school, home and peer groups. According to the model, influence derives from an individual's perceptions or interpretations of these settings, which is not always objective. The next component is known as the *mesosystem*, which points out how the interrelationships among microsystems can impact an individual's perception within a setting. Such interrelationships include interactions between parents and schools, communities and families, and churches and communities. Next comes the *ecosystem*, which includes institutions where the developing individuals themselves are not participating, even though they are affected by what is happening in these settings. An example of an ecosystem would be the relationship between a child and her older siblings peer group. Finally, the *macrosystem* refers to the culture that affects all the other components as well as the individual. This level is the most remote from an individual's experiences, although it plays an important role in the development of the individual (Bronfenbrenner, 1979). Thus, Bronfenbrenner (1979) proposes that all levels of an individual's environment are influential in their own way. Figure 1 located in Appendix 1 represents the different levels and variables used in this study. The microsystem settings are the major focus of this study.

Individual Factors

Many individual level factors have been associated with adolescent smoking behavior. Two of the most frequently cited variables are ethnicity and rebelliousness. In this section, I review the recent literature associated with these factors.

Ethnicity

Multiple researchers report the existence of ethnic differences in smoking prevalence rates. Specifically, smoking seems to be more prevalent in White adolescents than in minority groups (Allen, Page, Moore & Hewitt, 1994; Amey, Albrecht & Miller, 1996; Centers for Disease Control and Prevention et al., 2002; Flint, Yamada, & Novotny, 1998; French & Jeffery, 1995; French & Perry, 1996; Gittlesohn, Roche, Alexander & Tassler, 2001; Johnson, & Hoffman, 2000; Kelder, Prokhorov, Barrosa, Murray, Orpinas, & McCormick, 2003; Mermelstein & the Tobacco Control Network Writing Group, 1999; Urberg, Degirmencioglu & Pilgrim, 1997; Wallace & Muroff, 2002). Moreover, a study by Orlando, Tucker, Ellickson, and Klein (2004) stated that White adolescents (both male and female) are more likely to be smoking at higher rates by age 23 when compared to African-Americans, Hispanics, and Asians, who fell in categories characterized by low smoking levels at the age of 23. With the exception of Allen et al. (1994), none of these studies report gender-specific, between-group ethnic differences. Allen et al. (1994) found that White males smoked more than White females (21.3% and 20.7%, respectively) and that African-American males smoked more than African-American females (13.3% versus 1.3%, respectively). No ethnic comparisons within gender were given. In a study by Marsiglia, Kulis, and Hecht (2001) with a sample of 408 seventh graders from a large city in the southwest, it was found that in general, African-American, Mexican American, and mixed ethnicity students with a strong sense of ethnic pride reported less drug use, while ethnically proud White adolescents reported more use. Moreover, ethnic minority students that viewed their behavior, speech, and looks as congruent with their own ethnic group reported more drug

use while the White adolescents reported less. This study examined alcohol, “uppers,” marijuana, and any other hard drugs (crack, cocaine, heroin, etc.), as well as tobacco.

In a recent study, Kelder et al. (2003) utilized a 3-year serial cross-sectional survey with a cohort of 1,589 6th through 8th graders (811 girls and 778 boys). By the eighth grade, White and Hispanic students smoked two to three times more than their African-American classmates, suggesting that there are ethnic differences in smoking rates across time. This seemed to be especially true for female adolescents, where the incidence relative risk differences for both White and Hispanics were greater than 3.0. Because these data are epidemiological, the researchers provide no suggestions as to why the ethnic smoking differences exist.

In another recent study by Shakib et al. (2003), results show that in a sample of 1,846 Southern California sixth graders, parental monitoring acted as a protective factor against adolescent smoking for White adolescents when compared to Latinos/Hispanics. Parental communication however, possessed a stronger protective effect for Hispanic/Latinos when compared to White adolescents. A possible limitation to this study is that it only assessed adolescents’ perceptions of factors such as parental monitoring and communication.

Flint et al. (1998) examined differences between African-American and White adolescents’ progression of smoking from experimentation to regular use in a longitudinal, nationally representative sample. Their findings revealed that, when compared to Whites, the odds of progressing from experimentation to regular use were one-third as great for African-American adolescents. The authors conclude that there are large systematic differences between these two racial groups but suggest future research

is needed to discern what these differences may be. Although this sample was comprised of both boys and girls, it is important to note that the findings were not differentiated by gender.

In a study using data from the 1999 National Youth Tobacco Survey to examine ethnic differences in smoking behaviors, Unger (2003) reported differences among various ethnic groups. For instance, pro-tobacco media was an especially strong predictor of smoking among Pacific-Islanders and Multiethnic adolescents. Moreover, peer influences were the strongest predictor of smoking among Native Americans and Whites and less of a predictor of smoking behavior for Hispanic adolescents.

While differences in prevalence rates across ethnicities do occur, Griesler, Kandel, and Davies (2002) suggest that there are more similarities than differences in the factors predicting smoking initiation and persistence among smokers from different ethnic groups. Specifically, in their study of White, African-American, and Hispanic youth, they found that the initiation predictors of age, problem behavior and perceived peer pressure were the same across ethnicities; female gender and ineffective parenting were predictive for Whites only. Persistence, age, problem behaviors and perceived scholastic competence were predictive across ethnic groups. Only negative mood differentiated Whites from the other two groups. Their findings were based on longitudinal data from 1,427 mother-child dyads from the *National Longitudinal Survey of Youth* (NLSY). Limitations to this study include a small sample size when examining persistence, particularly among Hispanics.

In general, it appears that the majority of research illustrates the existence of ethnic differences in smoking prevalence rates. Although exceptions can be found, most

research states that smoking is more prevalent in White adolescents than in minority groups.

Rebelliousness

Rebelliousness has also been linked to smoking behavior in adolescents. In their cross-sectional study of 7th through 12th graders, O’Byrne, Haddock, Poston, and the Mid American Heart Institute (2002) report that rebelliousness increased the odds of adolescents (analyses not conducted separately by gender) experimenting with smoking. This study however, was based on self-reports, was a cross-sectional design, and was largely comprised of Caucasian individuals from high SES groups, making generalizability difficult. However, in their review of smoking etiology in adolescent girls, French and Perry (1996) also conclude that rebelliousness is associated with smoking in female adolescents.

Lloyd, Lucas, and Fernbach (1997) examined British adolescent girls’ social constructions of social identities. Specifically, they examined the types of identities adolescent girls associated with smokers and non-smokers. Regardless of their own smoking status, girls reported that smokers were more “fun loving” and more “rule breaking” than non-smokers but that non-smokers were more “mature” and “sensible” than smokers. In a follow-up focus group, female smokers were described as more rebellious against authority and more likely to pursue “risky” behaviors than were non-smokers.

In their three-year longitudinal study of 3,566 adolescents, Best, Brown, Cameron, Manske, and Santi (1995) found that dispositional factors, such as rebelliousness, rejection of adult authority, personal dissatisfaction and peer approval

were significant determinants of the transition from never smoking to smoking. In fact, the higher the score on these measures, the more likely the transition. In addition, a study using a sample of 1,503 urban minority youth by Scheier, Miller, Ifill-Williams, and Botvin (2001) concluded that risk-taking behavior was a strong predictor of cigarette, alcohol, and marijuana use. Similarly, a recent study by Tyc et al. (2004) using 237 adolescents ages 12-18 reported that higher risk-taking/rebelliousness increased the odds of an adolescent being a smoker

Finally, in their six-year longitudinal study, Griffin, Botvin, Doyle, Diaz, and Epstein (1999) found that heavy smoking for 12th grade girls was predicted by high risk-taking characteristics (defined as scoring in the top third of the distribution) in the 7th grade such as impulsivity and daring behavior. Limitations to this study include not looking at the contributions of different types of risk factors and having a sample that was predominately White and middle-class, restricting generalizability.

In terms of rebelliousness, research states that rebellious attitudes and behaviors in adolescents are often a predictor of smoking behavior. In most of the studies, rebelliousness is characterized by rule-breaking and risky behavior.

Family/Parent Factors

According to Johnson and Johnson (2001), many parents are led to believe that their influence on their children decreases when youth enter their adolescent years. Contrary to popular belief, researchers have found that parents continue to be a powerful influence in the lives of adolescents. In fact, the majority of adolescents report feeling close to their parents and respecting their judgment (Steinberg, 1990). This section

reviews the literature in the areas of parental attitudes and practices towards smoking and parent-child conflict/abuse.

Parenting Attitudes

Permissive parental attitudes concerning smoking have been linked to adolescent smoking behavior. In their focus group study with African-American and White adolescents ages 14 through 17, Gittelsohn et al. (2001), reported ethnic differences in participants' perceptions of parental permissiveness about smoking behavior.

Specifically, White females perceived a great deal of permissiveness (e.g., parents buying teens cigarettes, active approval, or passive disapproval) while African-American females described moderate permissiveness (e.g., parents may know about smoking behavior but, out of respect, participants do not smoke in front of their parents). Males, especially African- American males, reported receiving the strictest parental sanctions concerning smoking behavior.

In a culturally diverse sample of 645 8th through 10th graders, Ma, Shive, Legos, and Tan (2003) found that a significant number of smoking adolescents felt that if they would be caught smoking at school, neither the school nor their parents would do much in terms of punishment. In their review of the literature, Johnson and Johnson (2001) concluded that parents' implicit and explicit messages about smoking have an impact, and that youth may interpret a lack of discussion about the topic as an indication that it is not important to their parents.

Thus, in general, research states that permissive parental attitudes concerning smoking act as a risk factor for adolescent smoking. In most of the studies, permissive

parental attitudes are characterized by parents buying their teens cigarettes, active approval, or passive disapproval of smoking.

Family Conflict/Abuse

Six studies have reported a relationship between smoking behavior, family conflict, and even child abuse. In their six-year longitudinal study of 7th through 12th graders, Flay, Phil, Hu, and Richardson (1998) found that, only among the girls in their sample, high family conflict predicted regular smoking. Simons-Morton, Crump, Haynie, Saylor, Eitel, and Yu (1999) reported that 6th through 8th grade girls were less likely to smoke if they experienced lower levels of conflict with their parents. These findings were based on cross-section data from 4,263 youth.

