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The Association Between Bully Victimization And Risky Behaviors Among Youth

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THE ASSOCIATION BETWEEN BULLY VICTIMIZATION AND RISKY BEHAVIORS AMONG YOUTH

A Thesis Presented

By

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DEDICATION

For my parents, without whom none of this would have been possible.

For my amazing Father, and example of what a true man should be, kind, strong, loving and an example of the Divine Father. You have supported Akki and me for so long, never saying no to us and forever trying to do what is best for us. I could never thank you enough, and I hope I make you proud. I love you so very much.

For my Mother, a strong woman who has shown me what faith, dedication and perseverance can achieve. You always told me I could do anything, and even when there were times when I doubted myself, my path and my destination, you never ever gave up on me. Who I am is because of you. I love you so very much.

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Most of all, for God. You have blessed me beyond reckoning, and if this thesis can help just one child, it will be done in Your Name.

"The test of the morality of a society is what it does for its children"
-Dietrich Bonhoeffer

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ABSTRACT

THE ASSOCIATION BETWEEN BULLY VICTIMIZATION
AND RISKY BEHAVIORS AMONG YOUTH

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In 2005, the Massachusetts Youth Risk Behavior Survey reported 21.9% of males and 26.1% of females were bullied in schools. Little research has been conducted into showing an association between childhood bully victimization and risky behaviors. In addition, knowledge is limited about the connection between victimization and risky behaviors among different ethnic groups. We propose to assess the association between victimization and risky behaviors, using the Massachusetts Youth Risk Behavior Survey among 3,116 students in grades 9 through 12 in 2007. Data was obtained by self-administered questionnaire, and victimization was considered as a single dichotomous variable. Victimization was assessed as a dichotomous variable. Risky behaviors (smoking, alcohol use, marijuana use, unprotected sex and weapon violence) were measured using several questions regarding frequency and initial age of use. Logistic regression was used to analyze the association between bullying and risky behavior, and then the results were stratified with ethnic background (White, Hispanic and other) to assess possible effect modification. Results show that victims are more

likely to have engaged in risky behaviors before the age of 13 and are also more likely to engage in risky behaviors while at school. Significant ethnic differences in the relation between bully victimization and risk behaviors were not generally observed; however, non-White bully victims were generally at greater risk for all risky behaviors than Whites. These findings will help provide information on factors that may be used to identify at-risk children, and to target adjust existing interventions with bullying and victims to improve efficacy.

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CHAPTER I

LITERATURE REVIEW

Introduction

Bullying in school is a common aspect of the adolescent experience, indicated by the estimated 5.7 million who experience bullying throughout the nation.[1] In the state of Massachusetts, the percent of those who have been bullied has remained at the same level (22% of students in 2007)[2] throughout the years. Bullying consists of three major factors; deliberate hurtful behavior, repetition of such behavior and the difficulty of a target in defending him/herself.[3] Bullying consists of two separate components, the bully and the victims. It is possible that being victimized could lead to later engaging in risky behaviors.

Risky behaviors, such as smoking, alcohol use, illicit drug use, weapon possession and unprotected sex continue to have high prevalence rates among youth in the United States.[2] Among students, prevalence of smoking has been reported as twenty-three percent in 2005 nationwide.[2] Smoking is known to cause lung disease and continues to be prevalent in society today, although the rate has decreased among youth over the past few years.[2] In addition, the state of Massachusetts reported that seventy-three percent of high school students use alcohol, which may lead to alcoholism and a breakdown in familial and societal relationships.[2] The CDC's 2007 Youth Risk Behavior Survey showed that

forty–one percent of youth use marijuana, making it the most popular illicit drug.[2] Approximately eighteen percent of youth carried a weapon, according to the CDC's YRBS.[2] With the increase in school shootings, weapon possession is a risky behavior that continues to be of great interest. Finally, unprotected sex can lead to unwanted pregnancies and an increase in sexually transmitted diseases, and it is of note that forty-one percent of high school students throughout the nation engage in unprotected sex. These risky behaviors pose a serious problem for public health systems nationwide due to the concurrent increases in hospitalization and disease rates. As more students choose to partake in risky behaviors, the burden on society will increase.

There are no psychological studies on the link between being a bully victim and risky behavior, but there have been studies on each of these factors separately. Those studies have shown that adolescents who take part in risky behaviors tend to have persistent behavioral problems, peer pressure, family history of abuse and most importantly, interpersonal alienation.[5] Other studies show that when a child becomes the target of a bully, they will become increasingly shy, fearful and anxious, and have a lower capacity to handle emotion.[6] As such, these effects of being a victim of bullying can be potentially linked to the likelihood of choosing risky behaviors, and therefore being victimized could be a risk factor for risky behaviors.

