Department of Health and Mental Hygiene
Adolescent Executive Summary
August 2003

Introduction

Prevalence of adolescent tobacco use is commonly monitored to measure the effectiveness of tobacco control, prevention, and cessation efforts. The present report addresses the question of whether prevalence alone is the most effective indicator to use in evaluating the efficacy of smoking campaigns for reducing the prevalence of tobacco use in the adolescent population of Maryland. This report uses the Maryland Youth Tobacco Survey (MYTS) administered in the Fall of 2000 to evaluate markers of vulnerability and smoking status that could provide a more sensitive measurement of adolescent smoking.

Nature of the Issues Addressed in this Report

The quantity of cigarettes smoked during one's adolescence is a measure that is typically used to assess smoking behavior and to provide prevalence estimates. This coarse measure of smoking behavior does not take into account cognitions, attitudes, or intentions about smoking. The Stages of Initiation for smoking acquisition, on the other hand, attempts to captures not only prevalence of smoking but also smoking-related intentions, attitudes, and cognitions. The present report examined cigarette smoking among Maryland adolescents using the Stages of Initiation and a prevalence measure assessing the Level of Experience with cigarettes and compared these two ways of examining adolescent smoking on smoking risk and protective factors.

The MYTS data set was evaluated in order to address the following questions:

- Can smoking initiation be successfully staged using MYTS variables?
- How does conceptualizing smoking initiation using the Transtheoretical Model of intentional behavior change compare with measures of smoking prevalence?
- How do Stages of Initiation relate to identified demographic and psychosocial risk and protective factors such as ethnicity and / or peer influence?
- Are measures of adolescent smoking similar across Middle School and High School students and across the counties of Maryland?

Methodology

Analyses were conducted using the MYTS data set. First, individuals were classified according to defined Stages of Smoking Initiation and Levels of Cigarette Smoking Experience. Comparisons were then made on risk and protective factors for smoking initiation, based on those classifications. Finally, comparisons were made by school status and by county of residence.

Key Findings:

I. **Acquisition of cigarette smoking is multidimensional**. Dividing adolescents simply by how many cigarettes they have smoked in their lifetime or in the past 30 days (**Level of Experience**) underestimates their vulnerability to beginning smoking cigarettes when compared to a measure that divides the population by looking at both lifetime and current behaviors as well as attitudes and intentions about smoking in the future (**Stages of Initiation**).

II. Stages of Initiation offer an interesting view of risk and protective factors for smoking initiation and of the shifts in these factors as adolescents move toward beginning smoking and developing a smoking habit. Findings indicate that:

- **More permissive student attitudes about the nature of smoking** are associated with progression through the Stages of Initiation.
- **Increased exposure to peers who smoke** is clearly associated with progression through the Stages of Initiation and is an indicator or mediator of acquisition of the smoking habit.
- **Less environmental exposure to smoking** is associated with ***less*** movement forward through the Stages of Initiation.
- **Increased exposure to tobacco-related advertising and media** is associated with progression through the Stages of Initiation.

III. Before adolescents smoke a single cigarette, Stage of Initiation can provide a sensitive measure for understanding and tracking smoking initiation.

IV. **Important differences in adolescent smoking initiation** were observed as a function of school status and county of residence.

Recommendations

- Interventions should be aimed at preventing movement through the Stages of Initiation toward regular smoking and not simply trying to stop smoking behavior.
- Because of the variability in identified risk and protective factors, both between and within stage of initiation, interventions should be tailored to target individuals within their current stage to prevent or delay smoking initiation.
- County-specific interventions that address population differences across the Stages of Initiation would offer more efficient and hopefully more effective strategies for smoking prevention than blanket statewide interventions.
- Smoking prevention interventions should address differences in the Stages of Initiation between middle and high school students. More interventions efforts should be directed at the high school level.

Summary

The Stages of Initiation are important indicators for evaluating smoking control and prevention efforts. When used in conjunction with smoking-related risk and protective factors, stages of initiation provide a better model for designing, implementing and evaluating successful prevention efforts than cigarette prevalence estimates alone. Continued research needs to be conducted in order to determine how best to apply these indicators to the creation of successful smoking prevention programs.

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DHMH ADOLESCENT DATA REPORT
The Maryland Youth Tobacco Survey (MYTS)
August 2003

Introduction

Prevalence of tobacco use experiences or number of cigarettes smoked by youth is the commonly monitored metric used to measure the effectiveness of tobacco control, prevention, and cessation efforts. However, prevalence of cigarette smoking, either in one's lifetime or in the last 30 days, is a rather insensitive measure of the activities and experiences that facilitate the process of change that moves adolescents toward smoking initiation or cessation. The objective of this report is to evaluate whether more sensitive measures of smoking attitudes, activities, and experiences would be helpful to evaluate the effectiveness of the various smoking prevention and cessation campaigns in the adolescent population of Maryland. The report uses the Maryland Youth Tobacco Survey (MYTS) that was administered from October 2 through November 15, 2000 to youth in grades 6 through 12 enrolled in Maryland public schools. The survey was created to provide a baseline measure of youth tobacco use in Maryland and a means of evaluating the efficacy of existing tobacco control activities. Although the prevalence of tobacco use and basic demographics for the MYTS have already been reported (Initial Findings from the Baseline Tobacco Study), the Department of Health and Mental Hygiene (DHMH) requested that researchers from the University of Maryland, Baltimore County (UMBC) led by Dr. Carlo DiClemente and Dr. Steven Pitts[1] analyze the MYTS data in order to evaluate a classification of these adolescents according to the stages of smoking initiation described in the Transtheoretical Model of Intentional Behavior Change (DiClemente, 2003). Given that these stages take into account smoking-related attitudes, intentions, and behaviors, the Stages of Initiation could offer a more sensitive measure of change than smoking prevalence rates. The present report was funded through a subcontract between UMBC and DHMH with funds derived from the Master Settlement Agreement from the tobacco industry lawsuit of 1998.

Background

General Adolescent Smoking Information

Up to 5,000 youth begin experimenting with cigarettes and approximately 3,000 youth move from experimentation to regular smoking every day in the United States (Gilpin, Choi, Berry & Pierce, 1999). One-third of these young smokers will become tobacco dependent (Anthony, Warner & Kessler, 1994). Eighty percent of regular smokers had initiated cigarette use by the age of 18 (Centers for Disease Control and Prevention [CDCP], 2000), a statistic that has led the Surgeon General to identify cigarette smoking as a pediatric epidemic (U.S. Department of Health and Human Services, 1994).

Adolescence is often cited as a time of great upheaval due to social, emotional, cognitive and physical changes in development. It is during this time of massive change that adolescents begin defining their identity (Williams, Holmbeck & Greenley, 2002). For example, adolescents are thought to smoke in order to assert their maturity and to strive for autonomy and independence. Social modeling of adult and peer behavior is hypothesized as another important reason for smoking initiation (Rowe & Linver, 1995).

Cigarette smoking is the overall leading preventable cause of morbidity and mortality in the United States, contributing to 440,000 deaths each year (CDCP, 2002a). As a result of the physical consequences of smoking, approximately 75 billion dollars are spent each year on

[1] This team included graduate research assistants Janine Delahanty, Jennifer Malson, and Amanda Keevican.

health care for smokers (CDCP, 2002a). Despite these statistics, over 60% of adolescents in the United States have tried cigarette smoking (even one or two puffs) and almost 30% reported current cigarette use (past 30 days) in 2001 (CDCP, 2002b).

Over half of those adolescents who smoke regularly want to stop smoking (CDCP, 2000). However, when they attempted to quit smoking, more than 90% of adolescent daily smokers reported experiencing at least one symptom of nicotine withdrawal (e.g., difficulty concentrating, irritability, cigarette cravings) (CDCP, 1994). While approximately 60% of adolescent smokers have attempted to stop smoking during the past year, less than 5% of those who quit were successful in maintaining their abstinence for more than 3 months (CDCP, 2000).

Because smoking cessation is difficult to achieve, prevention should be a major goal. It is imperative to reduce the rates of adolescent smoking initiation, to delay the onset of cigarette smoking in those who will begin smoking, and to increase the likelihood of successful cessation once smoking is established among this population. Changing adolescent smoking-related attitudes behavior will decrease rates of smoking initiation, use, and dependence and could potentially decrease the morbidity and mortality rates associated with cigarette smoking.

Predictors of Smoking Initiation among Adolescents

Previous studies have been conducted to identify factors that predict smoking initiation among adolescents. Demographic variables that are associated with smoking initiation include low socioeconomic status (Conrad, Flay & Hill, 1992; Tyas & Pederson, 1998), Caucasian ethnicity (Griesler, Kandel, & Davies, 2002; Ellickson, McGuigan, & Klein, 2001), and being young for one's peer group (Ellickson et al., 2001). Psychological predictors of smoking initiation include having intentions to smoke in the near future (Ellickson et al., 2001; Conrad, Flay & Hill, 1992), lower academic achievement (Pederson, Koval, O'Connor, 1997; Ellickson et al., 2001), poor social skills (Conrad, Flay & Hill, 1992), poor coping strategies (Siqueira et al., 2000), and depression (Escobedo, Reddy, & Giovino, 1998). There are also social factors associated with the acquisition of smoking behavior among adolescents including associating with deviant, anti-social peers (Oxford et al., 2000), having close friends who have tried smoking (Pederson, et al., 1997), having promotional smoking merchandise (Sargent, Dalton, & Beach, 2000), and being exposed to smoking in movies (Dalton et al., 2003).

Health and Addictive Behavior Change

Behavior changes involving addiction and health, including both smoking initiation and cessation, are often conceptualized as occurring in a series of stages (DiClemente, 2003). According to the Transtheoretical Model (TTM) of behavior change, individuals move through five different stages on the road to developing a well-maintained pattern of behavior (Prochaska, DiClemente, & Norcross, 1992). There are a series of distinct cognitive and behavioral markers that can describe each of the five stages of change: Precontemplation, Contemplation, Preparation, Action and Maintenance.

Precontemplation describes the stage in which an adolescent is not considering adopting or changing a particular behavior. When **staging the initiation** of smoking behavior, someone in Precontemplation would be a non-smoker who is not considering smoking at any time in the foreseeable future. As the adolescent enters *Contemplation,* he or she becomes more aware of smoking, is open to considering smoking, and/or experiences some desire to experiment with smoking a cigarette. This stage likely describes a large number of individuals, who think about trying smoking, but lack sufficient commitment to adopt the new behavior. The *Preparation*

stage includes individuals who not only are interested in smoking, but also have some intention to smoke in the near future, typically within the next 30 days. Someone in the Preparation stage of change for smoking initiation might seek out individuals who smoke and may begin to experiment more regularly with cigarette smoking. In addition, tobacco advertising may become more salient to these individuals and they will begin to find more pros of smoking than cons.

The *Action* stage is defined by some pattern of regular smoking behavior. As individuals progress through this stage, they develop a pattern of regular smoking and they begin to change their environment so that the behavior is more likely to occur. The Action stage typically lasts up to 6 months of a regular pattern of smoking. If smoking behavior is not viewed as sufficiently reinforcing, individuals may move back into one of the earlier stages of change. When considering smoking acquisition, the Action stage of change includes altering routines, reallocating time, and developing strategies to cope with the new behavior and the many environmental barriers associated with the newly acquired smoking behavior. The fifth stage, *Maintenance*, consists of ongoing integration of cigarette smoking into the individual's life. Individuals in this stage have an established pattern of regular smoking that has lasted more than six months.

While most prevention interventions have reduction in initiation rates as their distal outcome, a more sensitive measure of change is needed in order to fully identify the intermediary effects of these interventions. Therefore, the use of a proximal outcome such as movement through the Stages of Initiation could serve as a proxy measure to indicate the success of prevention efforts aimed at reducing smoking initiation and use among adolescents. Using the MYTS survey the present report examined cigarette smoking among Maryland adolescents using the Stages of Initiation and the Level of Experience with cigarettes and compared these two ways of examining adolescent smoking on smoking risk and protective factors.

Objectives

Aims of Analysis:

The MYTS data set was evaluated in order to address the following questions:

- Can smoking initiation be successfully staged using MYTS variables?
- How does conceptualizing smoking initiation using the Transtheoretical Model of intentional behavior change compare with measures of smoking prevalence?
- How do Stages of Initiation relate to identified demographic and psychosocial risk and protective factors such as ethnicity and / or peer influence?
- Are measures of adolescent smoking similar across Middle School and High School students and across the counties of Maryland?

Level of Experience

Level of Experience evaluates adolescents' experiences with actual smoking behavior. These are the traditional prevalence estimates used to track smoking in various surveys of adolescents. This measure focuses completely on lifetime or current (past 30 days) smoking in terms of numbers of cigarettes and does not take into account a student's cognitions, attitudes or intentions about smoking.

Stages of Initiation

One of the aims of this report is to evaluate the applicability of the Stages of Initiation for smoking among Maryland adolescents. Examining only adolescent level of experience with smoking provides prevalence rates of behavior and excludes other important factors, such as intentions and cognitions. The Stage of Initiation for smoking acquisition uses both experience with smoking and attitudes and intentions about smoking to create a measure more sensitive to initiation because it focuses not only on the number of and most recent smoking events but also future intentions and behaviors.

Smoking Initiation Staging Questions

Four questions were used to stage smoking initiation and ascertain level of experience in the present report:

- **Prevalence:** About how many cigarettes have you smoked in your entire life (Q8)?
- **Intention:** Do you think you will smoke a cigarette in the next year (Q45)?
- **Rate of Current Smoking:** During the past 30 days, on how many days did you smoke (Q10)?
- **Duration of Current Smoking:** How long have you smoked at your current rate (Q12)?