In their nationally-representative, cross-sectional study of 5th through 12th graders, Simantov, Schoen, and Klein (2000) found that a history of abuse and violence within the family were associated with increased risk of smoking behavior among adolescent girls only. In a nationally representative cross-sectional questionnaire study of 5th through 12th grade adolescents, Schoen et al. (1997) found that girls who have been physically or sexually abused were twice as likely to smoke as those who were not abused. In addition, a study by De Von Figueroa-Moseley, Landrine, and Klonoff (2004) illustrated that women who were sexually abused as children were 3.8 times more likely than their nonabused counterparts to be current smokers. Moreover, they were 2.1 times more likely to have begun smoking before the age of 14. This study sampled 296 women, ages 18-74. Finally, a longitudinal study by Farrell and White (1998) consisting of 630 urban 10th grade students, male and female, revealed that an association between peer pressure and drug use (cigarettes, beer, wine, liquor or marijuana) increased when mother-

adolescent distress increased among adolescents who were not living with fathers or stepfathers. Moreover, the association between peers as models of drug use and adolescent drug use increased as the level of mother-adolescent distress increased. Thus, it appears that family conflict/abuse is more of a risk factor for adolescent girls when compared to adolescent boys.

In general, research states that adolescents, especially girls, living in an atmosphere with high family conflict are more likely to smoke. Research states further that in families where abuse is present, there is an increased risk for adolescent smoking behavior.

Peer Factors

Peers are often thought to be particularly influential during the adolescent years. According to Brown (1990), 9th through 12th graders spend about twice the amount of time with peers as they do with parents. Several peer-level factors have emerged as important predictors of adolescent smoking. These include friends' smoking behavior/attitudes and popularity.

Friends' Smoking Behavior/Attitudes

Researchers agree that friends are particularly influential when it comes to female adolescent smoking behavior. In a longitudinal, school-based study, Griffin et al. (1999) reported that friends' attitudes about smoking best predicted later heavy smoking in females who were first surveyed in 7th grade and then again in 12th grade. In their review article, Johnson and Johnson (2001) concluded that male and female adolescents often seek out peers who hold the same values as they do about smoking.

Many researchers have reported a strong relationship between adolescent smoking behavior and having friends who smoke (Distefan, Gilpin, Choi, & Pierce, 1998; Goodrow, Seier, & Stewart, 2003; Griffin et al., 1999; Johnson & Johnson, 2001; National Center on Addiction and Substance Abuse, 2003; Ritchey, Reid, & Hasse, 2001). It is interesting to note that several researchers have noted that perceptions about friends' smoking behavior are more influential than friends' actual behavior in predicting adolescents' smoking behavior (Fisher & Bauman, 1988; Iannotti, Bush, & Weinfurt, 1996; Simon-Morton et al., 1999).

In an attempt to better understand the influence of peers, researchers have attempted to differentiate between the influence of close friends as opposed to friendship networks. For example, in a nationally-representative, school-based sample of 7th through 12th graders, Alexander, Piazza, Mekos, and Valente (2001) found that adolescents who were involved in friendship groups in which more than half the members smoked were twice as likely to report current cigarette smoking as their peers who had friendship networks with fewer smokers. Having best friends who smoked also resulted in a two-fold increase in risk of smoking. No gender interaction effects were noted. Unfortunately, results of this study do not allow the authors to conclude whether peer smoking was a result of peer influence or whether adolescents that were more likely to smoke selected friends that smoked. Along similar lines, a study by Taylor, Conrad, O'Bryne, Haddock, and Poston (2004) using a sample of 806 adolescents from a mid-size Midwestern town, found females who had a best friend that smoked were nearly seven times more likely to smoke than females who did not have a best friend that smoked. In addition, the more smoker

friends that the male and female adolescents in the study had, the more likely they were to engage in smoking.

Similar findings of the powerful influence of friendship networks and the likelihood of having close friends who smoke were reported by Urberg et al. (1997) in their longitudinal sample of Midwestern 6th, 8th, and 12th graders. Their findings, however, held only for White adolescents; they were not predictive of smoking behavior in African-American adolescents. Moreover, the data set for this study was not large enough to look at higher order effects. No gender interaction effects were found.

In a slightly different study, Aloise-Young, Graham, and Hansen (1994) examined group outsiders' (those who did not have reciprocal friends) and group members' susceptibility to peer influence related to smoking. As part of the study, the researchers asked participants to name their three best friends. Based on the reciprocity of the nominations, they classified adolescents as group members or group outsiders. Their finding that group outsiders were more susceptible to their listed (but not reciprocated) best friend's smoking status than were group members led them to suggest that some adolescents may use smoking as a means of entering a desired friendship group. No gender differences were reported. It is important to note that the study only obtained the names of three friends per subject; more reciprocity may have occurred if more friendship nominations had been included.

In terms of attempts at quitting smoking, a study by Jones, Schroeder, and Moolchan (2004) sampled 98 adolescent smokers in the Baltimore area that were enrolled in a smoking cessation study (68% female, 32% male). The study showed that among smokers who had at least one quit attempt, time spent with friends who smoked was

inversely related with their number of prior quit attempts, but not the duration of their quit attempts.

In general, research states that having friends that smoke, particularly for females, acts as risk factor for adolescent smoking. In addition, research also states that having multiple friends that smoke or a best friend that smokes also increases the likelihood that an adolescent will begin smoking.

Peer Pressure/Popularity

Peer pressure and a desire to be seen as “cool” by their peers has often been cited as another important factor in determining adolescent smoking behavior (Urberg, Cheng, & Shyu, 1991). Several researchers suggest that girls are particularly susceptible to peer pressure. A review article by Amos (1996) demonstrated that initiation of female adolescent smoking is heavily influenced by social pressures. In a study by Sarason, Mankowski, Peterson, and Dinh (1992), 1,615 10th grade students reported that the most common reasons for beginning smoking were social norms, offers to smoke, and desire. Significantly more females (15%) than males (9%) reported that pressure was the reason for beginning to smoke. In a self-report study of the reciprocal influence of cigarettes and alcohol, Ritchey et al. (2001) reported that peer pressure, along with having friends that drink increased the likelihood of becoming a smoker (and drinker). In a telephone survey conducted with adolescent 5th, 8th and 12th grade girls and with senior girls in college, researchers found that girls’ perception of pressure to smoke increased as the girls got older (National Center on Addiction and Substance Abuse, 2003). In contrast to other studies, however, they reported that boys were more likely to feel peer pressure than were girls. Flay et al.’s (1998) longitudinal study demonstrated that becoming an

experimental smoker was predicted by friends' smoking behavior, being offered cigarettes from friends, grades, and alcohol and marijuana use. Attrition bias is reported as a limitation to this study. Finally, a study by Farrell and White (1998) showed that both peer pressure and peer drug use significantly increased the frequency of adolescent drug use (cigarettes, beer, wine, liquor, or marijuana) in a sample of 630 urban 10th graders. In addition, they reported that this relationship between peer pressure and drug use was stronger among girls than it was among boys.

Alexander, Allen, Crawford, and McCormick (1999) reported that when discussing the influence of peers on smoking behaviors, female adolescents usually described interactions in which they wanted to smoke to gain acceptance by friends who were already smoking. These adolescent girls did not suggest that they were coerced into the behavior, but rather that they participated simply because they perceived that everyone else was doing it. Female adolescents' smoking as a way to fit in was also reported by Gittelsohn et al. (2001). Such findings illustrate the difficulty in differentiating between peer pressure and desired popularity or acceptance.

If an adolescent is popular or if smoking is popular within an adolescent's peer group, it appears that the adolescent is more likely to smoke. Using in-home questionnaires and interviews with 2,525 male and female 7th through 12th graders, Alexander et al. (2001) reported that adolescents had a small but significant risk of becoming a smoker if they had a higher level of popularity. Moreover, in schools with low smoking prevalence, higher popularity was associated with reduced likelihood of smoking, while popular adolescents in schools with high smoking prevalence were more likely to smoke.

In a longitudinal, questionnaire study by Michell and Amos (1997), females at the top of the “social pecking order,” projecting an image of high self-esteem, were most likely to smoke. In a questionnaire survey of the personality characteristics associated with smokers and nonsmokers, Lloyd et al. (1997) found that smokers were attributed such characteristics as “fun loving,” “liking to party,” and “cool.” The study queried British adolescents’ ages 11 through 16, and no gender differences were reported.

In their focus group study with African-American and White adolescents ages 14 through 17, Gittelsohn et al. (2001) reported ethnic differences in perceptions of why female adolescents smoke. The authors conclude that both African-American and White girls’ smoking behavior was driven by their desire to fit in with their peer group while males were more coerced into smoking. The difference they found was that White girls choose to smoke to fit in with peers while African-American girls choose to not smoke in order to fit in with their peers, findings reflective of the differential prevalence rates of smoking between African-American and White females. According to questionnaires and self-reports of 4,771 British students grades 7 through 11, Lucas and Lloyd (1999) reported that for females, attracting males was a reason for initiating smoking. A review study by French and Perry (1996) also reported that girls initiated smoking to achieve a desired self-image, which included feelings of maturity, independence, sociability, and sexuality.

In general, research states that peer pressure is positively correlated with adolescent smoking, particularly in females. Moreover, the desire to be seen as popular or “cool” is also positively correlated with adolescent smoking, especially in females.

School Factors

Schools have a potentially powerful role in the lives of adolescents. Considering that the majority of youth under the age of 17 attend school and that average students spend about one-third of their time in school (Steinberg, 1999), it is no wonder that factors pertaining to school have also been associated with adolescent smoking behavior. Two frequently cited factors include academic performance and commitment to school and teachers. It should be noted that academic performance could also be considered an individual level variable. Such cross-over illustrates the overlapping nature of contexts as noted by Bronfenbrenner (1979; 1986).

Academic Performance

Several researchers have reported a positive relationship between low grade point average (GPA) and increased smoking behavior in 7th through 12th grade students (Griffin et al., 1999; O’Byrne et al., 2002; Ritchey et al., 2001). In their six-year longitudinal study of adolescent smokers, Griffin et al. (1999) found that heavy smoking in 12th grade girls was predicted by low GPA in the 7th grade. In their cross-sectional study of 7th through 12th grade students, Ritchey et al. (2001) reported that smokers (both boys and girls) were more likely to have lower GPAs than non-smokers. Similar findings were reported by O’Byrne et al. (2002) and by Simon-Morton et al. (1999). In their longitudinal study of smoking transitions, Tucker, Ellickson, and Klein (2003) found that low academic intentions (e.g. not planning to continue education past high school) were a significant risk factor for smoking during middle adolescence and young adulthood in males and females. They found that poor grades were a “marginal” ($p < .10$) risk factor in late adolescence. Review articles by Amos (1996) and Fried (1994) also reported that

both male and female adolescent smokers were more likely to be underachievers in school and to have relatively low academic goals. Fried (1994) pointed out that this may be because tobacco is more socially accepted by less-educated adolescents. Finally, DuNah, Holly, and Ahn (1991) reported that smokers were less likely than nonsmokers to have plans for college.

In a longitudinal study conducted by Pierce, Lee, and Gilpin (1994), surveys and self-reports of 102,626 respondents showed that smoking initiation rates were higher for girls never attending college than those who went to college. In a review article, French and Perry (1996) also reported that adolescent girls not attending college were more likely to smoke.