There have been few studies on the association between victimization and risky behaviors, and those studies have generally found a positive association. One study explained that when children are victimized, they may have a greater

likelihood of participating in delinquent behaviors (41.7% of males and 29.6% of females).[7] Research conducted has also shown a trend that bully victims and delinquents are largely the same,[7] and that violent and anti-social behavior is increased in bully victims.[8] These epidemiologic studies did not investigate the possible link between victims and risky behaviors and how this link differs within different ethnic groups, in additions to having some inconsistencies and difficulties in their individual designs. Therefore, we propose a secondary analysis of data from the Massachusetts Youth Risk Behavior Survey that consists of responses from students aged fourteen through eighteen in Massachusetts's public high schools.

Psychology of Victimization & Risky Behaviors

The psychosocial development of an individual is comprised of numerous aspects.[6] A child's social and emotional development is largely influenced by external factors such as family rearing and parental influence.[9] Although studies have also been conducted into the effects of certain genotypes in order to explain the link between social delinquencies (such as victimization) and the psyche,[10] a definitive link has yet to be established.

Unfortunately, there haven't been any studies on the association between being a victim and engaging in risky behaviors. However, there have been studies conducted on victimization and separate studies on risky behaviors. These studies have shown that victims of bullying tend to experience an increase

in isolation.[6] In addition, victims have an increased level of social isolation in groups[5] and tend to internalize problems.[11] Studies have also examined the state of bully victims and their psychosocial tendencies, and discovered that they tend to be increasingly shy, introverted, and have difficulty handling emotion.[6] Bully victims also present higher levels of total delinquency than bullies,[7] while victims show a progression toward future psychological problems such as ADHD, depression and anxiety.[7] As it has been shown that those who experience symptoms of depression or anxiety engage in greater levels of risky behaviors than those who do not, we can postulate that since victims show a progression toward anxiety, their level of risky behaviors can rise.

Psychological studies on risky behaviors have found an interesting difference in ethnic groups, with adolescent African Americans having a higher level of early sexual initiation and fighting in comparison to other groups.[13] This could be due to a possible difference in culture or society. It could also be the reaction of different ethnic groups when being victimized.

The psychosocial development of youth can be easily influenced by external factors.[6] Prior research into bully victims and risky behaviors has shown that there is a positive association between victims and psychological problems.[6] In addition, these psychological problems such as depression can lead to an increase in risky behaviors.[12]

Epidemiology of Victimization & Risky Behaviors

Research on bully victims and risky behavior has been performed in the past, although the studies are few in number. Five of these studies were performed as cross-sectional designs with some based outside of the United States.[8, 14-17] One such study conducted in South Africa showed an increase in violent and anti-social behaviors and elevated risky behaviors in victims.[8] The studies generally find a positive correlation between risky behaviors and victimization.[14, 17, 19-21] Two studies that explored the role of ethnicity found differences in bully victimization among various ethnic groups.[22, 23]

In order to assess the association between victimization and risky behaviors, Smith-Khuri *et al* examined the relation in five different countries using a cross-sectional study design among 22,139 participants.[17] The study used a self-report questionnaire administered at 11.5 years, 13.5 years and 15.5 years of age in Portugal, Sweden, Israel, Ireland and the United States. The questionnaire measured frequency of physical violence, i.e. fighting, victimization, carrying weapons and other risky behaviors (e.g. smoking and drinking). Victimization was defined as when a "student is being bullied when another student, or a group of students, say or do nasty or unpleasant things to him or her. It is also bullying when a student is teased repeatedly in a way he or she doesn't like, but it is not bullying when 2 students of about the same strength quarrel or fight". Risky behaviors were defined as engaging in smoking, violent

behavior, such as carrying weapons and fighting and alcohol use. The results showed an increase in participation in risky behaviors by those who were victims compared to those who were not (United States, OR 1.2 95% CI 1.12-1.29). Smith-Khuri *et al* were not able to assess racial groups between the countries or within each country, and each country's survey varied according to the translation methods used by each nation. As such, Smith-Khuri *et al* acknowledge that bullies could be influenced by cultural and environmental factors, and that victimization was still a subjective term for each country. For example, one country may believe the act of bullying to be physical violence whereas another might define it to be name-calling. Our study will not suffer from these problems, as it is entirely based in the United States, and we will be assessing the effect modification caused by ethnicity. In addition, the age range of our study is broader.