Level of Experience and Stage of Initiation

In Figure 1 we outline the MYTS questions and responses used to classify students into their Level of Experience with cigarettes and their Stage of Initiation for smoking. Students were classified as Inexperienced in relation to cigarette smoking if they reported smoking no

cigarettes in their entire lives. For assessing stages of initiation, however, these Inexperienced students were further subdivided based on whether or not they had future intentions of smoking cigarettes in the next year. Students in Precontemplation reported no future intentions to smoke whereas students in Contemplation reported some probability that they may smoke in the next year. Students were classified as Exposed to smoking cigarettes if they had smoked 1 or more puffs but less than 6 cigarettes in their entire lives. These Exposed students were also further subdivided into stages based on their future intentions to smoke (i.e., Precontemplation, Contemplation, or Preparation). Finally, students were classified as Experienced in smoking cigarettes if they have had smoked 6 or more cigarettes in their entire lives. Once again these experienced students were further subdivided into stages based on their future intentions to smoke and current smoking behavior. This initial staging resulted in 11 distinct subgroups as a function of stage of initiation and cigarette use history (e.g., Contemplators who have never tried a cigarette vs. Contemplators who have tried cigarettes vs. Contemplators who have smoked 6 to 99 cigarettes, but are not currently smoking). Students who smoked more than 100 cigarettes lifetime were considered lifetime smokers and were only included if they were currently smoking.

Table 1. contains the final classification of students based on their Level of Experience with smoking and their Stage of Initiation.

Stages of Initiation of Cigarette Smoking

As seen in Figure 1 and Table 1, data from the MYTS were used to classify all students with various stages of acquisition of cigarette smoking**,** based on their responses to behavioral and attitudinal questions. Consistent with the five stages proposed by the Transtheoretical Model, the groups were collapsed into five Stages of Initiation. Thus, all students in the Precontemplation Stage of Initiation (i.e., Inexperienced Precontemplators and Experienced Precontemplators) were collapsed into 1 group of Precontemplators. All other Stages of Initiation were collapsed in a similar fashion, producing 5 Stages of Initiation (Precontemplation, Contemplation, Preparation, Action and Maintenance). Although additional analyses could be conducted to examine differences in the 11 groups, potentially resulting in increased sensitivity, analyses in this report used only the 5 stage subgroups and the 3 levels of experience.

School Status

In general, rates of smoking prevalence have been found to differ between Middle and High School student, such that the uptake of cigarette smoking is much greater in High School. Accordingly, analyses considered the interaction between smoking status (Level or Stage) and school status (i.e., Middle vs. High School). Middle School (MS) status was defined as grades 6 through 8 while High School (HS) status was defined as grades 9 through 12. Although this type of analysis provides better sensitivity, for ease of interpretation, initial analyses were presented graphically for the total sample rather than separately for Middle School and High School.

Risk and Protective Factors

Risk and protective factors identified in the smoking literature guided the choice of variables examined in this present report. Risk factors are defined as variables increasing "the likelihood of engaging in a problem behavior" (Jessor, Van Den Bos, Vanderryn, Costa, & Turbin, 1995, p. 924). Risk factors increase an individual's vulnerability to experiment with

smoking (promote movement through the stages). On the other hand, protective factors are related to less initiation of smoking behavior and prevent movement through the Stages of smoking acquisition.

Logistic Regression

Logistic Regression is the appropriate analytical technique for dichotomous outcomes (i.e., Yes vs. No) with categorical (i.e., Stage of Change or Level of Experience) or continuous predictor variables. One of the distinct advantages to using Logistic Regression is it allows for controlling (co-varying) other independent variables. The results obtained from logistic regression are odds ratios, which indicate the relative increase in odds of one behavior relative to another. Examples of interpreting odds ratios will be provided when odds ratios are first considered.

Figure 1.

About how many cigarettes have you smoked <u>in your entire life</u>? (Q8)

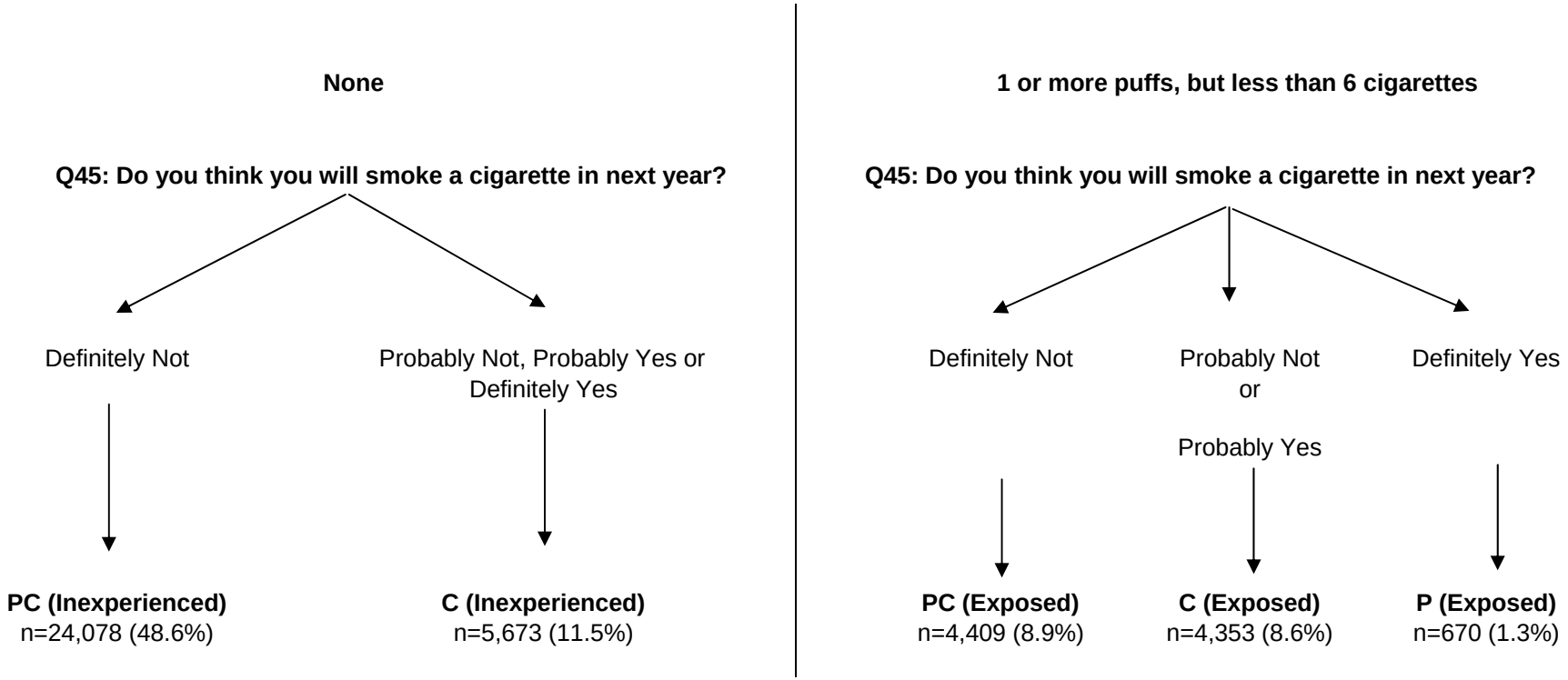


Figure 1. (cont)

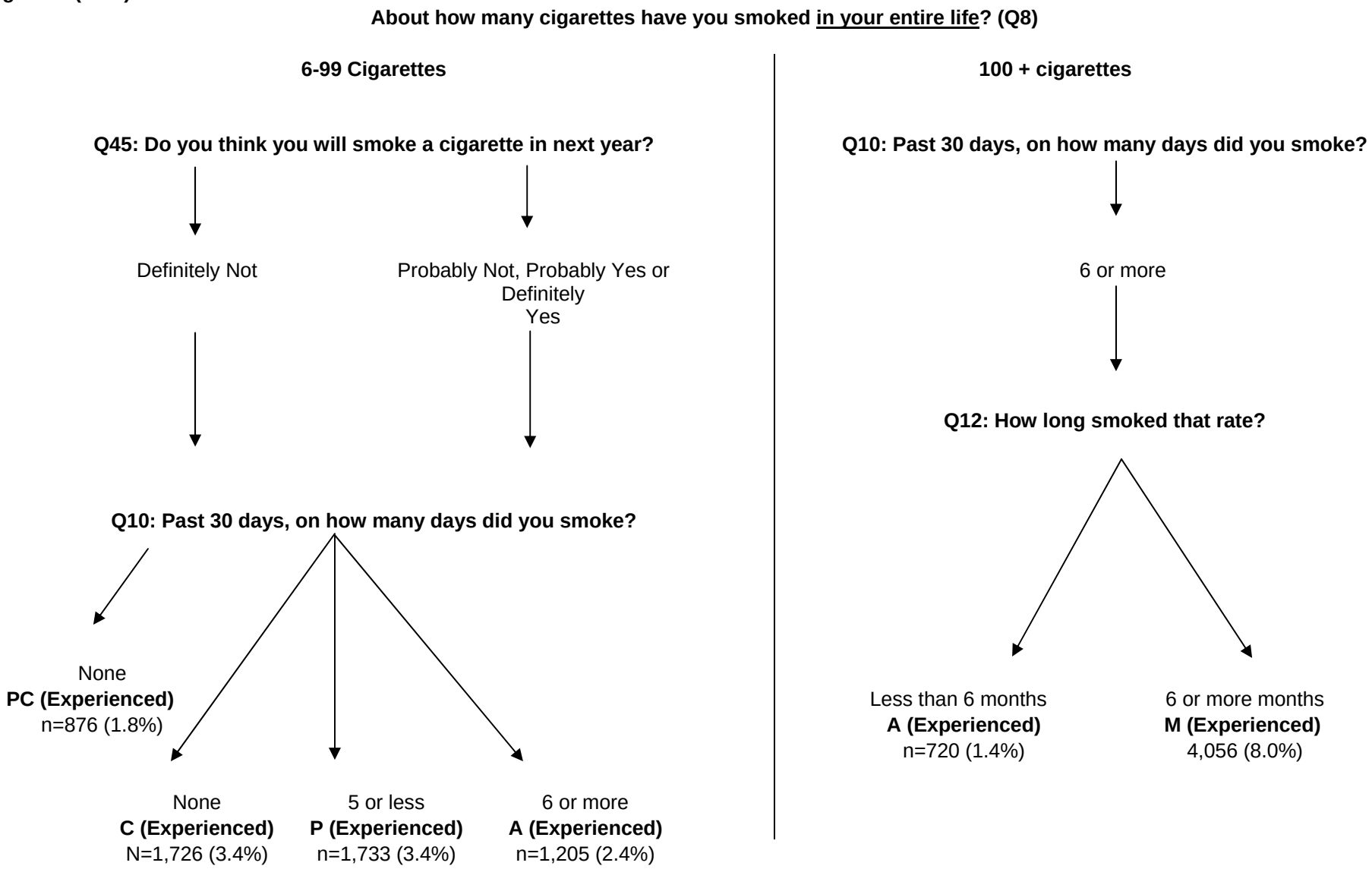


Table 1. Level of Experience and Stage of Smoking Initiation

Stages & Level	Definitions	Corresponding MYTS Questions
Inexperienced		
Precontemplation	Youth who have never smoked a whole cigarette in their entire life and definitely do not plan to smoke a cigarette within the next year.	Q8 = 1 (In entire life never smoked a whole cigarette) and Q45 = 4 (Definitely Will Not smoke a cigarette during the next year)
Contemplation	Youth who have never smoked a whole cigarette in their entire life and may or may not smoke at some time during the next year.	Q8 = 1 (In entire life never smoked a whole cigarette) and Q45 = 1, 2 or 3 (Definitely Will, Probably Will or Probably Will Not smoke a cigarette during the next year)
Exposed		
Precontemplation	Youth who have smoked up to five cigarettes in their entire life but are definitely not planning on smoking a cigarette during the next year.	Q8 = 2, 3, or 4 (In entire life smoked between 1 or more puffs and less than 6) and Q45 = 4 (Definitely Will Not smoke a cigarette during the next year)
Contemplation	Youth who have smoked up to five cigarettes in their entire life and may or may not smoke at some time during the next year.	Q8 = 2, 3 or 4 (In entire life smoked between 1 or more puffs and less than 6) and Q45 = 2 or 3 (Probably Will or Will Not smoke a cigarette during the next year)
Preparation	Youth who have smoked up to five cigarettes in their entire life and definitely plan on smoking at some time during the next year.	Q8 = 2, 3 or 4 (In entire life smoked between 1 or more puffs and less than 6) and Q45 = 1 (Definitely Will Smoke a cigarette during the next year)
Experienced		
Precontemplation	Youth who have smoked between 6 and 99 and cigarettes in their entire life (but have not smoked during the past 30 days) and are definitely planning on smoking a cigarette during the next year.	Q8 = 5,6, or 7 (In entire life smoked between 6 and 99 cigarettes) and Q45 = 4 (Definitely Will Smoke a cigarette in the next year) and Q10 = 1 (during the past 30 days smoked 0 days)
Contemplation	Youth who have smoked between 6 and 99 cigarettes in their entire life (but have not smoked during the past 30 days) and may or may not smoke a cigarette during the next year.	Q8 = 5,6, or 7 (In entire life smoked between 6 and 99 cigarettes) and Q45 = 1,2, or 3 (Definitely Will, Probably Will or Probably Will Not smoke a cigarette during the next year) and Q10 = 1 (during the past 30 days smoked 0 days)
Preparation	Youth who have smoked between 6 and 99 cigarettes in their entire life and have smoked up to 5 days during the past 30 and are definitely planning on smoking a cigarette during the next year.	Q8 = 5,6, or 7 (In entire life smoked between 6 and 99 cigarettes) and Q45 = 1,2, or 3 (Definitely Will, Probably Will or Probably Will Not smoke a cigarette during the next year) and Q10 = 2 or 3 (during the past 30 days smoked between 1 and 5 days)
Action	Youth who have smoked 6 to 99 cigarettes in their entire life and have smoked 6 or more days during the past 30 days and may or not smoke a cigarette within the next year **OR** youth who have smoked 100 or more cigarettes in their entire life and have smoked 6 or more days during the past 30 days and have smoked for at least one day but less than 6 months.	Q8 = 8 (In entire life smoked between 6 and 99 cigarettes) and Q45 = 1,2, or 3 (Definitely Will, Probably Will or Probably Will Not smoke a cigarette during the next year) and Q10 > 3 (during the past 30 days smoked 6 or more days) for Action (6-99) **OR** Q8 = 8 (In entire life smoked more than 100 or more cigarettes) and Q10 > 3 (during the past 30 days smoked 6 or more days) and Q12 =2 or 3 (smoked for at least one day but less than 6 months) (for Action 100+)
Maintenance	Youth who have smoked more than 100 cigarettes in their entire life and smoked 6 or more days during the past 30 days and have smoked for at least 6 months.	Q8 = 8 (in entire life smoked more than 100 or more cigarettes) and Q10 > 3 (during the past 30 days smoked 6 or more days) and Q12 > 3 (smoked for at least 6 months)

Methodology

Survey Methodology

The MYTS was a classroom-based survey, conducted in public schools throughout the state of Maryland between October 2nd and November 15, 2000. 55,967 Maryland students enrolled in grades 6 through 12 participated in the survey. Public schools were randomly selected to participate. 89.5% of eligible middle school students and 84.8% eligible high school students chose to participate. See *Initial Findings from the Baseline Tobacco Study* (2001) from DHMH for more information.