In general, research on the relationship between academic performance and adolescent smoking has produced similar findings. Most research states that there is a positive relationship between poor academic performance and low grade point average (GPA) and increased smoking behavior.

Commitment to School/Teachers

Research indicates that young smokers are less attached to school and teachers than are their nonsmoking counterparts. Through questionnaire surveys with British adolescents, Lloyd et al. (1997) reported that both male and female smokers 11 through 16 years old tended to have “nonchalant” attitudes towards school; they were also rebellious and ambivalent, while nonsmokers were often more interested in school. In addition, MacDonald and Wright (2002) reported that Canadian adolescent girls (grades 8-12) who smoked were more likely to feel alienated, less attached, and powerless over school and school-related aspects. Furthermore, these girls were likely to have

unfulfilling and conflicting relationships with adults in power, such as school administrators. Given that these studies were conducted with adolescents outside of the United States, generalizability may be limited.

Skipping school is another factor associated with commitment to school and adolescent smoking. In a cross-sectional survey by Kaufman et al. (2002), skipping school and performing poorly in school were linked to both male and female smoking. Adolescents ages 13 through 19 (n= 17,287) who tended to skip school and perform poorly in school were significantly more likely to become both experimenters and regular smokers. In general, female adolescents were 54 percent more likely than male adolescents to be susceptible to smoking uptake based on factors that include but are not limited to skipping school.

In general, research states that having a low commitment to school and teachers increased the risk for adolescent smoking. Many studies defined having a low commitment to school as possessing a “nonchalant” attitude about classes, teachers, and assignments, or skipping classes.

Community Factors

In addition to factors related to the individual, family, peer, and school contexts, adolescents are greatly influenced by the communities in which they live. Two frequently cited community-level factors that influence adolescent smoking are perceived availability of social activities and perceived availability of cigarettes.

Perceived Availability of Social Activities

Several authors have reported that adolescent smokers are less likely to be involved and active in their communities when compared to adolescent nonsmokers. For example,

in a nationally representative sample of 9th through 12th graders, Escobedo, Marcus, Hotlzman, and Giovino (1993) reported that students who did not participate in interscholastic sports were more likely than those who did to be heavy regular smokers. Aaron et al. (1995) examined the relationship between physical activity and the initiation of high-risk behaviors, including smoking, in a four-year longitudinal sample of 1,245 7th through 9th graders in Pennsylvania. Their findings reveal an inverse relationship between the initiation of smoking in females and physical activity such that females who were highly physically active were less than half as likely to initiate cigarette smoking than their less-fit counterparts. In contrast, no association was found between physical activity and smoking in adolescent males. It is important to note that the authors' definition of physical activity included participation in both leisure-time activities and competitive athletics and measured the incidence of these behaviors via a past-year recall questionnaire.

In their nationally-representative, cross-sectional study of 7th through 12th graders, Simantov et al. (2000) also reported that participation in extracurricular activities (defined as school sports teams, group/individual exercise activities or after-school clubs) was associated with lower risk of smoking in adolescent boys and girls. Similar findings were reported by Simons-Morton et al. (1999) with an ethnically diverse group of 6th through 8th graders.

In a recent longitudinal study by Van Den Bree, Whitmer, and Pickworth (2004), a sample of 14,133 adolescents taking part in the National Longitudinal Study of Adolescent Health was used to examine risk factors associated with adolescent smoking.

Findings of this study showed that the discontinuation of experimental smoking for girls was predicted by a greater involvement in pastime activities (i.e. sports, hobbies, etc.).

Lewis, Harrell, Bradley, and Deng (2001) examined the relationship between adolescent cardiovascular health and cigarette use in a sample of 1,207 North Carolina 6th through 8th graders. They measured physical activity via a 32-item Physical Activity Checklist that assessed what activities the adolescent had spent more than 15 minutes on during the past week. Their findings revealed a trend ($p < .06$) for adolescent smokers to be slightly *more* physically active than their nonsmoking counterparts. These discrepancies in findings may be due in part to the fact that different measures of physical activity were employed in each study.

It is apparent that there is a dearth of research examining the relationship between adolescent smoking and adolescent participation in social activities other than sporting or physical activities. For instance, there is a significant lack of research on adolescent smoking and social activities such as scouting, boys and girls clubs, 4-H clubs, and service clubs.

In general, research states that adolescent smokers are less likely to be involved and active in their communities when compared to adolescent nonsmokers. Some discrepancies exist, such as the Lewis et al. (2001) study stating that adolescent smokers were slightly *more* physically active than their nonsmoking counterparts.

Perceived Availability of Cigarettes

Interestingly, many studies report that there is not a significant decrease in adolescent smoking with active enforcement of tobacco laws that work to limit the availability of cigarettes to minors. For example, in a study by Staff, Bennett, and Angel (2003),

adolescents, ages 12-17 from 11 different metropolitan schools in Sydney, Australia were surveyed in 1995 (n=5,206) and again in 2000 (n=4,120), after communities began monitoring retailer compliance in terms of selling cigarettes to minors. Results of the study showed that increased difficulty in accessing cigarettes did not reduce the number of current adolescent smokers. The study concluded that a likely explanation for this trend was that adolescents gain access to cigarettes by having other people buy the cigarettes for them.

Another study, conducted by Harrison, Fulkerson, and Park (2000), yielded similar findings. In the study, an anonymous survey was administered to 133,794 public school students, grades 6, 9, and 12 in Minnesota. Results showed that even if access to cigarettes through retail outlets is restricted due to the law (no selling tobacco products to minors), students believe that they have many other ways to obtain cigarettes including, buying from stores willing to sell to minors, traveling to neighboring communities where laws are less strict, or having someone of age buy the cigarettes for them.

In contrast to the previous two studies, a study by Siegel, Biener, and Rigotti (1999) used 592 Massachusetts nonsmoking youth, ages 12-15 in a telephone survey regarding smoking initiation. Results of the study showed that youth living in towns that had local tobacco sales ordinances (no selling to minors) were significantly less likely to become established smokers than were youth living in towns without an ordinance. In terms of youths' perception however, there was no significant difference in youth's perceived access to cigarettes between youth living in towns with and without local tobacco sales ordinances. Moreover, the study showed no evidences that local ordinances reduced youths' access to cigarettes. The authors suggest that perhaps the ordinances only alter

attitudes and social norms that affect smoking, but do not actually reduce accessibility to cigarettes.

With some exceptions (Siegel, Biener, & Rigotti, 1999), the majority of the research states that there is not a significant decrease in adolescent smoking with active enforcement of tobacco laws that work to limit the availability of cigarettes to minors. Moreover, in terms of youths' perceptions, this study also concluded that there was no significant difference in youth's perceived access to cigarettes between youth living in towns with and without local tobacco sales ordinances.

CHAPTER III

Methods

Study Participants and Procedure

Virginia public school students in 8th, 10th, and 12th were surveyed in fall of 2000. Data was gathered by the Virginia Department of Mental Health, Mental Retardation and Substance Abuse Services as part of the Virginia Community Youth Survey (VCYS).

Classrooms participating in the survey were randomly selected from courses within a grade level that would be common to all students and would most likely contain the most heterogeneous sample. The survey was administered to those students who were present, had parental permission, and chose to participate. A passive consent form was sent home with all enrolled students, notifying parents of the study and allowing them the opportunity to exclude their children from participation if they wished.

The survey was administered by a research firm contacted by the state substance abuse authority. When it was time to complete the survey, survey administrators read the instructions aloud, including a statement conveying that students may skip any question that they wish not to answer. The students were asked not to place their name on the survey and were told that the survey would be anonymous. As surveys were completed, an envelope was passed throughout the classroom and completed surveys were placed inside. A total of 3,166 surveys were collected from 147 classrooms.

Demographics

The analyzed sample consisted of 3,166 participants, 52% of whom were female. The sample was not evenly distributed by grade; 53% were eighth graders, 25% were tenth graders, and 22% were twelfth graders. In terms of ethnicity, 2% of the sample reported

their ethnicity as “American Indian or Alaska Native,” 3% reported their ethnicity as “Asian,” 25% reported their ethnicity as “Black or African American,” 6% reported their ethnicity as “Hispanic or Latino,” 1% reported their ethnicity as “Native Hawaiian or Pacific Islander,” and 63% reported their ethnicity as “White.” Finally, 40% of the sample reported living in a rural locale (farm, or county), while 60% report living in an urban locale (city, town, or suburb).

Design of the Study

This study analyzed quantitative data previously collected through the Virginia Community Youth Survey (VCYS). This study benefited from the use of secondary data because it allowed for a large sample size.

An analysis using secondary data, however, does have its limitations. For instance the VCYS was created before this study’s implementation. The survey was designed to illustrate a wide array of adolescent behaviors, thoughts, and beliefs, rather than focus on one particular issue or behavior. Thus, the questions pertinent to this study had already been created and could not be altered to best fit this study.

Data Collection Instrument

The measures for this study were derived from the Virginia Community Youth Survey (VCYS), a 128-item survey based on the Student Survey of Risk and Protective Factors and Prevalence of Alcohol, Tobacco, and Other Drug Use. The survey included basic demographic information, as well as self-report measures that were divided into five sections: Demographics and School Climate, Peer Influences, Drug/Alcohol Usage, Community-Based Perceptions, and Family. The survey was designed to yield three

types of information including demographics, alcohol, tobacco, and other drug use as well as antisocial behavior, and risk and protective factors.

Measures

Adolescent Smoking

For the purpose of this study, “adolescent smoking” will be defined as answering the following question with one of the following answer options: “How often have you smoked cigarettes during the past 30 days;” “*not at all (1)*,” “*less than one cigarette per day (2)*,” “*one to five cigarettes per day (3)*,” “*about one half pack per day (4)*,” “*about one pack per day (5)*,” “*about one and one half packs per day (6)*,” or “*two or more packs per day(7)*.”

Individual Factors

Ethnicity

One survey item assessed the ethnicity of the adolescents. Adolescents were asked, “What do you consider yourself to be (select one or more).” Responses included “*American Indian or Alaskan Native (1)*,” “*Asian (2)*,” “*Black or African America (3)*,” “*Hispanic or Latino (4)*,” “*Native Hawaiian or Other Pacific Islander (5)*,” and “*White (6)*.”

Rebelliousness

Three survey items assessed the degree of rebelliousness reported by each adolescent. Adolescents were asked to answer how true or false each of the following statements was in terms of their own behavior: “I do the opposite of what people tell me, just to get them mad,” “I ignore rules that get in my way,” and “I like to see how much I can get away

with.” Four possible responses included “*Very False (1)*,” “*Somewhat False (2)*,” “*Somewhat True (3)*,” and “*Very True (4)*.”