Barker *et al*'s study was based on the Edinburgh Study of Youth Transitions and Crime, which followed 3,932 children from age 12 to 17, assessed annually. Barker assessed a smaller subset, using 14-17 year olds to see the trajectories of bully victimization and their links to delinquency and self-harm.[14] Barker assessed victimization as one or more students harming another intentionally and maliciously, while delinquency was defined as stealing, breaking and entering, smoking, alcohol use and fighting. The study adjusted for gender, but was unable to adjust for race, as the majority of the study base was white (94%). Results showed that those who were victimized have an increased risk of being delinquent in comparison to those who were not victimized (OR 2.97, 95%

CI 2.71-3.23). Questionnaires on delinquency were given to 16 year olds, yet the questionnaires on bullying were given to 14-16 year olds, thereby missing 2 years of potential exposure.[14] In addition, the questions regarding risky behaviors were not as well defined as the questions we will be using as they only relied on binary outcomes. Our study, in comparison, looks at three questions for each risky behavior.

A study that showed a link between victimization and risky behaviors was conducted by Jablonska *et al* using a sample of 15,424 9th graders in Stockholm, Sweden.[15] The cross-sectional study used a self-report questionnaire, measuring levels of victimization and risky behaviors including use of alcohol, drugs, and smoking. Victimization was assessed using the question, "Have you ever been bullied in the past school year?" Risky behaviors assessment was not comprehensive as the behaviors were generally measured as dichotomous variables using a *single* question of outcome, whereas our study looks at three questions per risky behavior. Nevertheless a number of risky behaviors were shown to be greater for children in single-parent households when the child was victimized in comparison to children in all other household types (such as shared custody) who were bullied (Smoking OR 1.4, 95% CI 1.3-1.6, Alcohol OR 1.4 95% CI 1.3-1.5 and Drugs OR 1.7, 95% CI 1.5-1.9). The study only assessed 9th graders and focused on parental grouping as an effect modifier, not ethnicity. In addition, our study will focus on a larger age range (14-18 years old).

Two studies examined the association between ethnicity and being a bully victim. Stein *et al*, conducted a cross-sectional study on victimization and

ethnicity.[22] This study used Hispanic, White, African-American and mixed as possible choices for ethnic background. Stein *et al* found that those who were biracial or mixed had a greater chance of being victimized in comparison to Whites. The other study on ethnicity performed by Carlyle *et al* was similar to that of Stein *et al*, as it measured the effect ethnicity had on victimization. Carlyle also saw a difference in ethnicity and victimization, yet recommended that further studies be conducted as their sample size was limited.[23]

Previous epidemiologic studies, though sparse, indicate a positive association between being the victim of bullying and engaging in risky behaviors. Each study had its own definition of risky behaviors and victimization, yet their findings proved to be relatively consistent. Our study will use a cross-sectional design, as it is the most efficient way to measure the effects of victimization on risky behaviors in terms of cost, and ease of use due to the data being collected at a single time. Our questionnaire will assess exposure and outcome with greater detail than prior studies and we will also look at students aged 12 to 18 (a greater range than that of other studies). Because of the possibility that the relation between victimization and risky behaviors varies by ethnicity, we will assess effect modification by ethnic group as well.

Summary

The act of bullying affects the psychological and emotional development of those who are victims. The connection between victimization and risky behaviors has been evaluated by a few epidemiological studies, yet each had limitations that can be overcome by our study.

Psychological studies indicated that victims might choose to partake in more risky behaviors than those who have not been victimized, may become more delinquent in later stages, and could possibly be diagnosed with future psychological problems such as ADHD and anxiety.[7] Epidemiologic studies conducted on victimization also point to the same idea-that victimization has a harmful effect on victims, and leads them to pursue risky behaviors with greater frequency than those who have not been victimized. In addition, studies that investigated the differences between ethnicities and races in victimization show a difference that needs to be further explored.

While there are some studies reviewing the aspects of victimization, and a few that investigate the link between victimization and risky behaviors, there have only been two studies that has evaluated victimization by ethnicity. Carlyle *et al* and Stein *et al* saw a difference in the risk of being victimized by different ethnic groups. Therefore it is prudent that we examine ethnicity as an effect modifier. Therefore, we propose to conduct a secondary analysis of data from a cross-sectional study to investigate the association between victimization and

increases in risky behaviors and will measure effect modification by ethnicity. If alternative preventative measures and programs are needed with different ethnicities, then our study could prove invaluable in adapting existing interventions.