Dropped

The full sample was 55,967 of Middle and High School students. Those aged 19 years and older were dropped from the analyses (n = 218) because they could represent a different population. Individuals aged 19 years and older are typically less likely to be in high school. An additional 4,857 cases were dropped from the analyses due to missing staging criteria data; 582 cases were dropped due to inconsistent data. In order to only assess those in the initiation process, reformed smokers, individuals who have smoked over 100 cigarettes but are not now smoking were eliminated from these analyses (n = 811). This resulted in eliminating 8.8% of the full sample. Our analyses are based on a final sub-sample of 49,499**.** The students who were dropped from our analyses were less likely to be White (50.8%) than those students included in the analyses (69.2% White), chi-square = 710.78, $p < .0001$. Similarly, the students who were dropped from our analyses were more likely to be Male (59.1%) than those students included in the analyses (48.2% Male), chi-square = 217.40, $p < .0001$.

Limitations of the MYTS Survey

Because the MYTS was conducted in public schools, the results underrepresented individuals who do not attend school, those whose parents did not elect for them to participate in the survey, and those absent on the day of the survey administration. The survey also underrepresented those who attend special and private schools.

Staging Methodology for Smoking Initiation and Level of Experience

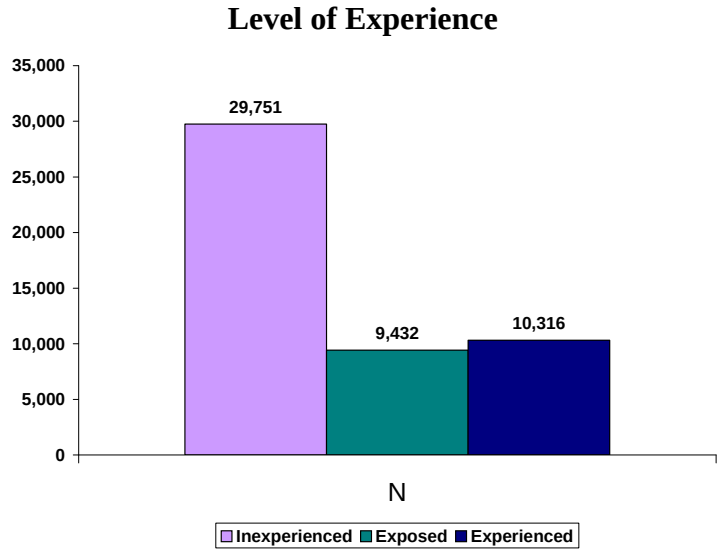
Definition of Stages of Initiation

- Precontemplation – Youth who are not currently smoking and are not planning on smoking within the next year.
    - Inexperienced: Youth who have never smoked a whole cigarette in their entire life and definitely do not plan to smoke a cigarette within the next year
    - Exposed: Youth who have smoked up to five cigarettes in their entire life, but are definitely not planning on smoking a cigarette during the next year
    - Experienced: Youth who have smoked between 6 and 99 cigarettes in their entire life, but not during the past 30 days, and are definitely not planning on smoking a cigarette during the next year.
- Contemplation – Youth who are not currently smoking and have some thoughts about smoking a cigarette in the next year.
    - Inexperienced: Youth who have never smoked a whole cigarette in their entire life and have some thoughts about smoking a cigarette at some time during the next year

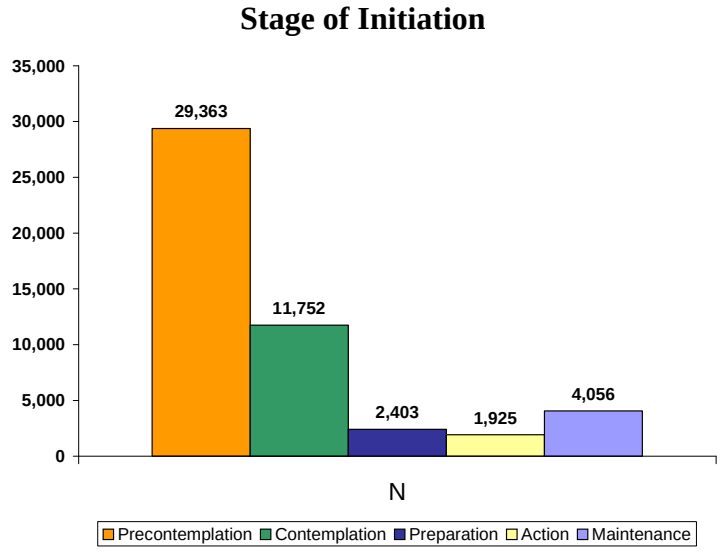
    - Exposed: Youth who have smoked up to five cigarettes in their entire life and have some thoughts about smoking at some time during the next year
    - Experienced: Youth who have smoked between 6 and 99 cigarettes in their entire life, but not during the past 30 days, and have some thoughts about smoking a cigarette during the next year.
- Preparation – Youth who have minimally tried cigarettes (less than 99 in their lifetime) who may be currently smoking (less than 5 days in past 30) and definitely plan on smoking within the next year.
    - Exposed: Youth who have smoked up to five cigarettes in their entire life and definitely plan on smoking at some time during the next year
    - Experienced: Youth who have smoked between 6 and 99 cigarettes in their entire life, and have smoked up to 5 days during the past 30 days, and are definitely planning on smoking a cigarette during the next year.
- Action
    - Experienced: Youth who have smoked more than 6 cigarettes (i.e., 6-99 or 100+ cigarettes) in their entire life, and have smoked 6 or more days during the past 30 days and have smoked for less than 6 months, and have expressed some probability of smoking a cigarette within the next year.
- Maintenance
    - Experienced: Youth who have smoked more than 100 cigarettes in their entire life, smoked 6 or more days during the past 30 months and have smoked for at least 6 months, and have some probability of smoking a cigarette within the next year.

What follows is an analysis of adolescent smoking by Level of Experience and Stages of Initiation that will present distribution n the populations and evaluate:

Distribution of Final Sample by Level of Experience and Stage of Initiation



Inexperienced – 60.1%
Exposed – 19.1%
Experienced – 20.8%



Precontemplation – 59.3%
Contemplation – 23.7%
Preparation – 4.9%
Action – 3.9%
Maintenance – 8.2%

Demographic Characteristics of the Sample

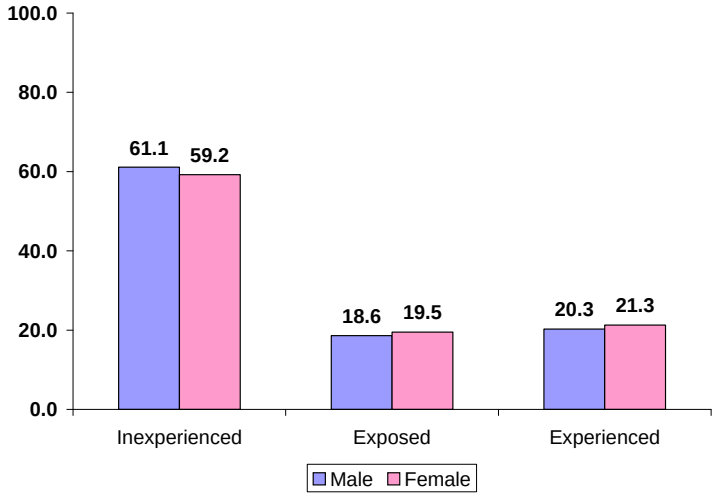
Table 2. Sample Demographics

	N[1]	%
Gender		
Male	23650	48.0
Female	25661	52.0
Race		
American Indian/Alaskan Native	1013	2.1
Asian	1535	3.2
Black or African American	10231	21.0
Hispanic or Latino(a)	1378	2.8
Native Hawaiian or other Pacific Islander	456	0.9
White	34055	70.0
Non-White vs. White		
Non-White	15340	31.1
White	34055	68.9
Age		
12 years or younger	13186	26.7
13 years	6808	13.8
14 years	7783	15.8
15 years	8036	16.3
16 years	7192	14.6
17 years	5525	11.2
18 years	882	1.8
Grade		
6^{th}	7102	14.5
7^{th}	6476	13.2
8^{th}	6397	12.9
9^{th}	8176	16.7
10^{th}	7961	16.3
11^{th}	6901	14.1
12^{th}	5936	12.1

[1] Analyses based on adolescents less than 19 years of age who had complete data on the staging variables. Sample sizes differ as a function of missing data on demographic variables.

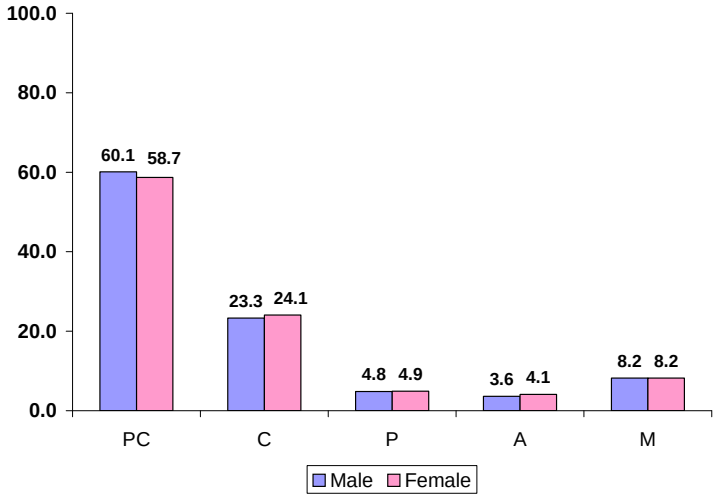
Section I. Demographic Comparisons by Level of Experience and Stage of Initiation