Age

Age was assessed by asking adolescents, “How old are you?” Possible responses included “*10 (1)*,” “*11 (2)*,” “*12 (3)*,” “*13 (4)*,” “*14 (5)*,” “*15 (6)*,” “*16 (7)*,” “*17 (8)*,” “*18 (9)*,” and “*19 or older (10)*.”

Grade Level

Grade level was assessed by asking adolescents, “What grade are you in?” Possible responses included “*8th (2)*,” “*10th (3)*,” and “*12th (4)*.”

Family/Parent Factors

Parenting Attitudes/Practices

Parental attitudes toward smoking behavior were assessed by asking adolescents, “How wrong do your parents feel it would be for you to: smoke cigarettes?” Responses included “*Very Wrong (1)*,” “*Wrong (2)*,” “*Little Bit Wrong (3)*,” and “*Not Wrong at All (4)*.”

Family Conflict

Three survey items assessed the degree of family conflict from the adolescent’s perception. Adolescents were asked if “People in my family often insult or yell at each other,” if “People in my family have serious arguments,” or if “We argue about the same things in my family over and over.” Responses included “*NO! (1)*,” “*no (2)*,” “*yes (3)*,” and “*YES! (4)*.”

Peer Factors

Friends' Smoking Behavior/Attitudes

To assess friends' smoking behavior, adolescents were asked, "Think of your four best friends (the friends you feel closest to). In the past year (12 months), how many of your best friends have: smoked cigarettes?" Possible responses included: "None (0)," "1 (1)," "2 (2)," "3 (3)," and "4 (4)."

Peer Pressure/Popularity

To assess peer pressure/popularity, adolescents were asked, "What are the chances you would be seen as cool if you: smoked cigarettes?" Possible responses included: "No or Very Little Chance (1)," "Little Chance (2)," "Some Chance (3)," "Pretty Good Chance (4)," and "Very Good Chance (5)."

School Factors

Academic Performance

To assess academic performance, adolescents were asked, "Putting them all together, what were your grades like last year?" Possible responses included: "Mostly F's (1)," "Mostly D's (2)," "Mostly C's (3)," "Mostly B's (4)," and "Mostly A's (5)." Adolescents were also asked, "Are your school grades better than the grades of most students in your class?" Possible responses included: "NO! (1)," "no (2)," "yes (3)," and "YES! (4)."

Commitment to School and Teachers

To assess commitment to school and teachers, adolescents were asked, "How often do you feel that the school work you are assigned is meaningful and important?" Possible responses included: "Almost Always (1)," "Often (2)," "Sometimes (3)," "Seldom (4)," and

“*Never (5).*” Adolescents were also asked, “How interesting are most of your courses to you?” Possible responses included: “*Very Interesting and Stimulating (1),*” “*Quite Interesting (2),*” “*Fairly Interesting (3),*” “*Slightly Dull (4),*” and “*Very Dull (5).*” In addition, adolescents were asked, “How important do you think the things you are learning in school are going to be for your later life?” Possible responses included: “*Very important (1),*” “*Quite Important (2),*” “*Fairly important (3),*” “*Slightly dull (4),*” and “*Not at all important (5).*” Adolescents were then asked to think back over the past year in school and were asked, “How often did you enjoy being in school,” Hate being in school,” and “Try to do your best work in school.” Possible responses to all three questions included, “*Never(1),*” “*Seldom (2),*” “*Sometimes (3),*” “*Often (4)*” and “*Almost Always (5).*” Finally, adolescents were asked, “During the LAST FOUR WEEKS how many whole days have you missed because you skipped or ‘cut’.” Possible responses included, “*None (1),*” “*1 (1.67),*” “*2 (2.33),*” “*3 (3),*” “*4-5 (3.67),*” “*6-10 (4.33),*” and “*11 or more (5).*”

Community Factors

Perceived Availability of Social Activities

Perceived availability of social activities was assessed by asking adolescents, “Which of the following activities for people your age is available in your community?” Possible activities included: sporting teams, scouting, boys and girls clubs, 4-H clubs, and service clubs. Adolescents were asked to mark “*Yes (4),*” if the activity was available to them in their community and “*No (1),*” if the activity was not available in their community.

Adolescents were asked to mark either “Yes,” or “No” for each of the five activities.

These items were summed to form a scale of perceived availability of activities where

“1= No,” meaning that the adolescents perceived no available activities and “4=Yes,” meaning that the adolescents perceived that all activities were available.

Perceived Availability

Perceived availability of cigarettes was assessed by asking the adolescents, “If you wanted to get some cigarettes, how easy would it be for you to get some?” Possible responses included: “*Very Hard (1)*,” “*Sort of Hard (2)*,” “*Sort of Easy (3)*,” and “*Very Easy (4)*.”

Chapter IV

Results

Profile of Sample

Of the 3,166 adolescents that participated in the study, 52% were female. In terms of ethnicity, 2% of the sample reported their ethnicity as “American Indian or Alaska Native,” 3% reported their ethnicity as “Asian,” 25% reported their ethnicity as “Black or African American,” 6% reported their ethnicity as “Hispanic or Latino,” 1% reported their ethnicity as “Native Hawaiian or Pacific Islander,” and 63% reported their ethnicity as “White.”

In terms of age, 1% of the sample were twelve-years-old, 36% were thirteen-years old, 14% were fourteen-years-old, 18% were fifteen-years-old, 8% were sixteen-years-old, 16% were seventeen years old, 6% were eighteen-years-old, and 1% were nineteen or older. The sample was also not evenly distributed by grade; 53% were eighth graders, 25% were tenth graders, and 22% were twelfth graders.

Twenty-two percent of the 3,166 adolescents reported that they earned mostly “A’s” last year in school, 38% reported that they earned mostly “B’s” last year, 31% reported that they earned mostly “C’s” last year, 7% reported that they earned mostly “D’s” last year, and 2% reported that they earned mostly “F’s” in school last year. In terms of home environment, 40% of the sample reported living in a rural setting (farm or country), while 60% reported living in an urban environment (city, town, or suburb).

Bivariate Correlations

Tables 1-5 illustrate the results of the bivariate correlations. Due to size constraints, tables are based on variable levels. It is important to note that the large sample in the study increases the tendency for the correlations to be significant. All individual level variables for both the rural and urban populations were positively correlated with adolescent smoking. Age, grade, and the variables associated with rebelliousness (ignoring rules, doing the opposite to make people mad, and liking to see how much they can get away with) were all positively correlated with adolescent smoking and significant at the $p < .01$ level for both the urban and rural population. However, the correlations for the variables associated with rebelliousness were slightly stronger for the urban population.

In terms of the variables on the family level for the rural population, all variables were positively correlated with adolescent smoking. Having parents who think smoking cigarettes is not wrong for you and having a family that argues about the same thing over and over were both positively correlated with adolescent smoking and significant at the $p < .01$ level. For the urban population, all family level variables were positively correlated with adolescent smoking and significant at the $p < .01$ level. For both the rural and urban population, the strongest correlation with adolescent smoking was having parents who think smoking cigarettes is not wrong for you.

On the peer level for the rural and urban populations, having best friends who smoke and perceiving that you would be seen as “cool” if you smoke were positively correlated with adolescent smoking and significant at the $p < .01$ level, although perceiving that you would be seen as “cool” was more strongly correlated to adolescent smoking with the

urban population. Of all the variables in the study, having best friends who smoke had the strongest correlation to increased adolescent smoking for both the rural and urban population.

School level variables for the rural and urban population were all significant at the $p < .01$ level. Skipping school, not finding your courses interesting, not believing that your courses are important for later in life, and often hating to be in school in the past year were all positively correlated with adolescent smoking in both populations. Last year's grades, getting better grades than most other students in the class, finding your school work to be meaningful, often enjoying school in the past year, and trying your best in school during the past year were all negatively correlated with adolescent smoking in both populations. The majority of the correlations were stronger, however, for the urban population.

On the community level for both the rural and urban population, all variables were positively correlated with adolescent smoking. The only variable that was significant at $p < .01$ level for the rural population was having the perception that cigarettes were easy to obtain. In the urban population, all variables were significant at the $p < .01$ level except involvement in 4-H, which was significant at the $p < .05$ level.

Independent Sample T-tests

Table 6 illustrates t-test results comparing the risk and protective factors for adolescents in a rural and urban setting. In terms of cigarette smoking over the past thirty days, a significant difference between rural and urban adolescents is evident. On average, rural adolescents report smoking more cigarettes in the past thirty days than do

urban adolescents. Translated into number of cigarettes smoked however, the majority of both rural and urban adolescents report smoking less than one cigarette per day. Thus, the actual effect size is very small (Cohen's $d=.11$). All individual level variables show no significant difference.

In terms of the family level variables, t-test results show a significant difference in parental attitudes about smoking between the rural and urban population. On average, urban adolescents report more than rural adolescents that they perceive that their parents think it would be "very wrong" to smoke. Translated into adolescent responses however, the majority of both rural and urban adolescents report that their parents would feel it was between "very wrong" and "wrong" to smoke cigarettes. Thus, the actual effect size is very small (Cohen's $d= .19$). Results for all other family level variables were not statistically significant.

On the peer level, a significant difference is found in the perceived number of best friends that smoked in that past year between a rural and urban population. On average, rural adolescents report having more best friends that have smoked in the past year when compared to urban adolescents. Translated into adolescent responses however, the majority of both rural and urban adolescents report having between two and three best friends that have smoked in the past year. Thus, the actual effect size is very small (Cohen's $d=.15$). All other peer level variables were not statistically significant.

In terms of school level variables, significant differences are found when looking at last year's grades, skipping school, perceiving courses as interesting, perceiving school is important for later life, and enjoying school in the past year. On average, urban adolescents report earning higher grades in the past year than do rural adolescents, but

translated into numbers, the majority of both urban and rural adolescents report earning mostly B's and C's during the previous school year. The actual effect is too small for practical relevance (Cohen's $d = -.08$). Urban adolescents report enjoying school more during the past year than rural adolescents, but the majority of both rural and urban adolescents report "sometimes" enjoying being in school. The actual effect size is too small for practical relevance (Cohen's $d = -.09$). Urban adolescents report skipping more school than rural adolescents, but both populations' responses illustrate that they report skipping between zero and one whole days of class in the last four weeks. The actual effect size is too small for practical relevance (Cohen's $d = -.08$). Urban adolescents report not finding courses more interesting however, both the majority of urban and rural adolescents report that their courses are "fairly interesting." The actual effect size is very small (Cohen's $d = .10$). Finally, urban adolescents report not perceiving that the things they learn in school will be more important in later life more than rural adolescents, but the majority of both populations report perceiving that the things they learn in school are "quite important." The actual effect size is very small (Cohen's $d = .11$). All other school level variables are not statistically significant.