CHAPTER II

SPECIFIC AIMS & HYPOTHESIS

Specific Aim:

To measure the association between bully victimization and risky behaviors among 14 to 18 year olds in Massachusetts

Hypothesis 1:

Adolescents who experience victimization will engage in more risky behaviors (i.e. smoking, alcohol use, illicit drug use and unsafe sex) than those who do not experience victimization.

Hypothesis 2:

The association between victimization and risky behaviors (i.e. smoking, alcohol use, illicit drug use and unsafe sex) will differ according to ethnic group.

CHAPTER III

STUDY METHODOLOGY

Study Design and Population

In order to assess the association between victimization and risky behaviors, we propose a secondary analysis using data from the 2007 Massachusetts Youth Risk Behavior Survey (MYRBS) conducted by the Massachusetts Department of Public Health. Initiated in 1993, the biennial MYRBS sampled 59 random public and private schools. The study is conducted via self-administered, computer-scanned questionnaire. The survey has two versions, one for middle school students in grades 6 through 8 and another for high school students in grades 9 through 12; both include questions that assess victimization and risky behaviors. We used the high school edition for our study. These self-administered questionnaires are completed in forty-five minutes (approximately the same amount of time as a single class period), and are conducted biennially. The state sample size of the MYRBS in 2007 was n=3,131. We will be using the results of the 2007 administration of the MYRBS for the purposes of our study. For our study, sampling weights will not be used to correct for oversampling of certain groups.

We will exclude respondents who did not answer questions on ethnicity, gender, age, victimization or questions on our risky behaviors of interest. Those who responded as being twelve or thirteen years of age were also removed from

the study. We removed these respondents for two reasons. For one, they might have been lying about their ages. If that was the case, then these respondents may have lied on the rest of the survey. Secondly, if the respondents were in fact twelve or thirteen years of age, then their behaviors may be different from the behavior expressed by “typical” high school students.

After completion, questionnaires were submitted back to the Massachusetts Department of Education for processing and compilation. We restricted our sample to those who answered the question on bullying, as well as the questions on risky behaviors (Table 1). The population of the MYRBS was largely White (Table 1), and since the number of participants from the other ethnicities was so small (such as 5.1% African-American and 0.5% for Native Hawaiian/Pacific Islander), we decided to define two ethnic groups. We combined the ‘Multiple/Hispanic’ group with the ‘Hispanic/Latino’ group to create a unified ‘Hispanic’ group, which we will compare with the ‘White’ ethnic group. The rest of the ethnic groups were combined into an ‘other’ group so as not to miss an effect caused by membership to the other minorities. Our study was not weighted for ethnicity, and therefore may not be representative of the state of Massachusetts’ actual ethnic composition.

Study Exposures

Our exposure of interest is bully victimization. In the MYRBS, there is a single question regarding bullying which states, “How often were you bullied in school in the past 12 months?” Since those who were victims were spread out in terms of frequency of bully victimization (Table 1), we decided to use the question as a dichotomous variable, resulting in the question "Were you bullied 1+ times in the past 12 months?” We will define “victim” as “NO” if the subject has not been bullied, and “YES” if they report being victimized at least once in the past 12 months (Table 1).

Study Outcomes

Our outcome of interest is risky behaviors, which include smoking, alcohol use, illicit drug use, sexual intercourse without condoms, and weapon violence. Each of the sections of the MYRBS investigating the outcomes of interest has different sets of questions. The questions that we will be investigating are early onset of the risky behavior, presence of the risky behavior in the past 30 days, and the presence of the risky behavior in the past 30 days on school property. These questions will also be assessed dichotomously to simplify assessment with victimization. We will assess each risky behavior (smoking, alcohol use, marijuana use & unsafe sex) individually against victimization (Table 3).

Reliability study

Brener *et al*, conducted a reliability study evaluating self-report behavior questionnaires in adolescents.[24] After conducting a search on journal articles from 1980 onward, the author found that self-report questionnaires are affected by psychosocial and environmental factors, yet can prove to be an effective measuring tool. For example, Brener *et al* explore a study conducted in adolescents regarding sexual behavior, where 96% of students answered questions the same way, regardless of how the question was phrased and even when different terms were used. Yet in another study, when students were asked about drug use, they would tend to recant their answers on the use of several drugs, specifically barbiturates and tranquilizers. This may be due to the lack of definition for those particular classes of drugs, or it could be because of the social stigma attached to the use of drugs as a whole. Overall, self-report questionnaires remain an effective way of measuring risky behaviors in adolescents. Unfortunately, we have not seen any validation studies on victimization in youth.