Gender by Level of Experience



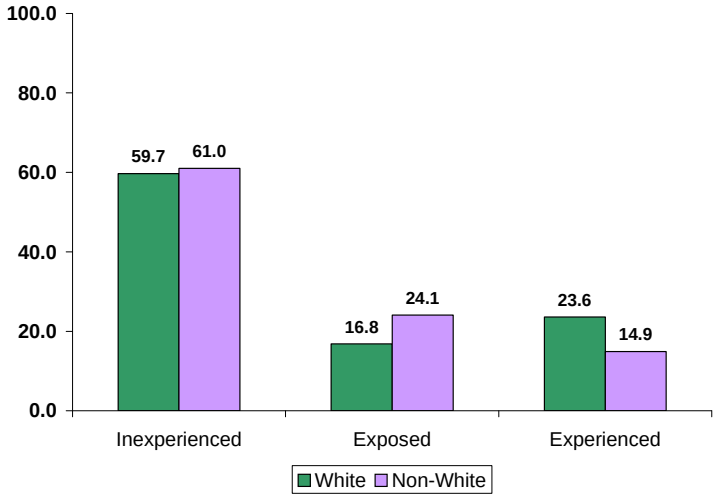
Chi-Square = 19.52, p < .0001

Gender by Stage of Initiation



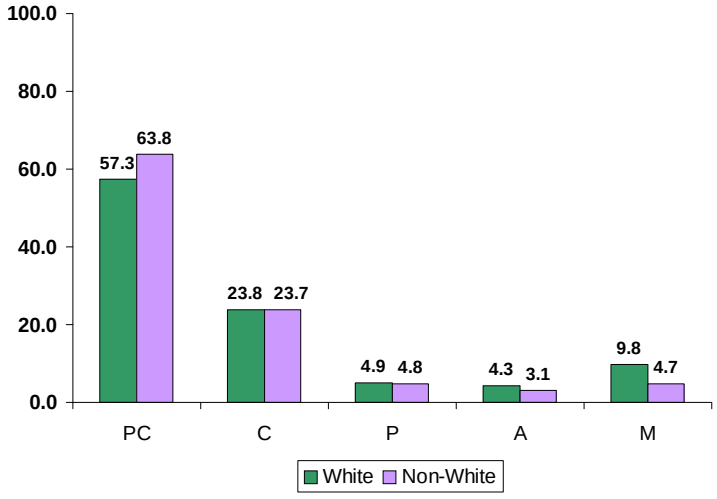
Chi-Square = 15.74, p = .003

Ethnicity by Level of Experience



Chi-Square = 682.91, p < .0001

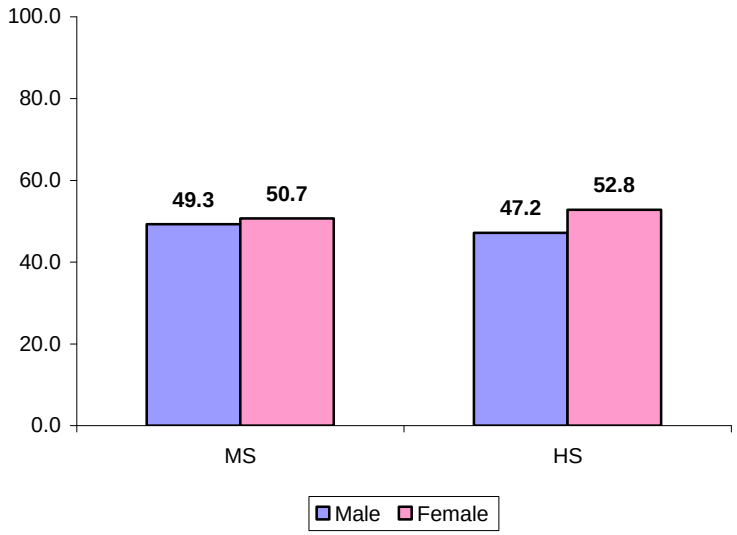
Ethnicity by Stage of Initiation



Chi-Square = 445.04, p < .0001

Section II. School Status

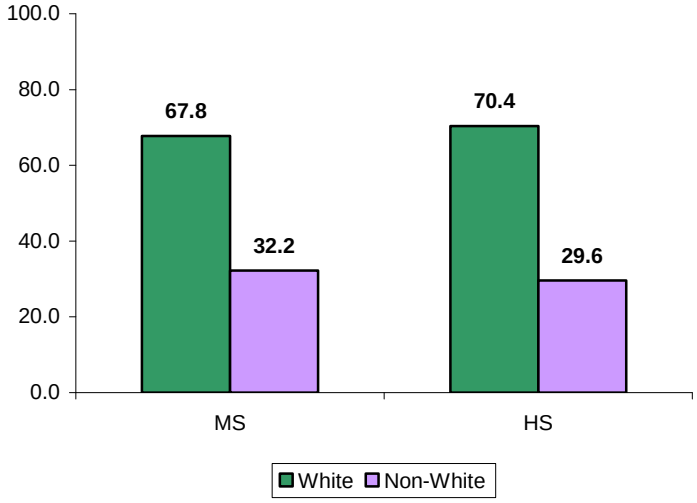
Gender by School Status



Chi-square = 20.51, p < .0001

- Although gender was roughly equivalent by school status, there were slightly more females in both middle school and high school.

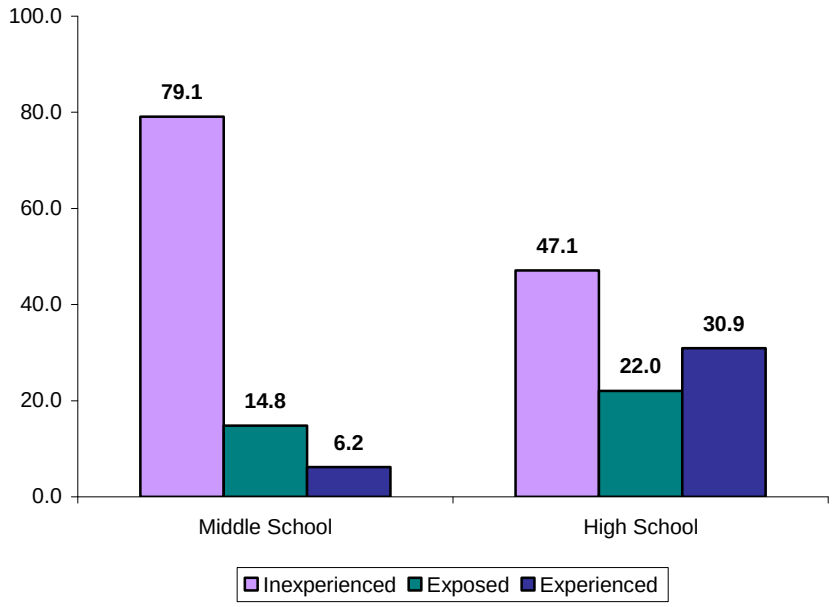
Ethnicity by School Status



Chi-square = 40.43, p < .0001

- There were significantly more Whites than Non-Whites in both Middle School and High School, which approximately reflects the distribution of adolescents in Maryland.

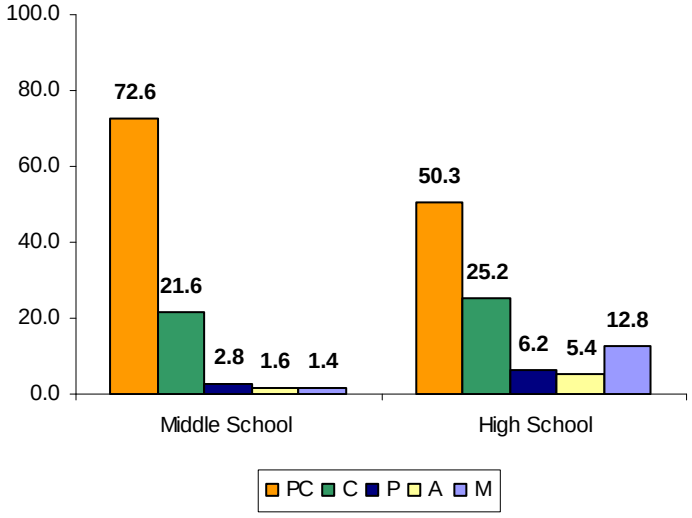
Level of Experience by School Status



Chi-square = 5,794.24, p<.0001

- The majority of students in both Middle and High School have no experience with smoking, but students in High School have higher levels of overall experience

Stage of Initiation by School Status



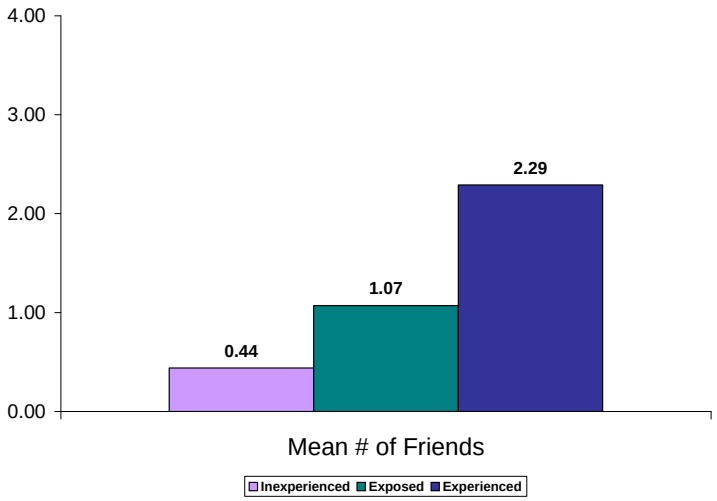
Chi-Square = 3,677.09, p < .0001

- Students in High School are more likely to have progressed further in the Stages of Initiation than students in Middle School

Section III. Peer Smoking and Influence by Level of Experience and Stage of Initiation

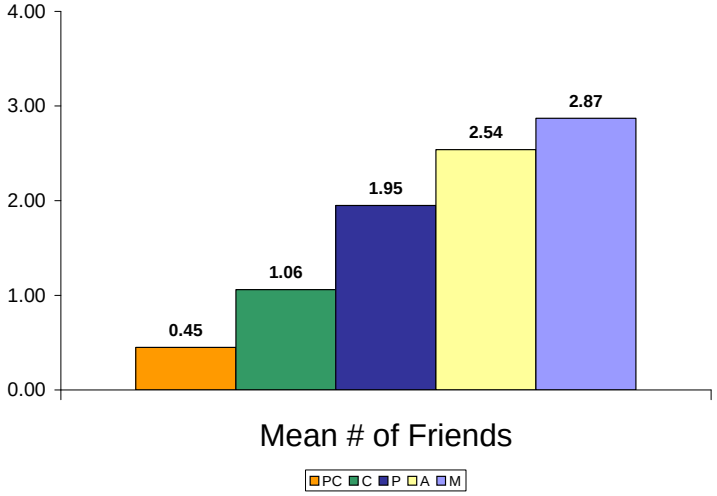
Q85: How many of your four closest friends smoke (Risk Factor)?

Level of Experience



F = 8,599.17, df = 2, p < .0001
Adjusted R^2 = .301
Experienced > Exposed > Inexperienced
(> = significant differences between groups)

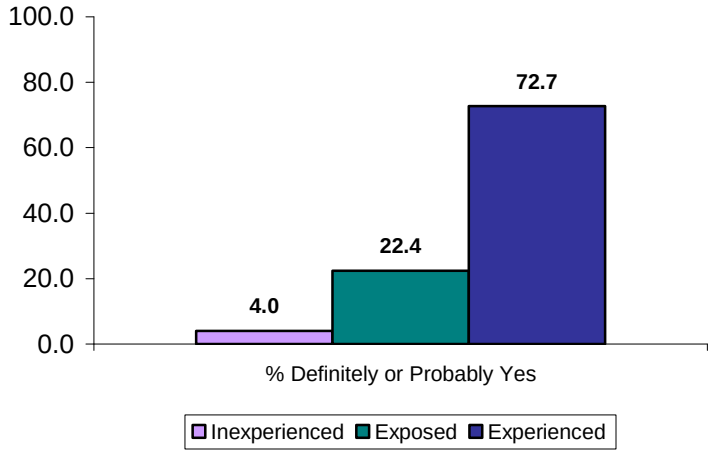
Stage of Initiation



F = 5,068.76, df = 4, p < .0001
Adjusted R^2 = .337
Maintenance > Action > Preparation > Contemplation > Precontemplation

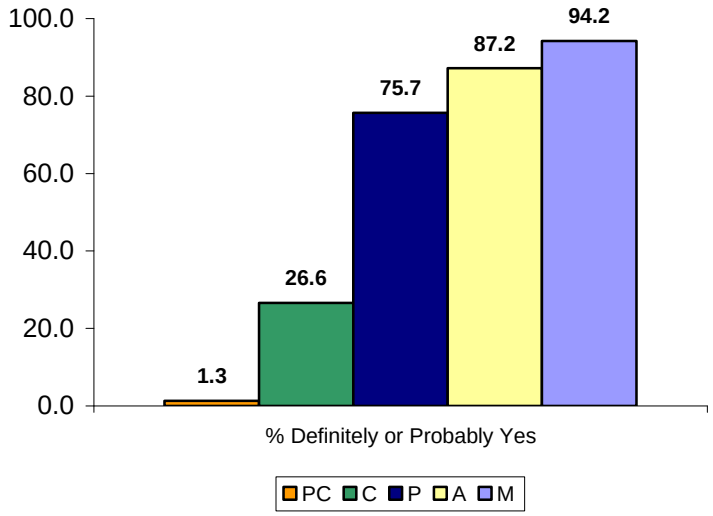
Q47: If one of your best friends offered you a cigarette, would you smoke it (Risk Factor)?

Level of Experience



Chi-square = 21,037.41, p < .0001
Experienced > Exposed > Inexperienced
(> = significant differences between groups)

Stage of Initiation



Chi-square = 28,591.10, p < .0001
Maintenance > Action > Preparation > Contemplation > Precontemplation

Peer Smoking and Influence by Level of Experience and Stage of Initiation Summary

- Overall, students who reported a greater number of close friends who smoked were at an increased risk for smoking themselves. Current smokers (i.e., those in Action or Maintenance) and experienced smokers have the greatest number of friends who smoke.
- As the design is correlational, it is not possible to determine the direction of this relation. For example:
    1. Smoking peers may influence the youth's smoking behaviors and intentions.
    2. As the youth's behavior and cognitions regarding smoking change, he or she may be more likely to seek out friends who smoke.
    3. This relation may be bidirectional. That is, having friends who smoke may influence the youth's smoking behavior and, in turn, the smoking youth may seek out friends who smoke.
- The pattern of association between youth smoking and number of smoking friends mimics the relation seen among adult smokers and smoking friends.
- Differences between the Action and Maintenance Stages of Initiation were significant, suggesting an increased sensitivity for Stage of Initiation relative to Level of Experience
- Of particular interest is the fact that students in the Preparation Stage of Initiation are more similar to regular smokers than to students who are currently not smoking. Level of Experience does not reveal this striking difference in vulnerability. These students appear to be more susceptible to peer influence.
- The increased sensitivity of Stage of Initiation is also evident when corresponding odds ratios are examined (next page). For example, a Middle School student in the Maintenance Stage of Initiation is over 900 times more likely than a Middle School student in Precontemplation to accept a cigarette from his or her best friend. When examining this relation by Level of Experience, an Experienced student is only 83 times more likely than an Inexperienced student to accept a cigarette when offered one by a best friend. Similar patterns of sensitivity of the Stages of Initiation are present among High School students.

Results of Logistic Regressions by Level of Experience and School Status

Q47: If one of your best friends offered you a cigarette, would you smoke it (Risk Factor)?