Finally, on the community level, differences in perceived availability of cigarettes and perceived availability of scouts, clubs, and 4-H were statistically significant between rural and urban adolescents. In terms of perceived availability, rural adolescents report that it would be easier to get cigarettes than do urban adolescents, however the majority of both populations report that it would be "sort of easy" of get cigarettes. The actual effect size is too small for practical relevance (Cohen's $d = .09$). In addition, rural adolescents report perceiving that scouts are more available in their community than

urban adolescents; however, the majority of both populations report that they do not feel that scouts are largely available in their community. The actual effect size is very small (Cohen's $d = .10$). Rural adolescents also perceive that community clubs are more available in their community than urban adolescents; however, the majority of both populations do not feel that community clubs are largely available in their community. The actual effect size is very small (Cohen's $d = .12$). Urban adolescents report perceiving that community 4-H clubs are more available in their community than do rural adolescents; however, the majority of both populations do not feel that community 4-H clubs are largely available in their community. The actual effect size is small (Cohen's $d = -.40$).

Linear Regressions

Regressions were conducted for both the rural and urban population. These results are displayed in Tables 7 and 8. Overall, the variables contributed to 23% (adjusted R^2) of the variance in cigarette smoking among rural adolescents. Among the rural adolescents, the individual level model accounted for 5% of the variance in adolescent smoking behavior while none of the variables were a significant predictor of rural adolescent smoking. The family level model accounted for 16% of the variance in rural adolescent smoking behavior. On the family level, having parents who think cigarettes are not wrong for you was the only variable that was a significant predictor of adolescent smoking in rural adolescents ($B = .321, p = .000$). The peer level model accounted for 8% of the variance in rural adolescent smoking while having best friends that smoked was the only variable that was a significant predictor of adolescent smoking in rural adolescents ($B = .274, p = .001$). The school level model accounted for 3% of the variance and the

community level accounted for 1% of the variance in rural adolescent smoking behavior while none of the variables on either level were significant predictors of rural adolescent smoking.

Overall, the variables contributed to 40% (adjusted R^2) of the variance in cigarette smoking among the urban adolescents. Among the urban adolescents, the individual level model accounted for 13% of the variance in adolescent smoking behavior while none of the variables were significant predictors of urban adolescent smoking. The family level model accounted for 10% of the variance in urban adolescent smoking behavior. On the family level, having parents who think cigarettes are not wrong for you ($B=.188$, $p=.000$) and having family arguments ($B= -.104$, $p=.025$) were the variables that significantly predicted adolescent smoking in urban adolescents. The peer level model accounted for 13% of the variance in urban adolescent smoking while having best friends that smoked ($B=.289$, $p=.000$) and thinking that you would be perceived as cool if you smoked ($B=.148$, $p=.000$) both significantly predicted adolescent smoking in urban adolescents. The school level model accounted for 7% of the variance in urban adolescent smoking while skipping school ($B=.201$, $p=.000$) and thinking your schooling would be not be important for later life ($B=.117$, $p=.015$) were the variables that significantly predicted adolescent smoking in urban adolescents. The community level model accounted for 2% of the variance in urban adolescent smoking while perceiving that scouts ($B=.111$, $p=.030$) and service clubs ($B= -.121$, $p=.020$) were available in their community were the variables that significantly predicted adolescent smoking in urban adolescents.

Chapter V

Discussion

The purpose of this study was to compare risk and protective factors for smoking in adolescents living in rural and urban environments. This study used an ecological model as its theoretical framework (Bronfenbrenner, 1979). This framework was appropriate because many previous studies have suggested that future research should utilize a more complex model by incorporating multiple levels of an adolescent's life, such as individual, family, school, peer, and community instead of looking at only one or two of these levels in isolation (Scheer, Borden, & Donnermeyer, 2000).

Also of importance in this study is our sample of both rural and urban adolescents. Few research studies concerning adolescent smoking have examined a rural adolescent population, nor have they used samples comparing rural and urban adolescents. This study may be the first step in examining the differences and similarities of risk and protective factors for adolescent smoking in different locales. Our findings suggest that while there are similarities in the risk and protective factors for smoking in adolescents living in rural and urban environments, differences do exist.

In terms of cigarette smoking over the past thirty days, rural adolescents in this study reported smoking more cigarettes than did urban adolescents. Although these results were statistically significant, translated into number of cigarettes smoked, both rural and urban adolescents reported that they smoked between zero and less than one cigarette a day. These findings are inconsistent with recent studies reporting that cigarette use among teens tends to be higher in rural than in urban settings (Kopstein, 2001). The results of this study illustrate that rural adolescents are not smoking much more than

urban adolescents are smoking and that the actual amount of cigarettes smoked in both populations is relatively low.

In terms of the individual level variables, t-test results illustrated that all individual variables showed no significant difference between rural and urban adolescents. These findings demonstrate that demographically, the urban and rural samples were very similar; thus, differences in risk and protective factors can then be attributed to some of the non-demographically based variables, such as family, peer, school, and community variables.

Many researchers have agreed that friends are particularly influential when it comes to adolescent smoking behavior. For example a study by Alexander, Piazza, Mekos, and Valente (2001) suggests that having best friends who smoked resulted in a two-fold increase for being at risk for smoking. Similarly, a recent study by Taylor, Conrad, O'Bryne, Haddock, and Poston (2004) found females who had a best friend that smoked were nearly seven times more likely to smoke than females who did not have a best friend that smoked. While these studies did not distinguish between rural and urban adolescents, they are consistent with this study in that for both the rural and urban population, having a best friend that smoked was the strongest correlation to adolescent smoking when compared to all other variables in the study. Thus, having a best friend that smokes appears to be a risk factor for both the rural and urban adolescent population.

Similarly to having best friends that smoke, many researchers suggest that parental attitudes greatly influence adolescent smoking. A recent study by Ma, Shive, Legos, and Tan (2003) found that a significant number of smoking adolescents felt that if they would be caught smoking at school, neither the school nor their parents would do much in terms

of punishment. These findings are again consistent with those of this study in which for both the rural and urban adolescents, having parents who think cigarettes are not wrong for you is positively correlated with adolescent smoking. Thus, having parents with permissive attitudes about smoking appears to act as a risk factor for both the rural and urban adolescent population.

In terms of the rural and urban populations in this study, 23% of the variance in smoking behavior could be accounted for in the rural adolescents, while 40% of the variance in smoking behavior could be accounted for in the urban adolescents. First, school level factors appear to be associated with smoking for urban adolescents, but not for the rural adolescents. For example, this study demonstrated that skipping school increased the risk of smoking in urban adolescents. These findings are consistent with previous research stating that adolescents who tended to skip school were significantly more likely to become both experimenters and regular smokers (Kaufman et al., 2002). Moreover, believing that their school courses were not important for later life were associated with higher rates of adolescent smoking in the urban population, but not in the rural population. Again, this finding is consistent with previous research stating that male and female smokers tended to have “nonchalant” attitudes towards school while nonsmokers were often more interested in school (Lloyd et al., 1997). None of these above studies however, distinguished between urban and rural adolescents.

In addition, family arguments were associated with smoking in the urban, but not the rural population. This studies’ findings demonstrate that as family arguments increase, smoking decreases. These findings appear to be inconsistent with that of previous research stating that high family conflict predicted regular smoking (Flay Phil, Hu, &

Richardson, 1998). Perhaps the families are arguing about the adolescent's smoking behavior, and as a result, the adolescent decided to quit smoking. Another possible explanation may be that the adolescents is smoking because of stress at home, and through arguments, the stressful issue eventually gets resolved, causing the adolescent to rely less on smoking as a stress manager.

In addition, having a desire to be perceived as "cool" and perceiving that scouts were available in their community were only associated with increased smoking behavior in the urban population, while perceiving that service clubs were available in their community was associated with decreased smoking only in the urban population. This studies' findings concerning the adolescent's belief that they would be perceived as "cool" if they smoked is consistent with the research stating that adolescent smoking, especially in females, is heavily influenced by peer pressure and a desire to be seen as "cool" by their peer groups (Farell & White, 1998; Ritchey et al., 2001; Urberg, Cheng, & Shyu, 1991). Again, these studies did not distinguish between urban and rural adolescents.

In terms of perceiving that activities are available in their community, the results of this study show that the perception of availability both increased and decreased smoking behavior in the urban population. Most of the research states that participation in extracurricular activities is associated with a lower risk of smoking in adolescent boys and girls (Simantov et al., 2000). However, most studies only define extracurricular activities as those activities involving sports and as in the Simantov (2000) study, do not distinguish between urban and rural adolescents. This studies' findings demonstrate that perceiving that an activity is available in the community may not translate into actual

participation. Moreover, it may be that all activities are not created equal and that if an adolescent is participating in an activity, the other adolescents involved, the leadership, or the experiences provided may unwillingly allow for risk taking opportunities that would not otherwise be available to the adolescent. Thus, participation in activities may not always be a protective factor for adolescent smoking, or for any other risky behavior.

While both family and peer level variables influence urban and rural adolescents smoking behavior, school and community level variables appear only to influence urban adolescent smoking behavior. This finding is consistent with previous literature stating that parents and peers are critical in terms of influencing adolescent smoking behavior (Gittelsohn et al., 2001; Urberg, Cheng, & Shyu, 1991) in both the urban and rural population. Moreover, it is unclear as to why school level variables in this study were associated with urban adolescent smoking but not with rural adolescent smoking. It is evident that school level factors have an impact on urban adolescent smoking, but it is difficult at this point to explain that impact. From this study, it has become clear that better models for predicting adolescent smoking, especially in a rural population, are needed.

Community level variables were also associated with adolescent smoking in the urban, but not the rural adolescents. Perhaps this difference is due to sheer availability of opportunities. There may be more activities offered in urban environments. The difference may also be due to advertising with better sources of spreading the word about available activities in the urban environment.

Clinical Implications

The results of this study demonstrate that many factors act as risk and protective factors for adolescent smoking. Particularly, having a best friend that smokes acts as a strong risk factor, while having parents who think that smoking cigarettes is wrong acts as a strong protective factor for both rural and urban adolescents.

In the past, adolescent smoking has been addressed by a variety of mediums. Prevention programs have been put in schools and communities and antismoking commercials are often run during television programs targeting an adolescent demographic. These programs tend to focus mainly on individual health risks and the dangers of smoking, as well as peer pressure (Wiehe, Garrison, Christakis, Ebel, & Rivara, 2005).