Level of Experience

ORs for Inexperienced vs. Each Other Level of Experience

	Middle School		High School	
	OR	CI	OR	CI
Inexperienced	1.0	--	1.0	--
Exposed	10.9 ***	9.7 - 12.3	5.1 ***	4.6 - 5.7
Experienced	83.1 ***	71.2 - 97.0	54.3 ***	49.5 - 59.6

* p < .05; ** p < .01; *** p < .001

Stage of Initiation

ORs for Precontemplation vs. Each Other Stage of Initiation

	Middle School		High School	
	OR	CI	OR	CI
Precontemplation	1.0	--	1.0	--
Contemplation	28.7 ***	24.3 - 33.9	27.7 ***	23.8 - 32.2
Preparation	371.0 ***	285.0 - 482.8	211.5 ***	177.2 - 252.5
Action	626.4 ***	432.4 - 907.6	501.3 ***	408.2 - 615.7
Maintenance	929.3 ***	590.9 - 1461.4	1281.5 ***	1048.2 -1566.8

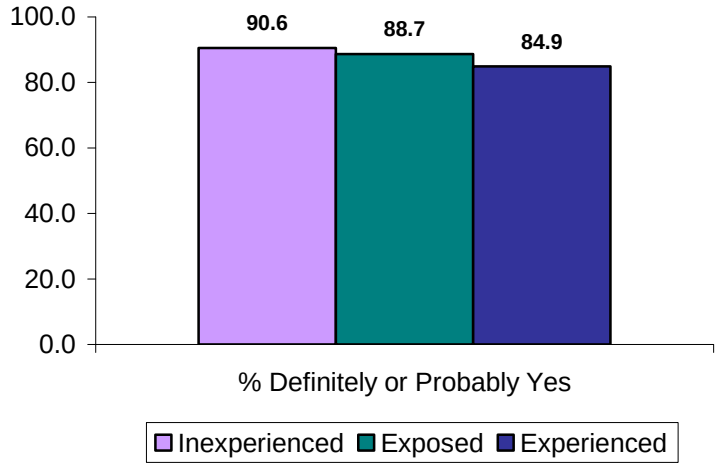
* p < .05; ** p < .01; *** p < .001

Interpreting the odds ratios: Odds ratios are the relative increase in odds of saying "yes" on the outcome due to staging on the predictor variables (i.e., Level of Experience or Stage of Initiation). For example, the odds that an Exposed Middle School student will accept a cigarette (if his or her best friend offered it) are 10.9 times greater than an Inexperienced Middle School student, while the odds that an Exposed High School student will accept a cigarette are only 5.1 times greater than an Inexperienced High School student. Considering Stage of Initiation, the odds that a Middle School student in Contemplation will accept a cigarette are 28.7 times greater than a Middle School student in Precontemplation, while the odds that a High School student in Contemplation are 27.7 times greater than a High School student in Precontemplation.

Section IV: Student Attitudes About the Nature of Smoking

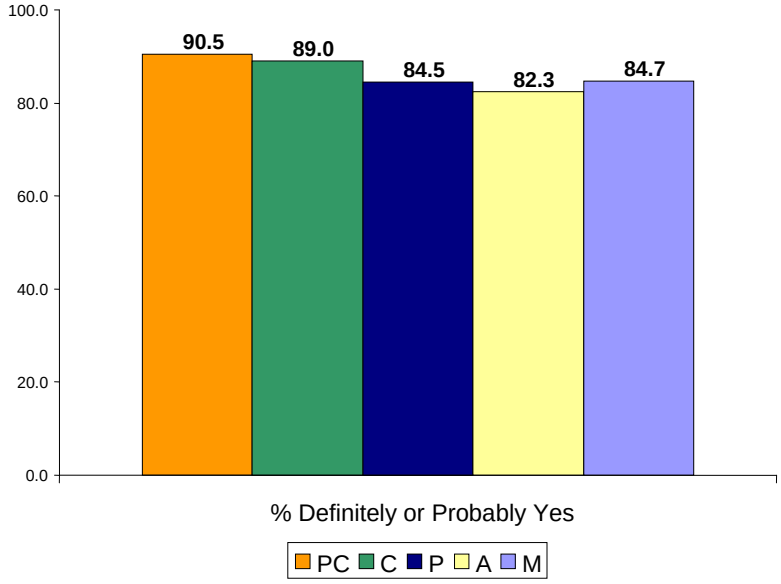
Q53: Do You Think That People Can Be Addicted to Using Tobacco Just Like They Can Get Addicted to Using Cocaine or Heroin (Protective Factor)?

Level of Experience



Chi-square = 247.23, p <.0001
Inexperienced > Exposed > Experienced

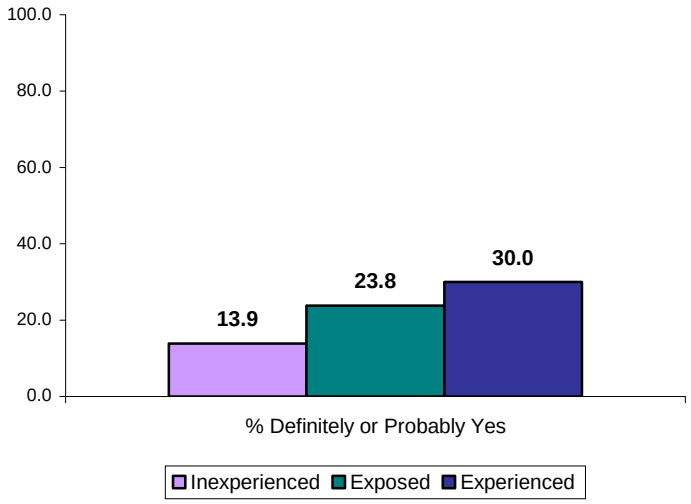
Stage of Initiation



Chi-square = 274.92, p <.0001
Precontemplation > Contemplation > Preparation & Maintenance > Action

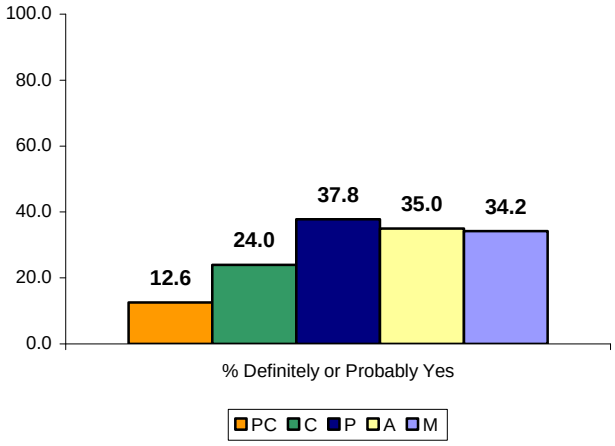
Q54: Do you think young people who smoke cigarettes have more friends (Risk Factor)?

Level of Experience



Chi-square = 1,404.02, p <.0001
Experienced > Exposed > Inexperienced

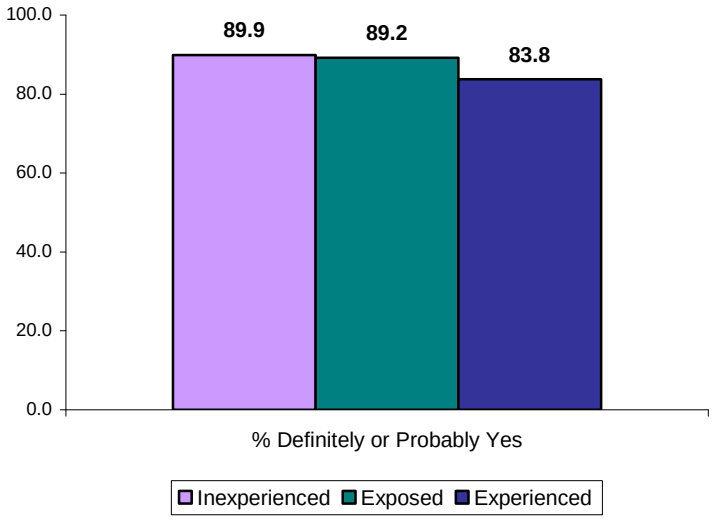
Stage of Initiation



Chi-square = 2,333.48, p <.0001
Preparation > Action & Maintenance > Contemplation > Precontemplation

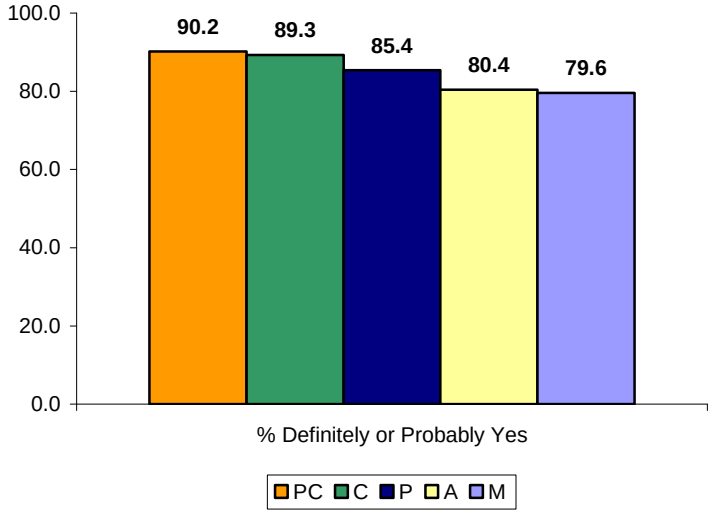
Q56: Do you think young people risk harming themselves if they smoke 1 to 5 cigarettes per day (Protective Factor)?

Level of Experience



Chi-square = 275.00, p<.0001
Inexperienced & Exposed > Experienced

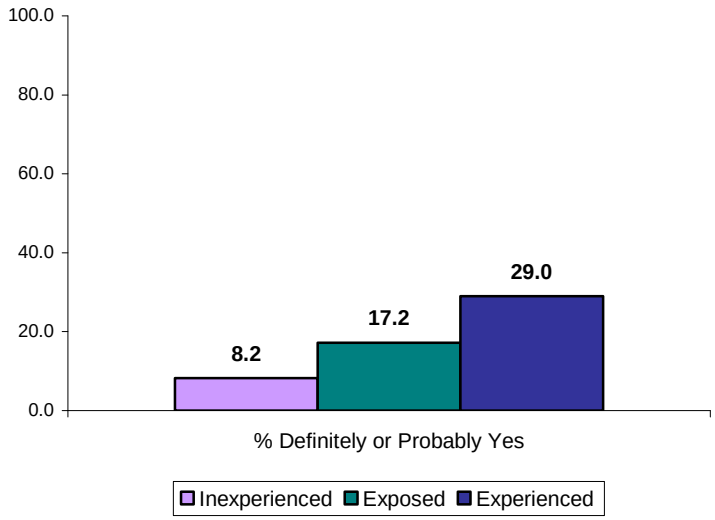
Stage of Initiation



Chi-square = 537.02, p <.0001
Precontemplation & Contemplation > Preparation > Action & Maintenance

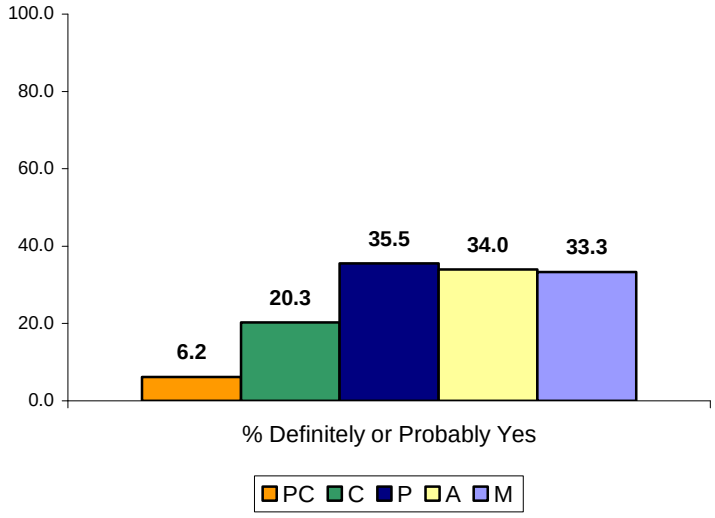
Q57: Do you think it is safe to smoke for only a year or two, as long as you quit after that (Risk Factor)?

Level of Experience



Chi-square = 2,675.21, p<.0001
Experienced > Exposed > Inexperienced

Stage of Initiation



Chi-square = 4,424.06, p<.0001
Preparation > Action & Maintenance > Contemplation > Precontemplation

Student Attitudes About the Nature of Smoking

- Overall, most students believe that smoking 1 to 5 cigarettes per day is harmful, that smokers have shorter lives than non-smokers, and that smoke from other people's cigarettes is harmful (all figures not shown).
- Differences in responses between Level of Experience and Stage of Initiation in this section provide additional evidence that Stages of Initiation are a more sensitive and instructive measure of the process of smoking initiation than smoking experience alone. Stage of Initiation is more sensitive to the process of initiation because it takes into consideration the student's smoking-related intentions and attitudes.
- There is a decrease in perceived risk of addiction, as students increase their involvement with cigarettes.
    - The most experienced students believed less in the addictive properties of cigarette smoking as compared to inexperienced and exposed students.
    - Students who were further along in the Stages of Initiation (i.e., Preparation, Action, Maintenance) believed less in the addictive properties of cigarette smoking than students in Precontemplation and Contemplation.
- These results suggest that students in the Precontemplation and Contemplation Stages may be more protected from initiating smoking because of their beliefs regarding the addictive properties of tobacco.
- Students in the Preparation Stage of Initiation are more likely to have different attitudes regarding the nature of cigarette smoking than students in the other pre-action stages. As these students prepare for regular smoking, they are anomalous in their belief that smokers have more friends and they have less realistic views about the dangers of cigarette smoking and the addictive properties of tobacco. At times even more so than those in the Action and Maintenance stages of Initiation.
- Odds ratios confirm these relations (*see next pages*).

Student Attitudes About the Nature of Smoking

Q53: Do You Think That People Can Be Addicted to Using Tobacco Just Like They Can Get Addicted to Using Cocaine or Heroin (Protective Factor)?

Level of Experience

ORs for Inexperienced vs. Each Other Level of Experience

	Middle School		High School	
	OR	CI	OR	CI
Inexperienced	1.0	--	1.0	--
Exposed	1.1	1.0 - 1.3	1.4 ***	1.3 - 1.6
Experienced	1.7 ***	1.5 - 2.0	1.9 ***	1.8 - 2.1

* p < .05; ** p < .01; *** p < .001

Stage of Initiation

ORs for Precontemplation vs. Each Other Stage of Initiation

	Middle School		High School	
	OR	CI	OR	CI
Precontemplation	1.0	--	1.0	--
Contemplation	1.2 **	1.0 - 1.3	1.2 ***	1.1 - 1.3
Preparation	1.9 ***	1.5 - 2.3	1.8 ***	1.6 - 2.1
Action	1.7 **	1.2 - 2.2	2.3 ***	2.0 - 2.6
Maintenance	1.8 ***	1.3 - 2.5	1.8 ***	1.6 - 2.0

* p < .05; ** p < .01; *** p < .001

NOTE. For ease of interpretation, odds ratios for *protective factors* were conducted estimating the probability of saying "definitely" or "probably" no. In contrast, odds ratios for *risk factors* were conducted estimating the probability of saying "definitely" or "probably" yes.

Student Attitudes About the Nature of Smoking

Q54: Do you think young people who smoke cigarettes have more friends (Risk Factor)?

Level of Experience

ORs for Inexperienced vs. Each Other Level of Experience

	Middle School		High School	
	OR	CI	OR	CI
Inexperienced	1.0	--	1.0	--
Exposed	2.8 ***	2.5 - 3.0	1.5 ***	1.4 - 1.6
Experienced	5.8 ***	5.1 - 6.5	2.1 ***	2.0 - 2.3

* p < .05; ** p < .01; *** p < .001

Stage of Initiation

ORs for Precontemplation vs. Each Other Stage of Initiation

	Middle School		High School	
	OR	CI	OR	CI
Precontemplation	1.0	--	1.0	--
Contemplation	2.9 ***	2.6 - 3.1	1.8 ***	1.6 - 1.9
Preparation	9.7 ***	8.1 - 11.6	2.9 ***	2.6 - 3.2
Action	7.9 ***	6.3 - 10.0	2.8 ***	2.5 - 3.2
Maintenance	7.4 ***	5.8 - 9.4	3.0 ***	2.8 - 3.3

* p < .05; ** p < .01; *** p < .001

Student Attitudes About the Nature of Smoking

Q56: Do you think young people risk harming themselves if they smoke 1 to 5 cigarettes per day (Protective Factor)?

Level of Experience

ORs for Inexperienced vs. Each Other Level of Experience

	Middle School		High School	
	OR	CI	OR	CI
Inexperienced	1.0	--	1.0	--
Exposed	1.1	1.0 - 1.3	1.2 ***	1.1 - 1.4
Experienced	1.9 ***	1.6 - 2.2	2.1 ***	1.9 - 2.3

* p < .05; ** p < .01; *** p < .001

Stage of Initiation

ORs for Precontemplation vs. Each Other Stage of Initiation

	Middle School		High School	
	OR	CI	OR	CI
Precontemplation	1.0	--	1.0	--
Contemplation	1.1 *	1.0 - 1.3	1.2 ***	1.1 - 1.3
Preparation	2.0 ***	1.6 - 2.4	1.7 ***	1.4 - 2.0
Action	2.3 ***	1.7 - 3.0	2.7 ***	2.3 - 3.1
Maintenance	3.2 ***	2.5 - 4.2	2.8 ***	2.5 - 3.1

* p < .05; ** p < .01; *** p < .001

NOTE. For ease of interpretation, odds ratios for *protective factors* were conducted estimating the probability of saying "definitely" or "probably" no. In contrast, odds ratios for *risk factors* were conducted estimating the probability of saying "definitely" or "probably" yes.

Student Attitudes About the Nature of Smoking

Q57: Do you think it is safe to smoke for only a year or two, as long as you quit after that (Risk Factor)?

Level of Experience

ORs for Inexperienced vs. Each Other Level of Experience

	Middle School		High School	
	OR	CI	OR	CI
Inexperienced	1.0	--	1.0	--
Exposed	3.0 ***	2.7 - 3.3	2.0 ***	1.8 - 2.2
Experienced	5.7 ***	5.0 - 6.5	4.3 ***	3.9 - 4.6

* p < .05; ** p < .01; *** p < .001

Stage of Initiation

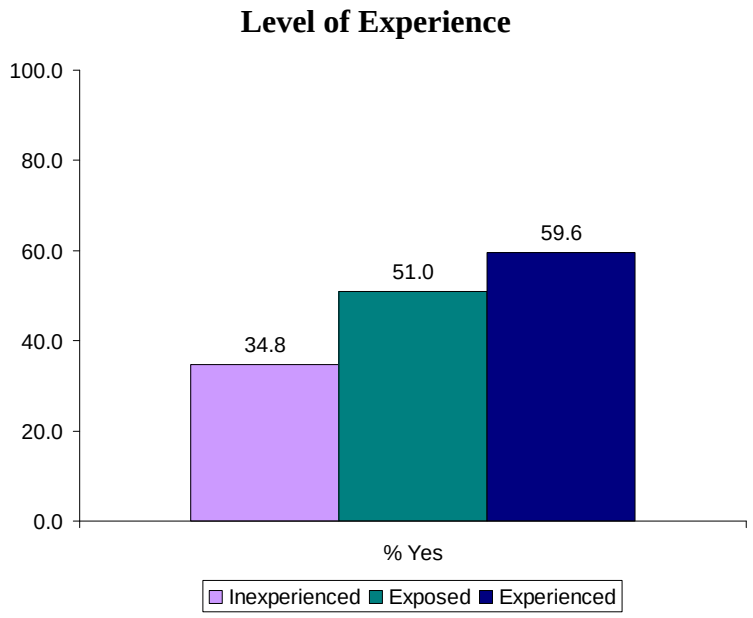
ORs for Precontemplation vs. Each Other Stage of Initiation

	Middle School		High School	
	OR	CI	OR	CI
Precontemplation	1.0	--	1.0	--
Contemplation	4.1 ***	3.7 - 4.6	3.7 ***	3.3 - 4.0
Preparation	10.8 ***	9.0 - 13.1	7.5 ***	6.7 - 8.5
Action	8.3 ***	6.5 - 10.6	7.5 ***	6.6 - 8.5
Maintenance	9.8 ***	7.6 - 12.7	7.3 ***	6.6 - 8.1

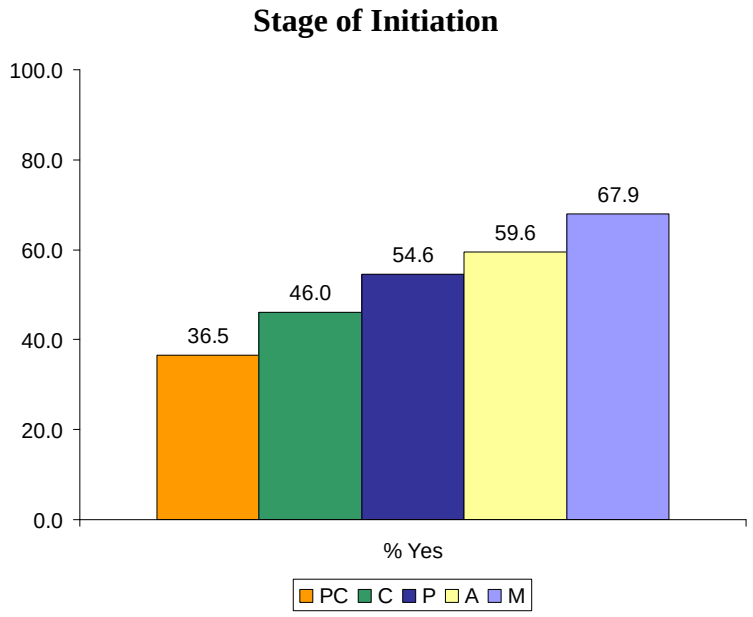
* p < .05; ** p < .01; *** p < .001

Section V. Smoking Within the Adolescent's Environment

Q82: Does anyone who lives with you now smoke cigarettes?

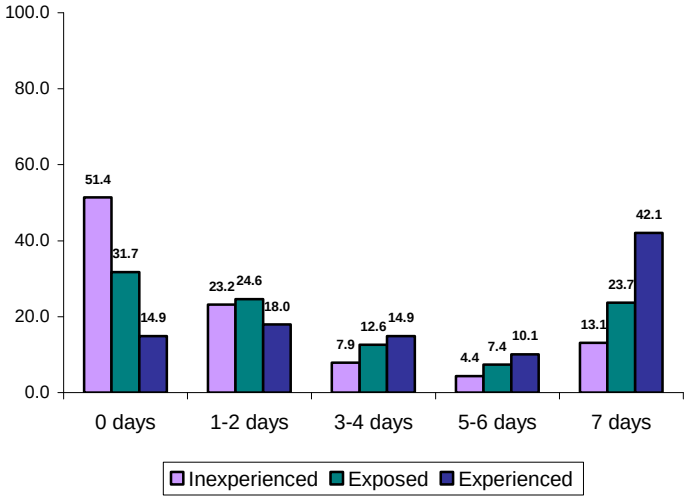


Chi-square = 1,985.01, p<.0001
Experienced > Exposed > Inexperienced

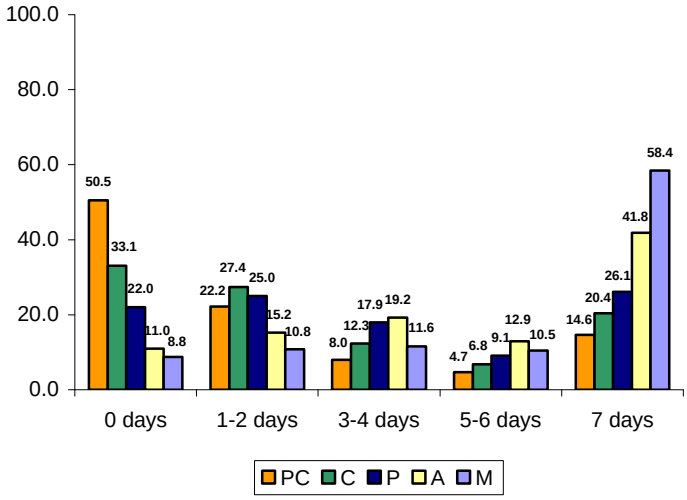


Chi-Square = 1,708.44, p<.0001
Maintenance > Action > Preparation > Contemplation > Precontemplation

Q79: During the past 7 days, on how many days were you in the same room with someone who was smoking cigarettes (Risk Factor)?



Chi-square = 6,367.55, p<.0001



Chi-square = 6,999.32, p<.0001

Smoking Within the Adolescent's Environment

- The more experienced a student is with smoking cigarettes, the greater their report of environmental exposure to cigarette smoking (i.e., in the same room). Similar results were found for environmental exposure to smoking in cars (figure not shown).
- The greater the progression through the Stages of Initiation, the greater the report of environmental exposure to cigarette smoking (i.e., in the same room). Similar results were found for environmental exposure to smoking in cars (figure not shown).
- Approximately 1/3 of students in the Precontemplation Stage of Initiation live with someone who smokes while more than 2/3 of the students in Maintenance live with someone who smokes.
- While the pattern looks similar, the Stages of Initiation provide more information regarding environmental exposure. For example, the Stages of Initiation are more sensitive to the increased exposure for students in Maintenance, whereas Level of Experience is not as sensitive to this distinction.
- Approximately 80% of students in Maintenance were exposed to environmental smoking 3 or more days per week while less than 30% of students in Precontemplation had this level of exposure.
- The increased sensitivity of Stage of Initiation relative to Level of Experience can be observed with the contrast between Maintenance and Experienced students. About 60% of students in Maintenance were exposed to environmental smoking 7 days within the past week, contrasted with approximately 40% of Experienced students. These data suggest that students with greater personal experience with smoking cigarettes do not represent a homogeneous group and treating them as such may reduce the ability to detect important but subtle differences in this heterogeneous population.
- The increased sensitivity of Stage of Initiation is also evident when corresponding odds ratios are examined (*see page 34)*. For example, a Middle School student in the Maintenance Stage of Initiation is 5.4 times more likely than a student in Precontemplation to live with someone who smokes cigarettes. When examining this relation by Level of Experience, an Experienced student is only 4.3 times more likely than an Inexperienced student to live with someone who smokes cigarettes. Similar patterns of sensitivity of the Stages of Initiation are present among High School students.

Smoking Within the Adolescent's Environment

Q82: Does anyone who lives with you now smoke cigarettes (Risk Factor)?