Essentially, prevention programs are falling short by only targeting the individual context. While these programs may be useful to some adolescents, they tend to lose focus of other factors that can act as risk/protective factors for adolescent smoking, such as home environment, value on education and perceiving that there is nothing else to do in the community in terms of leisure activities. As a result, prevention programs should expand their efforts to target family, peer, school, and community contexts as well as the individual context. Often times, school prevention programs are only for the youth; therefore, the role of parental attitudes encouraging abstaining from smoking as a protective factor in adolescent smoking is not addressed. Conveying to parents the importance of sending their adolescent antismoking messages should assist in decreasing adolescent smoking. It may be beneficial for schools to alert parents through bulletins or

flyers sent home from school to the influence that they as parents have over their youth's risk taking behavior.

In addition, because there appear to be differences in the risk and protective factors in urban and rural locales, prevention programs should be tailored to reflect these differences. For example, school level variables were influential in the urban, but not the rural environment; therefore, prevention, education, and intervention programs in urban environments may want to add more of a focus on the importance of school for later life, than those programs in rural settings.

Community level variables were also influential in the urban, but not the rural environment. Perhaps in some instances, such as with service clubs, perceiving that there are more opportunities available to participate in out-of-school activities made the urban adolescents feel more connected and supported by the community, which led to their lack of need or desire to smoke. However, with community scouts, urban adolescents reported that the more they perceived scouts were available, the more they smoked. Perhaps this is due to the adolescents actually participating in these clubs and the clubs in turn presenting them with opportunities to smoke (i.e. because they are away from parents or because they are not supervised well). Thus, it may be useful for rural communities to make it a priority to have activities such as scouts and service clubs available to adolescents, despite the obstacles they may face in offering these activities to the adolescents. It would also be important for adults in both urban and rural environments to ensure supervised, positive activities for the adolescents. From this study, it is becoming evident that the risk and protective factors of smoking are not identical in both urban and rural settings, and as a result, the factors are not generalizable

across settings. Although ideas have been generated, interpretation as to why the risk and protective factors for adolescent smoking are not identical remains unclear.

In terms of mental health professionals, treating adolescents that use substances which negatively affect their health or even adolescents with dependency issues is not uncommon. Treatment for any kind of substance use, be it alcohol, drug, or tobacco requires that many systems work together. Involving all levels of Bronfenbrenner's (1979) ecological model including individual, family, peer, school, and community as agents of change would help to insure that the various risk and protective factors for adolescent smoking are adequately addressed.

If parents came to therapy with an adolescent that was using any type of dangerous substances including tobacco, alcohol, or any other drug, it would be useful for the therapist to ask the parents what they have told their adolescent about substance use. Given the results of this study, it would be important for the therapist to educate the parents on the influence they have over their adolescent when it comes to behaviors such as smoking. Therapists may want to convey to parents the numerous research studies demonstrating that if parents send antismoking messages to their adolescents, the adolescents tend to smoke less.

Limitations and Future Research

In terms of the sample, the results of this study are best generalized only to rural and urban adolescents living in Virginia. Therefore, results may have been different if the study was conducted in a different state or states. In addition, because Virginia is a tobacco growing state, it would be logical to believe that tobacco is largely available and

that its use may be more prevalent than in non-tobacco growing states. However, research shows that the recent surge of anti-smoking media campaigns has helped to prevent youth smoking initiation (Sly, Hopkins, Trapido, & Ray, 2001).

It can also not be assumed that those adolescent that were absent, who did not participate, who completed questionnaires that were not usable, or who were not enrolled in school were comparable to those included in this studies analysis.

Because secondary data was used, this study was limited to variables already included in the questionnaire and to the way the variable was measured. As a result, variables were already coded and may not have been done in a manner that would have been favored. Moreover, the questions pertinent to this study had already been created and could not be expanded upon to best fit this study. For example, questions about community activities (scouts, 4-H, service clubs, etc) asked about the youth's perception of the availability of these activities, but did not specifically ask if the youth choose to participate in any of these activities.

Another limitation to this study is that all measures were based on adolescent self-report and the adolescent's perception of various situations. As a result, this studies' questions may not determine state of mind versus actual behavior. For example, if an adolescent recently had a fight with their parents, their perception of family arguments may be skewed. Because cross-sectional data were employed, results also assumed a direction of relationships. For example, having a best friend that smokes predicts higher levels of adolescent smoking; however, it may be the case that adolescents that smoke attract best friends who also smoke.

Despite the limitations, there are also strengths to this study. First, the study included a large, ethnically diverse sample that is representative of the US population. The sample was also balanced with a fairly equal number of urban and rural adolescents. Moreover, this study incorporated a large amount of available data based on adolescent self-report. Even though self-report is often considered a limitation, several researchers acknowledge the value of using adolescent self-report measures of substance use rather than using their parent's perceptions of those same actions (Hansen, Malotte, & Fielding, 1985; Velicer, Prochaska, Rossi, & Snow, 1992).

In terms of this study, comparing contexts/locales was shown to be of importance for understanding the phenomena of adolescent smoking. As a result, it may be important for future studies examining other phenomena to compare contexts as well. Using the ecological model as a framework provides rationale for such comparisons. Because it appears that more is known about the factors influencing urban adolescent smoking, future research may want to focus on a rural adolescent population to examine more thoroughly what is influencing their smoking behavior. In addition, future studies could employ adolescents from multiple states, helping to ensure that a wide range of urban and rural settings were included in the analysis. Future studies could also compare risk and protective factors in urban and rural environments as well as comparing the factors by gender all within the same study. Many studies look at differences based on gender, but few look at both gender and local as variables. Future research may also want to use a sample of only those adolescents in high school because as research states, smoking rates tend to increase with age (Griffin, Botvin, Doyle, Diaz, & Epstein, 1999). Lastly, future research may want to examine different variables (i.e. the role of media, parental

monitoring, or religiosity) as risk and protective factors and compare them in urban and rural environments.

Table 1

Relationship Between Individual Level Variables and Adolescent Smoking
 Total N= 3,166

Variable	1.	2.	3.	4.	5.	6.	7.
1. Cig. Frequency	1	.297**	.255**	.104	.190**	.118**	.181**
2. Age	.239**	1	.926**	.063	.058*	-.011	.084**
3. Grade	.221**	.938**	1	.026	.036	-.030	-.037
4. Race	.059	.035	.021	1	.039	.087	-.059
5. Ignore rules	.231**	.112**	.091**	.028	1	.427**	.474**
6. Do opposite to make people mad	.210**	.050*	.032	.047	.374**	1	.436**
7. Like to see how much get away with	.213**	.127**	.110**	.041	.427**	.427**	1

Note: Rural adolescent correlations above the diagonal; Urban adolescent correlations below the diagonal.

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

Table 2
 Relationship Between Family Level Variables and Adolescent Smoking
 Total N= 3,166

Variable	1.	2.	3.	4.	5.
1. Cig. Frequency	1	.482**	.038	.095**	.059
2. Parents think cigs are not wrong for you	.469**	1	.101**	.101**	.084**
3. Family yelling	.125**	.147**	1	.553**	.545**
4. Family arguing	.152**	.149**	.576**	1	.452**
5. Family arguments	.101**	.122**	.554**	.502**	1

Note: Rural adolescent correlations above the diagonal; Urban adolescent correlations below the diagonal.
 *p<.05, **p<.01

Table 3
 Relationship Between Peer Level Variables and Adolescent Smoking
 Total N= 3,166

Variable	1.	2.	3.
1. Cig. Frequency	1	.504**	.149**
2. # best friends that smoke	.504**	1	.220**
3. Cool if smoke	.278**	.263**	1

Note: Rural adolescent correlations above the diagonal; Urban adolescent correlations below the diagonal.
 *p<.05, **p<.01

Table 4
 Relationship Between School Level Variables and Adolescent Smoking
 Total N= 3,166

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Cig. Frequency	1	-.256**	.277**	-.200**	-.148**	.189**	.213**	-.185**	.156**	-.208**
2. Last yrs. grades	-.310**	1	-.198**	.476**	.148**	-.181**	-.105**	.270**	-.239**	.270**
3. Skipped school	.385**	-.268**	1	-.195**	-.133**	.107**	.177**	-.120**	.113**	-.205**
4. Better grades than most	-.190**	.486**	-.173**	1	.219**	-.245**	-.186**	.233**	-.237**	.246**
5. Meaningful school work	-.166**	.163**	-.167**	.158**	1	-.475**	-.435**	.337**	-.325**	.271**
6. Courses not interesting	.177**	-.189**	.159**	-.198**	-.477**	1	.401**	-.382**	.365**	-.250**
7. Not important for later life	.184**	-.106**	.196**	-.116**	-.463**	.446**	1	-.258**	.237**	-.242**
8. Past yr. enjoyed school	-.226**	.278**	-.172**	.263**	.352**	-.394**	-.309**	1	-.621**	.227**
9. Past yr. hated school	.233**	-.249**	.183**	-.205**	-.331**	.393**	.289**	-.606**	1	-.201**
10. Past yr. tried best	-.232**	.360**	-.226**	.289**	.308**	-.269**	-.293**	.294**	-.247**	1

Note: Rural adolescent correlations above the diagonal; Urban adolescent correlations below the diagonal.

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

Table 5
 Relationship Between Community Level Variables and Adolescent Smoking
 Total N= 3,166

Variable	1.	2.	3.	4.	5.	6.	7.
1. Cig. Frequency	1.	.298**	.030	.053	.011	.007	.035
2. Easy to get cigs	.316**	1	-.005	.002	-.008	-.053	-.039
3. Comm. sports	.089**	-.002	1	.410**	.373**	.436**	.365**
4. Comm. scouts	.091**	.025	.491**	1	.536**	.522**	.434**
5. Comm. clubs	.076**	.033	.402**	.528**	1	.485**	.484**
6. Comm. 4-H	.062*	.022	.332**	.425**	.448**	1	.511**
7. Comm. Svc clubs	.077**	.044	.383**	.486**	.494**	.535**	1

Note: Rural adolescent correlations above the diagonal; Urban adolescent correlations below the diagonal.
 *p<.05, **p<.01

Table 6
T-test Results Comparing All Variables between Rural and Urban Adolescents
Total N = 3, 166