Level of Experience

ORs for Inexperienced vs. Each Other Level of Experience

	Middle School		High School	
	OR	CI	OR	CI
Inexperienced	1.0	--	1.0	--
Exposed	2.6 ***	2.4 - 2.8	1.8 ***	1.7 - 2.0
Experienced	4.3 ***	3.8 - 5.0	2.8 ***	2.7 - 3.0

* p < .05; ** p < .01; *** p < .001

Stage of Initiation

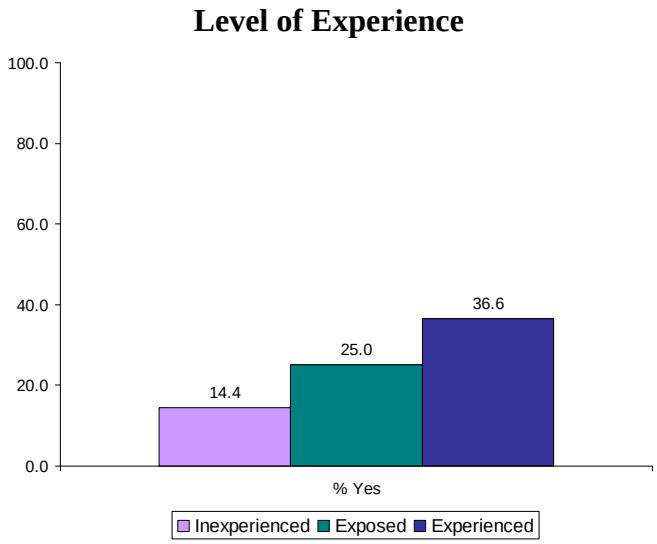
ORs for Precontemplation vs. Each Other Stage of Initiation

	Middle School		High School	
	OR	CI	OR	CI
Precontemplation	1.0	--	1.0	--
Contemplation	1.9 ***	1.8 - 2.0	1.3 ***	1.2 - 1.4
Preparation	3.7 ***	3.0 - 4.6	1.8 ***	1.6 - 2.0
Action	4.7 ***	3.5 - 6.2	2.4 ***	2.1 - 2.6
Maintenance	5.4 ***	4.0 - 7.4	3.6 ***	3.4 - 4.0

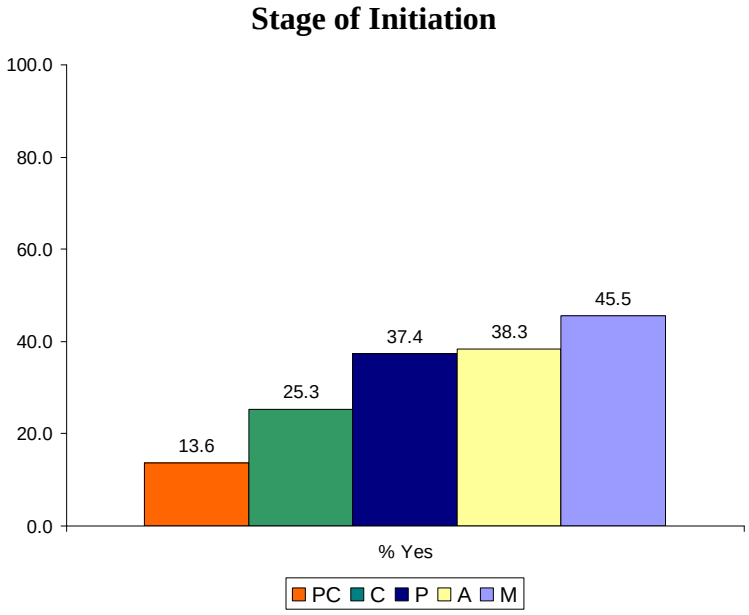
* p < .05; ** p < .01; *** p < .001

Section VI. Advertisements

Q77: During the past 12 months, did you buy or receive anything that has a tobacco company name or picture on it?

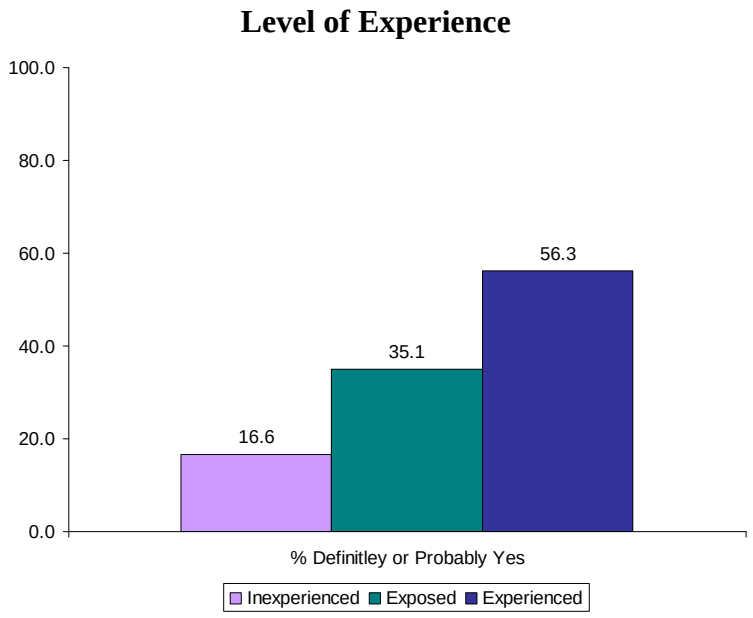


Chi-Square = 2141.05, p < .0001
Experienced > Exposed > Inexperienced

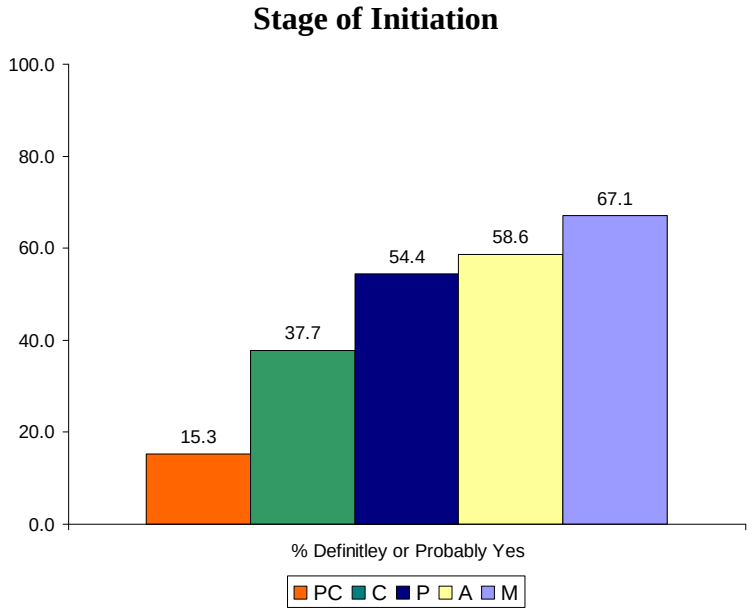


Chi-Square = 2931.12, p < .0001
Maintenance > Preparation & Action > Contemplation > Precontemplation

Q78: Would you ever use or wear something that has a tobacco company name or picture on it such as a lighter, t-shirt, hat, or sunglasses?



Chi-Square = 5675.76, p < .0001
Experienced > Exposed > Inexperienced



Chi-Square = 6974.47, p < .0001
Maintenance > Action > Preparation > Contemplation > Precontemplation

Advertisements

- The more experienced a student has smoking cigarettes, the greater their report of buying or receiving tobacco company merchandise and the more receptive they would be to using this type of merchandise.
- The greater the progression through the Stages of Initiation, the greater their report of buying or receiving tobacco company merchandise and the more receptive they would be to using this type of merchandise.
- While the patterns look similar, the Stages of Initiation provide more information regarding students' responses to smoking-related advertisements. Basic Level of Exposure does not take into account the student's acceptance of tobacco-related merchandise and it conceals the heterogeneity in receptivity that is seen when examining the Stages of Initiation. For example, relative to the other Stages of Initiation significantly more students in the Maintenance Stage endorsed owning tobacco-related merchandise.
- The increased sensitivity of Stage of Initiation is also evident when corresponding odds ratios are examined. For example, a Middle School student in the Maintenance Stage of Initiation is 11.5 times more likely than a Middle School student in Precontemplation to have bought or received tobacco-related merchandise. When examining this relation by Level of Experience, an Experienced Middle School student is only 5.6 times more likely than an Inexperienced Middle School student to have bought or received tobacco-related merchandise.
- Reliance solely on Level of Experience would obscure distinct differences between the individuals within the more heterogeneous stage groups, and potentially miss important patterns. Examination of these variables by the Stages of Initiation allows for better detection of these distinct sub-populations of students.
- Odds ratios for these analyses appear on pages 38-39.

Section VI. Advertisements and Media Exposure

Q77: During the past 12 months, did you buy or receive anything that has a tobacco company name or picture on it?

Level of Experience

ORs for Inexperienced vs. Each Other Level of Experience

	Middle School		High School	
	OR	CI	OR	CI
Inexperienced	1.0	--	1.0	--
Exposed	2.6 ***	2.3 - 2.8	1.7 ***	1.6 - 1.9
Experienced	5.6 ***	4.9 - 6.4	3.2 ***	3.0 - 3.4

* p < .05; ** p < .01; *** p < .001

Stage of Initiation

Odd Ratios for Precontemplation vs. Each Other Stage of Initiation

	Middle School		High School	
	OR	CI	OR	CI
Precontemplation	1.0	--	1.0	--
Contemplation	2.5 ***	2.3 - 2.7	2.0 ***	1.8 - 2.1
Preparation	5.8 ***	4.8 - 7.1	3.3 ***	2.9 - 3.7
Action	6.5 ***	5.1 - 8.4	3.5 ***	3.1 - 4.0
Maintenance	11.5 ***	8.8 - 15.1	4.9 ***	4.5 - 5.3

* p < .05; ** p < .01; *** p < .001

Q78: Would you ever use or wear something that has a tobacco company name or picture on it such as a lighter, t-shirt, hat, or sunglasses?

Level of Experience

ORs for Inexperienced vs. Each Other Level of Experience

	Middle School		High School	
	OR	CI	OR	CI
Inexperienced	1.0	--	1.0	--
Exposed	3.8 ***	3.5 - 4.2	2.1 ***	2.0 - 2.2
Experienced	8.8 ***	7.8 - 10.1	5.1 ***	4.8 - 5.4

* p < .05; ** p < .01; *** p < .001

Stage of Initiation

ORs for Precontemplation vs. Each Other Stage of Initiation

	Middle School		High School	
	OR	CI	OR	CI
Precontemplation	1.0	--	1.0	--
Contemplation	4.3 ***	4.0 - 4.7	2.7 ***	2.5 - 2.9
Preparation	12.2 ***	10.0 - 14.8	4.7 ***	4.3 - 5.2
Action	12.6 ***	9.8 - 16.3	6.0 ***	5.3 - 6.7
Maintenance	17.7 ***	13.4 - 23.4	8.7 ***	8.0 - 9.5

* p < .05; ** p < .01; *** p < .001

Section VII. County Analyses

Level of Experience by County of Residence for all students **(Weighted)**

County	Inexperienced	Exposed	Experienced
Allegany	54.8%	19.0%	**26.3%**
Anne Arundel	61.3%	18.1%	20.5%
Baltimore	61.0%	**28.7%**	***10.3%***
Baltimore City	64.5%	18.1%	17.4%
Calvert	60.1%	18.1%	21.7%
Caroline	***52.8%***	21.7%	25.5%
Carroll	69.4%	***13.5%***	17.0%
Cecil	57.3%	19.3%	23.3%
Charles	59.7%	20.0%	20.3%
Dorchester	56.1%	24.6%	19.3%
Frederick	62.9%	16.0%	21.1%
Garrett	55.8%	18.5%	25.7%
Harford	60.1%	17.9%	22.0%
Howard	**72.7%**	***13.7%***	13.6%
Kent	53.6%	23.0%	23.4%
Montgomery	**71.6%**	15.0%	13.4%
Prince George's	65.2%	**25.0%**	***9.8%***
Queen Anne's	59.9%	18.2%	21.9%
St. Mary's	***50.7%***	21.8%	**27.6%**
Somerset	61.4%	18.3%	20.3%
Talbot	58.1%	17.7%	24.2%
Washington	56.3%	19.3%	24.4%
Wicomico	56.5%	20.0%	23.5%
Worcester	59.6%	19.9%	20.5%

Percentages bolded and italicized are the 2 lowest percentages for each column
Percentages bolded and underlined are the 2 highest percentages for each column

- There are differences by county in Level of Experience with cigarette smoking. Individuals in the Experienced group are current smokers and rates of cigarette use in this group range from 9.8% to 27.6% by county.
- Overall, Howard County has the lowest rates of experience, followed by Montgomery County.
- In contrast, St. Mary's County has the highest overall rates of experience with cigarette smoking.

Stage of Change for Initiation of Smoking by County of Residence for all students (**Weighted**)

County	Precontemplation	Contemplation	Preparation	Action	Maintenance
Allegany	54.8%	22.9%	5.2%	4.8%	**12.3%**
Anne Arundel	59.0%	24.0%	4.7%	3.8%	8.5%
Baltimore	**68.3%**	***21.3%***	6.2%	***2.1%***	***2.1%***
Baltimore City	62.7%	24.0%	***3.4%***	2.5%	7.5%
Calvert	58.6%	24.1%	5.2%	3.5%	8.6%
Caroline	55.8%	23.3%	4.7%	**5.2%**	**11.1%**
Carroll	65.3%	***20.8%***	3.7%	3.1%	7.1%
Cecil	58.8%	22.4%	5.0%	3.9%	9.9%
Charles	58.9%	24.0%	5.6%	3.9%	7.5%
Dorchester	57.9%	**26.1%**	6.0%	4.2%	5.9%
Frederick	59.2%	23.9%	4.7%	4.2%	8.0%
Garrett	55.7%	25.2%	5.0%	4.0%	10.1%
Harford	56.2%	25.4%	4.8%	4.3%	9.4%
Howard	64.6%	24.7%	***3.3%***	2.8%	4.5%
Kent	***52.0%***	**28.4%**	**7.3%**	4.4%	7.9%
Montgomery	66.0%	23.8%	3.9%	2.3%	4.0%
Prince George's	***68.1%***	23.4%	3.9%	***2.0%***	***2.6%***
Queen Anne's	58.6%	23.1%	5.7%	4.2%	8.4%
St. Mary's	***51.8%***	23.7%	**8.0%**	**5.9%**	10.7%
Somerset	59.7%	23.5%	4.4%	4.0%	8.5%
Talbot	55.8%	23.9%	4.6%	5.1%	10.6%
Washington	56.7%	23.1%	5.4%	5.0%	9.8%
Wicomico	58.8%	22.1%	4.6%	4.8%	9.8%
Worcester	61.9%	23.5%	4.4%	3.0%	8.6%

Percentages bolded and italicized are the 2 lowest percentages for each column
Percentages bolded and underlined are the 2 highest percentages for each column

- St. Mary's county, which had the highest rates of exposure to cigarettes smoking, has the lowest percentage of students in Precontemplation and therefore has a greater percentage of individuals progressing through the Stages of Initiation.
- In contrast, Prince George's and Baltimore counties have the highest rate of students in Precontemplation. Accordingly, fewer of their students are moving through the Stages of Initiation toward regular cigarette use.