Variable	Rural Mean (SD)	Urban Mean (SD)	<i>t</i>
Cig Frequency	1.51 (1.1)	1.40(.94)	2.9*
Age	5.74 (1.7)	5.7 (1.7)	1.0
Grade	2.7 (.82)	2.7 (.81)	.3
Race	3.04 (.77)	3.08 (.75)	-.88
Ignore rules	2.07 (.88)	2.08 (.88)	-.36
Do opposite to make people mad	1.81 (.86)	1.82 (.86)	-.46
Like to see how much get away with	2.05 (.96)	2.05 (.95)	.15
Parents think cigs not wrong for you	1.49 (.86)	1.34 (.71)	5.1**
Family yelling	2.18 (.92)	2.23 (.92)	-1.5
Family arguing	2.35 (.96)	2.41 (.93)	-1.6
Family arguments	2.08 (.92)	2.14 (.91)	-1.7
# best friends that smoke	2.52 (1.5)	2.29 (1.5)	3.9**
Cool if smoke	1.83 (1.1)	1.78 (1.1)	1.1
Last years grades	3.67 (.95)	3.75 (.97)	-2.1*
Skipped school	1.24 (.81)	1.31 (.92)	-1.9*
Better grades than most	2.58 (.83)	2.63 (.8)	-1.9
Meaningful school work	3.11 (1.1)	3.18 (1.0)	-1.8
Courses not interesting	3.17 (1.0)	3.07 (1.0)	2.6*
Not important for later life	2.44 (1.2)	2.31 (1.2)	2.9*
Past year enjoyed school	3.02 (1.1)	3.12 (1.1)	-2.2*
Past year hated school	3.13 (1.1)	3.07 (1.1)	1.5
Past year tried best	4.18 (.93)	4.13 (.93)	1.5
Easy to get cigs	2.94 (1.2)	2.83 (1.2)	2.6*
Comm. sports	1.16 (.37)	1.16 (.37)	-.06
Comm. scouts	1.40 (.49)	1.35 (.48)	2.4*
Comm. clubs	1.47 (.5)	1.41 (.5)	2.7*
Comm. 4-H	1.35 (.48)	1.55 (.5)	-10.9**
Comm. svc clubs	1.47 (.5)	1.46 (.5)	.56

* p<.05, ** p<.001

Table 7
 Regression Analysis of Risk and Protective Factors for Adolescent Smoking: Rural
 N= 1,196

Variable	Beta	R	R ² Δ	F (df)
1. Age	.092	.050	.050	1.578 (7, 209)
Grade	-.046			
Race	-.053			
Ignore rules	-.029			
Do opposite to make people mad	-.085			
Like to see how much can get away with	.092			
2. Parents think cigs not wrong for you	.321*	.213	.163	5.045 (11, 205)**
Family yelling	-.099			
Family arguing	.083			
Family arguments	-.014			
3. # best friends that smoke	.274*	.289	.075	6.331 (13, 203)**
Cool if smoke	.030			
4. Last years grades	.034	.315	.026	4.046 (22, 194)**
Skipped school	.086			
Better grades than most	-.020			
Meaningful school work	-.102			
Courses not interesting	-.083			
Not important for later life	.063			
Past yr. enjoyed school	-.016			
Past yr. hated school	.052			
Past yr. tried best	-.055			
5. Easy to get cigs	-.044	.328	.013	3.269 (28, 188)**
Comm sports	.102			
Comm scout	-.066			
Comm clubs	-.039			
Comm 4-H	.040			
Comm svc club	-.012			

* p<.05, ** p<.001

Table 8
 Regression Analysis of Risk and Protective Factors for Adolescent Smoking: Urban
 N= 1,784

Variable	Beta	R	R ² Δ	F (df)
1. Age	.110	.127	.127	10.586 (6, 437)**
Grade	-.122			
Race	.047			
Ignore rules	-.053			
Do opposite to make people mad	.064			
Like to see how much can get away with	.000			
2. Parents think cigs not wrong for you	.188*	.225	.098	12.584 (10, 433)**
Family yelling	.048			
Family arguing	.026			
Family arguments	-.104*			
3. # best friends that smoke	.289*	.356	.131	19.907 (12, 431)**
Cool if smoke	.148*			
4. Last years grades	-.022	.422	.065	14.666 (21, 422)**
Skipped school	.201*			
Better grades than most	-.042			
Meaningful school work	.025			
Courses not interesting	.035			
Not important for later life	.117*			
Past yr. enjoyed school	.029			
Past yr. hated school	.046			
Past yr. tried best	-.042			
5. Easy to get cigs	-.027	.439	.018	12.078 (27, 416)**
Comm sports	.037			
Comm scout	.111*			
Comm clubs	-.038			
Comm 4-H	.080			
Comm svc club	-.121*			

* p<.05, ** p<.001

References

- Aaron, D. J., Dearwater, S. R., Anderson, R., Olsen, T., Kriska, A. M., & LaPorte, R. E. (1995). Physical activity and the initiation of high-risk health behaviors in adolescents. *Medicine and Science in Sports and Exercise*, *27*(12), 1639-1645.
- Alexander, C., Allen, P., Crawford, M., & McCormick, L. (1999). Taking a first puff: Cigarette smoking experiences among ethnically diverse adolescents. *Ethnicity & Health*, *4*(4), 245-257.
- Alexander, C., Piazza, M., Mekos, D., & Valente, T. (2001). Peers, schools, and adolescent cigarette smoking. *Journal of Adolescent Health*, *29*, 22-30.
- Allen, O., Page, R. M., Moore, L., & Hewitt, C. (1994). Gender differences in selected psychosocial characteristics of adolescent smokers and nonsmokers. *Health Values*, *18*(2), 34-39.
- Aloise-Young, P. A., Graham, J. W., & Hansen, W. B. (1994). Peer influence on smoking initiation during early adolescence: A comparison of group members and group outsiders. *Journal of Applied Psychology*, *79*(2), 282-287.
- Aloise-Young, P., Wayman, J., & Edwards, R. (2002). Prevalence of cigarette smoking among rural adolescents in the United States. *Substance Use & Misuse*, *37*(5-7), 613-630.
- Amey, C. H., Albrecht, S. L., Miller, M. K. (1996). Racial differences in adolescent drug use: The impact of religion. *Substance Use and Misuse*, *31*(10), 1311-1332.
- Amos, A. (1996). Women and smoking. *British Medical Bulletin*, *52*(1), 74-89.

- Best, J. A., Brown, K.S., Cameron, R., Manske, S .M. & Santi, S. (1995). Gender and predisposing attributes as predictors of smoking onset: Implications for theory and practice. *Journal of Health Education, 26(2)*, S52-S60.
- Bronfenbrenner, U. (1979). *The ecology of human development*. Cambridge: Harvard University Press.
- Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: Research perspectives. *Developmental Psychology, 22*, 723-742.
- Brown, B. (1990). Peer groups. In S. Feldman & G. Elliott, (Eds.). *At the threshold: The developing adolescent* (pp. 171-196). Cambridge, MA: Harvard University Press.
- Centers for Disease Control and Prevention (1999). Best practices for comprehensive tobacco control programs. Atlanta, GA: Department of Health and Human Services, Center for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- Centers for Disease Control and Prevention, Grunbaum, J., Kann, L., Kinchen, S., Williams, B. Ross, J. et al. (2002). Youth risk behavior surveillance: United States 2001. *Morbidity and Mortality Weekly Report, 51(SS-4)*.
- Chassin, L., Presson, C., Sherman, S., & Edwards, D. (1990). The natural history of cigarette smoking: Predicting young adult smoking outcomes from adolescent smoking patterns. *Health Psychology, 9*, 701-716.
- Cronk, C. E., & Sarvela, P. D. (1997). Alcohol, tobacco, and other drug use among rural/small town and urban youth: A secondary analysis of the monitoring the future data set. *American Journal of Public Health, 87*, 760-764.

- De Von Figueroa-Moseley, C., Landrine, H., & Klonoff, E.A. (2004). Sexual abuse and smoking among college student women. *Addictive Behaviors, 29*, 245-251.
- Dent, C., Sussman, S., Ellickson, P., Brown, P., & Richardson, J. (1996). Is current drug abuse prevention programming generalizable across ethnic groups? *American Behavioral Scientist, 39*, 911-918.
- Distefan, J., Gilpin, E., Choi, W., & Pierce, J. (1998). Parental influences predict adolescent smoking in the United States, 1989-1993. *Journal of Adolescent Health, 22*, 466-474.
- DuNah, R., Holly, E., & Ahn, D. (1991). Demographics and cigarette smoking among women. *Preventive Medicine, 29*(2), 262-270.
- Epstein, J.A., Botvin, G.J., & Spoth, R. (2003). Predicting smoking among rural adolescents: Social and cognitive processes. *Nicotine and Tobacco Research, 5*, 485-491.
- Escobedo, L, Marcus, S. Holtzman & Giovino, G. (1993). Sports participation, age at smoking initiation, and the risk of smoking among U.S. high school students. *Journal of the American Medical Association, 269*, 1391-1095.
- Farrell, A.D., & White, K.S. (1998). Peer influences and drug use among urban adolescents: Family structure and parent-adolescent relationship as protective factors. *Journal of Consulting and Clinical Psychology, 2*, 248-258.
- Fisher, L. & Bauman, K. (1988). Influence and selection in the friend-adolescent relationship: Findings from studies of adolescent smoking and drinking. *Journal of Applied Social Psychology, 18*, 289-314.

- Flay, B. R., Phil, D., Hu, F., & Richardson, J. (1998). Psychosocial predictors of different stages of cigarette smoking among high school students. *Preventive Medicine, 27*, A9-A18.
- Flint, A., Yamada, E. G., & Novotny, T. E. (1998). Black-white differences in cigarette smoking uptake: Progression from adolescent experimentation to regular use. *Preventive Medicine, 27*, 358-364.
- French, S. A., & Jeffery, R. W. (1995). Weight concerns and smoking: A literature review. *Annals of Behavioral Medicine, 17*, 234-244.
- French, S. A., & Perry, C. L. (1996). Smoking among adolescent girls; Prevalence and etiology. *Journal of the American Medical Women's Association, 51*, 25-28.
- Fried, J. L. (1994). Women and young girls...high-risk populations for tobacco use. *Health Values, 18(1)*, 33-40.
- Gittelsohn, J., Roche, K. M., Alexander, C. S., & Tassler, P. (2001). The social context of smoking among African-American and White adolescents in Baltimore city. *Ethnicity and Health, 6(3/4)*, 211-225.
- Gold, M. S. (1995). Tobacco. NY: Plenum Medical Book Company.
- Goodrow, B., Seier, E., & Stewart, K. (2003). Social influences and adolescent attitudes on smoking: Analysis of the 2000 tennessee youth tobacco survey. *Adolescent & Family Health, 3*, 89-94.
- Griesler, P., Kandel, D., & Davies, M. (2002). Ethnic differences in predictors of initiation and persistence of adolescent cigarette smoking in the National Longitudinal Survey of Youth. *Nicotine & Tobacco Research, 4*, 79-93=

- Griffin, K.W., Botvin, G. J., Doyle, M. M., Diaz, T., & Epstein, J. A. (1999). A six-year follow-up study of determinants of heavy cigarette smoking among high-school seniors. *Journal of Behavioral Medicine, 22*, 271-284.
- Hansen, W., Malotte, C., & Fielding, J. (1985). The bogus pipeline revisited: The use of the threat of detection as a means of increasing self-reports of tobacco use. *Journal of Applied Psychology, 70*, 789-792.
- Harrell, J., Bangdiwala, S., Deng, S., Webb, J., & Bradley, C. (1998). Smoking initiation in youth: The roles of gender, race, socioeconomic, and developmental status. *Journal of Adolescent Health, 23*, 271-279.
- Harrison, P.A., Fulkerson, J.A., & Park, E. (2000). The relative importance of social versus commercial sources in youth access to tobacco, alcohol, and other drugs. *Preventive Medicine, 31*, 39-48.
- Horn, K., Dino, G., & Momani, A. (1999). Smoking and stress among rural adolescents: The gender factor. *American Journal of Health Studies, 14(4)*, 183-193.
- Iannotti, R., Bush, P., & Weinfurt, K. (1996). Perception of friends' use of alcohol, cigarettes, and marijuana among urban schoolchildren: A longitudinal analysis. *Addictive Behaviors, 21(5)*, 615-632.
- Johnson, R., & Hoffman, J. (2000). Adolescent cigarette smoking in U.S. racial/ethnic subgroups: Findings from the National Educational Longitudinal Study. *Journal of Health and Social Behavior, 41(4)*, 392-407
- Johnson, H. & Johnson, P. (2001). Reaffirming the power of parental influence on adolescent smoking and drinking decisions. *Adolescent & Family Health, 2(1)*, 37-43.

- Johnston, L. D., O'Malley, P. M., & Bachman, J. C. (2002). *Monitoring the Future national survey results on drug use, 1975-2001. Volume 1: Secondary school students* (NIH Publication No. 02-5106). Bethesda, MD: National Institute on Drug Abuse.
- Jones, D.N., Schroeder, J.R. & Moolchan, E.T. (2004). Time spent with friends who smoke and quit attempts among teen smokers. *Addictive Behaviors, 29*, 723-729.
- Kaufman, N. J., Castrucci, B. C., Mowery, P. D., Erlach, K. K., Emont, S, & Orleans, T. (2002). Predictors of change on the smoking uptake continuum among adolescents. *Archives of Pediatrics & Adolescent Medicine, 156(6)*, 581-588.
- Kelder, S.H., Prokhorov, A., Barroso, C.S., Murray, N., Orpinas, P., & McCormick, L. (2003). Smoking differences among African American, Hispanic, and White middle school students in urban settings. *Addictive Behaviors, 28*, 513-522.
- Kopstein, A. (2001). *Tobacco use in America: Findings from the 1999 National Household Survey on Drug Abuse* (analytic Series: A-15, DHHS Publication No. SMA 02-3622). Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies.
- Lewis, P., Harrell, J., Bradley, C., & Deng, S. (2001). Cigarette use in adolescents: The cardiovascular health in children and youth study. *Research in Nursing and Health, 24*, 27-37.
- Lloyd, B., Lucas, K., & Fernbach, M. (1997). Adolescent girls' constructions of smoking identities: implications for health promotion. *Journal of Adolescence, 20*, 43-56.

- Lucas, K., & Lloyd, B. (1999). Starting smoking: Girls' explanations of the influence of peers. *Journal of Adolescence*, 22, 647-655.
- Ma, G.X., Shive, St., Legos, P., & Tan, Y. (2003). Ethnic differences in adolescent smoking behaviors, sources of tobacco, knowledge and attitudes toward restriction policies. *Addictive Behaviors*, 28, 249-268.
- MacDonald, M., & Wright, N. E. (2002). Cigarette smoking and the disenfranchisement of adolescent girls: A discourse of resistance? *Health Care for Women International*, 23(3), 281-305.
- Marsiglia, F.F., Kulis, S., & Hecht, M.L. (2001). Ethnic labels and ethnic identity as predictors of drug use among middle school students in the southwest. *Journal of Research on Adolescence*, 11, 21-48.
- Mermelstein, R., and The Tobacco Control Network Writing Group (1999). Explanations of ethnic and gender differences in youth smoking: a multi-site, qualitative investigation. *Nicotine and Tobacco Research*, 1, S91-S98.
- Michell, L., & Amos, A. (1997). Girls, pecking order and smoking. *Social Science and Medicine*, 44(12), 1861-1869.
- The National Center on Addiction and Substance Abuse (2003). *The Formative Years: Pathways to Substance Abuse Among Girls and Young Women Ages 8-22*. New York: Columbia University Press.
- O'Byrne, K., Haddock, K., Poston, W., & Mid American Heart Institute (2002). Parenting style and adolescent smoking. *Journal of Adolescent Health*, 30, 418-425.

- Orlando, M., Tucker, J.S., Ellickson, P.L., & Klein, D.J. (2004). Developmental trajectories of cigarette smoking and their correlates from early adolescence to young adulthood. *Journal of Consulting and Clinical Psychology, 72*, 400-410.
- Pierce, J. P., Lee, L., & Gilpin, E. A. (1994). Smoking initiation by adolescent girls, 1944 through 1988: An association with targeted advertising. *JAMA, 271*, 608-611.
- Ritchey, P. Reid, G., & Hasse, L. (2001). The relative influence of smoking and drinking and drinking on smoking among high school students in a rural tobacco-growing county. *Journal of Adolescent Health, 29*, 386-394.
- Sarason, I., Mankowski, E., Peterson, A. & Dinh, K. (1992). Adolescent's reasons for smoking. *Journal of School Health, 62(5)*, 185-190.
- Scheer, S.D., Borden, L.M., & Donnermeyer, J.F. (2000). The relationship between family factors and adolescent substance use in rural, suburban, and urban settings. *Journal of Child and Family Studies, 9*, 105-115.
- Scheier, L.M., Miller, N.L., Ifill-Williams, M., & Botvin, G.J. (2001). Perceived neighborhood risk as a predictor of drug use among urban ethnic minority adolescents: Moderating influences of psychosocial functioning. *Journal of Child & Adolescent Substance Abuse, 11*, 67-105.
- Schoen, C., Dvais, K., Collins, K.S., Greenberg, L., Des Roches, C., & Abrams, M. (1997). *The Commonwealth Fund Survey of the Health of Adolescent Girls*. New York: Commonwealth Fund.

- Shakib, S., Mouttapa, M., Johnson, A., Ritt-Olsen, A., Trinidad, D.R., Gallaher, P.E., et al. (2003). Ethnic variation in parenting characteristics and adolescent smoking. *Journal of Adolescent Health, 33*, 88-97.
- Siegel, M., Biener, L., & Rigotti, N.A. (1999). The effect of local tobacco sales laws on adolescent smoking initiation. *Preventive Medicine, 29*, 334-342.
- Simantov, E., Schoen, C. & Klein, J. (2000). Health-compromising behavior: Why do adolescents smoke or drink? *Archives of Pediatrics & Adolescent Medicine, 154(10)*, 1025-1050.
- Simons-Morton, B., Crump, A.D., Haynie, D.L., Saylor, K.E., Eitel, P., & Yu, K. (1999). Psychosocial, school, and parent factors associated with recent smoking among early-adolescent boys and girls. *Preventative Medicine, 28*, 138-148.
- Slade, J. (1993). Adolescent nicotine use and dependence. Philadelphia, PA: Hanley & Belfus.
- Sly, D.F., Hopkins, R.S., Trapido, E., & Ray, S. (2001). Influence of a counteradvertising media campaign to initiation of smoking: The Florida “truth campaign. *American Journal of Public Health, 91*, 233-238.
- Staff, M., Bennett, C.M., & Angel, P. (2003). Is restricting tobacco sales the answer to adolescent smoking? *Preventive Medicine, 37*, 529-533.
- Steinberg, L. (1999). *Adolescence* (5th Edition). Boston, MA: McGraw-Hill.
- Steinberg, L. (1990). Autonomy, conflict, and harmony in the family relationship. In S. Feldman & G. Elliott, (Eds.), *At the threshold: The developing adolescent* (pp. 255-276). Cambridge, MA: Harvard University Press.

- Taylor, J.E., Conrad, M.W., O'Bryne, K.K., Haddock, C.K., & Carlos Poston, W.S. (2004). Saturation of tobacco smoking models and risk of alcohol and tobacco use among adolescents. *Journal of Adolescent Health, 35*, 190-196.
- Tucker, J.S., Ellickson, P.L., & Klein, D.J. (2003). Predictors of the transition to regular smoking during adolescence and young adulthood. *Journal of Adolescent Health, 32*, 314-324.
- Tyc, V.L., Hadley, W., Allen, D., Varnell, S., Ey, S., Rai, S.N., et al. (2004). Predictors of smoking intentions and smoking status among nonsmoking and smoking adolescents. *Addictive Behaviors, 29*, 1143-1147.
- Unger, J.B. (2003). Peers, family, media, and adolescent smoking: Ethnic variation in risk factors in a national sample. *Adolescent & Family Health, 3*, 65-70.
- Unger, J.B., Ritt-Olsen, A., Teran, L., Huang, T., Hoffman, B.R., & Palmer, P. (2002). Cultural values and substance use in a multiethnic sample of California adolescents. *Addiction Research and Theory, 10*, 257-279.
- Urberg, K, Cheng, C., & Shyu, S. (1991). Grade changes in peer influence on adolescent cigarette smoking: A comparison of two measures. *Addictive Behaviors, 16*, 21-28.
- Urberg, K., Degirmencioglu, S., & Pilgrim, C. (1997). Close friend and group influence on adolescent cigarette smoking and alcohol use. *Developmental Psychology, 33*, 834-844.
- U.S. Department of Health and Human Services (1994). Preventing tobacco use among young people. A report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control

- and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- Van Den Bree, M.B.M., Whitmer, M.D., & Pickworth, W.B. (2004). Predictors of smoking development in a population-based sample of adolescents: A prospective study. *Journal of Adolescent Health, 35*, 172-181.
- Velicer, W.F., Prochaska, J.O., Rossi, J.S., & Snow, M.G. (1992). Assessing outcomes in smoking cessation studies. *Psychological Bulletin, 111*, 23-41.
- Virginia Farm Bureau Federation. (n.d.). *Virginia Tobacco*. Retrieved February 22, 2005, from <http://www.vafb.com>
- Wallace, Jr., J.M. & Muroff, J.R. (2002). Preventing substance abuse among african american children and youth: Race differences in risk factor exposure and vulnerability. *The Journal of Primary Prevention, 22*, 235-261.
- Wiehe, S.E., Garrison, M.M., Christakis, D.A., Ebel, B.E., & Rivara, F.P. (2005). A systematic review of school-based smoking prevention trials with long-term follow-up. *Journal of Adolescent Health, 36*, 162-169.

Appendices

Figure 1: Ecological Levels and Variables