Level of Experience by County of Residence for all students (**Weighted**) by School Status

County	Inexperienced	Exposed	Experienced
Allegany			
Middle School	76.5	16.7	6.9
High School	38.4	20.7	**40.9**
Anne Arundel			
Middle School	78.3	14.7	7.0
High School	47.0	21.1	31.9
Baltimore			
Middle School	***68.4***	**25.2**	6.3
High School	55.0	**31.4**	***13.5***
Baltimore City			
Middle School	82.6	13.2	4.2
High School	48.8	22.4	28.7
Calvert			
Middle School	79.0	13.4	7.6
High School	44.3	22.0	33.6
Caroline			
Middle School	71.6	18.9	9.5
High School	***37.4***	23.5	39.1
Carroll			
Middle School	**87.7**	***8.7***	3.7
High School	54.4	***17.7***	27.9
Cecil			
Middle School	72.1	18.1	**9.8**
High School	44.0	20.7	35.3
Charles			
Middle School	78.1	16.3	5.6
High School	45.3	23.0	31.7
Dorchester			
Middle School	72.8	18.7	8.5
High School	42.6	29.6	27.7
Frederick			
Middle School	81.1	12.2	6.8
High School	47.4	19.5	33.1
Garrett			
Middle School	76.1	17.1	6.8
High School	38.5	19.7	**41.8**
Harford			
Middle School	77.8	14.8	7.5
High School	44.2	21.0	34.8
Howard			
Middle School	87.1	9.4	3.5
High School	**60.2**	***17.5***	22.3
Kent			
Middle School	76.8	17.0	6.2
High School	***34.1***	28.0	37.8

Level of Experience by County of Residence for all students (**Weighted**) by School Status (cont.)

County	Inexperienced	Exposed	Experienced
Montgomery			
Middle School	**88.0**	***9.1***	***2.8***
High School	**57.5**	20.0	22.5
Prince George's			
Middle School	79.6	18.0	***2.3***
High School	53.5	**30.6**	***15.9***
Queen Anne's			
Middle School	80.4	12.6	7.0
High School	41.8	23.4	34.9
St. Mary's			
Middle School	***65.4***	**21.4**	**13.2**
High School	38.3	21.9	39.8
Somerset			
Middle School	79.6	14.3	6.2
High School	46.3	21.6	32.1
Talbot			
Middle School	78.0	15.6	6.4
High School	42.6	19.1	38.3
Washington			
Middle School	71.4	20.0	8.6
High School	43.4	18.4	38.1
Wicomico			
Middle School	74.7	15.6	9.6
High School	41.5	23.6	34.9
Worcester			
Middle School	75.6	18.2	6.2
High School	47.7	20.7	31.6

Percentages bolded and italicized are the 2 lowest percentages for each column
Percentages bolded and underlined are the 2 highest percentages for each column

Stage of Change for Initiation of Smoking by County of Residence for all students (**Weighted**) by School Status

County	Precontemplation	Contemplation	Preparation	Action	Maintenance
Allegany					
Middle School	69.1%	23.5%	4.0%	1.8%	1.6%
High School	44.0%	22.6%	5.9%	7.1%	**20.3%**
Anne Arundel					
Middle School	70.6%	22.1%	3.8%	1.1%	**2.4%**
High School	49.2%	25.6%	5.3%	6.2%	13.7%
Baltimore					
Middle School	68.3%	23.4%	**5.5%**	1.6%	1.2%
High School	**67.8%**	***20.1%***	6.7%	***2.7%***	***2.7%***
Baltimore City					
Middle School	73.7%	22.2%	***1.4%***	1.2%	1.5%
High School	53.3%	25.4%	***5.0%***	3.6%	12.7%
Calvert					
Middle School	70.7%	22.5%	3.6%	1.6%	2.2%
High School	49.0%	25.3%	6.5%	5.2%	14.0%
Caroline					
Middle School	71.8%	19.9%	2.3%	**3.4%**	**2.6%**
High School	42.8%	25.8%	6.7%	6.7%	**18.1%**
Carroll					
Middle School	**79.4%**	***17.5%***	***1.4%***	0.8%	1.0%
High School	53.8%	23.7%	5.5%	5.0%	12.0%
Cecil					
Middle School	69.4%	22.4%	3.5%	2.2%	**2.4%**
High School	49.1%	22.6%	6.5%	5.4%	16.4%
Charles					
Middle School	71.9%	21.8%	3.8%	1.4%	1.0%
High School	48.8%	25.7%	6.9%	5.9%	12.7%
Dorchester					
Middle School	***66.1%***	**26.9%**	3.9%	2.3%	0.8%
High School	51.8%	25.4%	7.5%	5.4%	9.9%
Frederick					
Middle School	74.0%	20.5%	2.2%	1.6%	1.7%
High School	46.5%	26.9%	6.6%	5.2%	13.5%
Garrett					
Middle School	70.2%	22.8%	3.0%	2.8%	1.2%
High School	43.6%	26.9%	6.6%	5.2%	17.7%
Harford					
Middle School	68.8%	24.4%	3.5%	1.9%	1.5%
High School	44.8%	26.7%	5.8%	6.5%	16.2%
Howard					
Middle School	76.6%	20.4%	***1.5%***	1.0%	0.5%
High School	54.3%	28.4%	***5.0%***	4.4%	7.9%

Stage of Change for Initiation of Smoking by County of Residence for all students (**Weighted**) by School Status (cont.)

County	Precontemplation	Contemplation	Preparation	Action	Maintenance
Kent					
Middle School	70.2%	24.1%	2.8%	1.4%	1.6%
High School	***37.3%***	**31.3%**	**11.3%**	7.0%	13.1%
Montgomery					
Middle School	**79.6%**	***18.0%***	***1.4%***	***0.5%***	0.6%
High School	54.1%	**29.0%**	6.0%	3.9%	6.9%
Prince George's					
Middle School	74.4%	22.1%	2.6%	***0.7%***	***0.2%***
High School	**63.4%**	24.3%	***4.8%***	***3.0%***	***4.5%***
Queen Anne's					
Middle School	73.4%	19.9%	2.8%	2.4%	1.6%
High School	45.8%	25.5%	8.4%	5.7%	14.5%
St. Mary's					
Middle School	***65.0%***	21.8%	**6.9%**	**3.8%**	**2.6%**
High School	***40.8%***	25.1%	**8.7%**	**7.7%**	17.6%
Somerset					
Middle School	69.2%	**25.2%**	3.0%	1.0%	1.7%
High School	51.5%	***22.2%***	5.7%	6.5%	14.0%
Talbot					
Middle School	73.7%	20.1%	2.6%	1.7%	2.0%
High School	41.6%	26.8%	6.4%	**7.5%**	17.7%
Washington					
Middle School	67.4%	24.2%	3.4%	3.1%	1.9%
High School	47.3%	22.4%	7.0%	6.6%	16.7%
Wicomico					
Middle School	70.6%	21.8%	2.8%	2.5%	2.3%
High School	49.2%	22.4%	5.9%	6.5%	15.9%
Worcester					
Middle School	75.0%	19.1%	2.8%	2.6%	***0.4%***
High School	51.5%	23.0%	6.3%	4.1%	15.0%

Percentages bolded and italicized are the 2 lowest percentages for each column

Percentages bolded and underlined are the 2 highest percentages for each column

Discussion

Overview. There are several conclusions that can be made from the preceding data analyses. There are several interesting potential risk and protective factors of smoking initiation that can be used in evaluating smoking control efforts.

Overall Conclusions:

- Stage of Initiation is a more sensitive measure than Level of Experience (i.e., prevalence measures) for understanding and tracking smoking initiation
- Stages of Initiation differentiate risk and protective factors of smoking initiation better than Level of Experience
- Stages of Initiation demonstrated important relationships with a number of theoretically defined risk and protective factors
- Stages of Initiation differ significantly as a function of school status
- Differences in adolescent smoking initiation were observed as a function of county of residence

Benefit of Stage of Initiation Relative to Level of Experience

Existing measurement of smoking initiation (i.e., Level of Experience) is not as effective as using a stage model of smoking initiation. Levels of Experience are analogous to prevalence rates and fail to account for smoking-related intentions and attitudes. In contrast, the Stages of Initiation examine not only prevalence of smoking, but address these intentions and attitudes. The increased sensitivity of the Stages of Initiation relative to Level of Experience was evident throughout the present report. For example, an examination of the Action and Maintenance Stages of Initiation reveals distinct differences, suggesting that experienced smokers are not a homogenous group. Moreover, Inexperienced smokers are not the same. Accordingly, Levels of Experience are not the most sensitive way to examine the risk and protective factors data. Rather the Stages of Initiation provide a clearer picture of students' progress in the acquisition of smoking. Thus, the Stages of Initiation represent a more sensitive measure of the process of smoking initiation with important implications for initiation.

Risk and Protective Factors of Adolescent Smoking Initiation

The present analyses substantiated several theoretically identified variables, which appear to represent risk and protective factors for smoking initiation. Protective factors would prevent movement through the Stages of Initiation, whereas risk factors would promote movement through these stages. Identification of factors that may protect against or promote movement through the Stages of Initiation is important for prevention efforts among this population. Prevention efforts should focus on reducing risk factors while increasing protective factors in the attempt to halt the process of smoking initiation.

Identified markers of potential movement through the Stages of Initiation

1. **Peer influence** is clearly associated with progression through the Stages of Initiation and can be used as an indicator and possible mediator for acquisition of smoking behavior.
2. **Student Attitudes About the Nature of Smoking** are clearly related to stage status and can be used to examine whether smoking control efforts have shifted smokers intentions and attitudes. This could be a particularly interesting indicator for counties where there are small numbers of adolescents in the earlier Stages of Initiation.
3. **Environmental Exposure** in the home and in the adolescent's environment is also associated with progression through the Stages of Initiation. Reducing exposure to others who smoke may retard movement toward smoking acquisition.
4. **Exposure to Advertising** is also associated with progression through the Stages of Initiation. Increased exposure to tobacco advertising and related merchandise is a risk factor that may promote an individual's movement through the Stages toward smoking behavior. Even reporting the adolescent's receptivity to wearing a tobacco-related item is associated with the adolescent's Stage of Initiation. Reducing exposure to this type of advertising may delay movement through the Stages of Initiation.

Differences in the Stages of Initiation by School Status and County.

Evidence provided by the present report suggests that differences among Middle and High School students exist for factors related to smoking initiation. Analyzing school status separately allowed for detection of differences that would have been overshadowed looking at only the full sample. Results identified specific risk and protective factors that were more or less salient based on level of School Status. Identification of these differential patterns of risk and protective factors can enable interveners to provide informed prevention programs targeted at those specific populations.

Results also differ as a function of county of residence. Although prevalence of smoking for the entire state of Maryland is below 17% in this survey, prevalence varies by county. More importantly, the distribution of the students' Stages of Initiation varies by county, where proportionally more students are not considering beginning smoking in some counties compared to others and to the city of Baltimore. Smoking control efforts should be informed by these differences and evaluation of efforts should consider baseline Stages of Initiation for particular counties and regions in order to create interventions and evaluate their impact on initiation. Using a single measure of prevalence for counties with larger numbers of students in Precontemplation versus Preparation can underestimate the effectiveness of smoking control efforts.

Limitations: These analyses are cross sectional; therefore the associations between the variables are not necessarily causal. Future analyses will be conducted on longitudinal data in order to examine causality. Other potential limitations include:

- Self-report survey
- Insensitivity of survey questions
- Lack of individuals who dropped out of Middle School / High School

- Moreover, some variables are retrospective reports and may be affected by memory biases.
- In addition, statistical significance could have been greatly influenced by the sample size of the present data set.

Recommendations

As a result of the current findings, several recommendations were made:

- Interventions should be aimed at preventing movement through the Stages of Initiation toward regular smoking and not simply trying to stop smoking behavior.
- Because of the variability in identified risk and protective factors, both between and within stage of initiation, interventions should be tailored to target individuals within their current stage to prevent or delay smoking initiation.
- County-specific interventions that address population differences across the Stages of Initiation would offer more efficient and hopefully more effective strategies for smoking prevention than blanket statewide interventions.
- Smoking prevention interventions should address differences in the Stages of Initiation between middle and high school students.

Summary

The Stages of Initiation are important indicators for understanding the current smoking status of the population of youth in Maryland and for evaluating smoking control and prevention efforts. When used in conjunction with smoking-related risk and protective factors, stages of initiation provide a better model for designing, implementing and evaluating successful prevention efforts than prevalence estimates alone. There are a number of smoking-related indicators, risk and protective factors, that relate to the Stages of Initiation. Prevention of smoking acquisition is associated with fewer friends who smoke, fewer intentions to smoke, more realistic attitudes about the dangers and addictive potential of smoking, less environmental exposure to smoking, and being less likely and less willing to own or use tobacco-related products. These factors can be used in addition to smoking initiation prevalence as benchmarks for evaluating smoking control and prevention programs. Initiation of smoking differs greatly by county of residence. Thus, prevention efforts should also differ by County providing a unique challenge for statewide smoking control. Continued research needs to be conducted in order to determine how best to apply these indicators to the creation of successful smoking prevention programs.

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