Covariate Assessment

Information regarding factors that may contribute to the outcome of interest, such as age, gender and ethnicity was obtained. These factors were chosen due to these covariates being possible confounders or effect modifiers, due to their known correlation detected by other studies. Age could possibly be a confounding factor because the type of bullying can differ according to age.[25] The tendency to partake in risky behaviors is also affected by age, and because of this, we will stratify victimization and risky behaviors by age and assess the association. We chose gender because previous studies have shown that gender is definitely associated with victimization, and girls tend to experience victimization in different ways.[26] Girls tend to experience bullying in verbal ways such as sexual comments or rumors while boys usually report more violent encounters.[1] Finally, to assess our second hypothesis we will assess if the association between bully victimization and risky behaviors varies by ethnicity as an effect modifier.

CHAPTER IV

DATA ANALYSIS

Data Cleaning

The MYRBS dataset was cleaned by the Massachusetts Department of Education in several different ways. One, if the question entered was not one of the viable choices, the answer was coded as missing. Other than for questions on race and ethnicity, if multiple answers were chosen, then the answer is set to missing. Because height and weight were considered required questions on the MYRBS, if height or weight were illegible or left blank then the entry is coded as missing. In addition, logical consistency was evaluated. If two questions are answered inconsistently, such as a subject answering '0' for 'During the past 30 days, on how many days did you carry a weapon such as a gun, knife or club?' while answering '1,2-3,4-5,6+days' for the question 'During the past 30 days, on how many days did you carry a gun' then the answers were coded as missing.

Specific Aim:

To measure the association between victimization *and risky behaviors among 14 to 18 year olds in Massachusetts*

Hypothesis 1*: Adolescents who experience victimization will engage in more risky behaviors than those who do not.*

Univariate Analysis, Hypothesis 1

We presented the number of respondents to the MYRBS survey and the demographics of the study base (Table 1) such as age, gender and ethnic background of which the first two will be considered as covariates. We presented the number and percentages of those who have been victimized within our study base (Table 1). In addition, we also presented the number and percent of those engaging in risky behaviors (Table 1) for each category.

Bivariate Analysis, Hypothesis 1

We used chi-square tests to assess the covariates as potential confounding factors by cross-tabulating them against victimization (Tables 3), which gave us unadjusted odds ratio with a 95% confidence interval, establishing a basic association between victimization and levels of risky behavior.

Multivariable Analysis, Hypothesis 1

We used logistic regression to calculate the adjusted odds ratio and 95% confidence interval for the association between victimization and risky behaviors, adjusting for covariates. Our logistic regression used the entry method, adding the covariates one at a time to create our adjusted odds ratios.

Hypothesis 2*: The association between victimization and risky behaviors differs according to ethnic group.*

Multivariable Analysis, Hypothesis 2

In order to evaluate our second hypothesis, we measured the association between victimization and risky behavior stratified by ethnicity. We created cross-tabulations of victimization by risky behaviors for each ethnic group to assess differences in odds ratios to measure possible effect modification. Statistical significance of these differences was verified using the Breslow-Day test of homogeneity of odds ratios. A p-value for the Breslow-Day of less than 0.05 indicates that the effect of victimization on risky behaviors is modified by ethnicity. We also conducted a logistic regression for each ethnic group to determine if confounding by our covariates of interest is applicable.

CHAPTER V

HUMAN SUBJECT PROTECTION

The 2007 Massachusetts Youth Risk Behavior Survey was conducted by a CDC contractor in 6 classes of each of the 59 public schools. The surveys were conducted anonymously, and were strictly voluntary. Students were asked not to put their names on the form, and were informed that the survey would not affect their grades in any way. Students were also told that “identifying information” such as ethnicity, and other background questions would not be used in an identifying manner.

The data was kept at the Department of Elementary and Secondary Education, and when we received the dataset, ID numbers were removed to further protect confidentiality.

There are possible psychological risks faced by subjects. A subject may be traumatized by having to answer questions on their risky behaviors or other aspects of their personal life. Thus, each school had a social worker or a nurse present on the day of the survey’s administration.

Ultimately, there are no direct benefits to the subjects of the 2007 MYRBS. However, research conducted using the survey by this and other studies will prove invaluable in providing and adjusting interventions in school to promote better health and healthy behaviors.

CHAPTER VI

TABLES

Table 1: Characteristics of study participants (n=3,131), aged 12 – 18 students in grades 9 - 12 from the Massachusetts Youth Risk Behaviors Study (MYRBS) 2007.

Characteristics	Totals (%)
Age (years)	
12	8 (0.3%)
13	7 (0.2%)
14	419 (13.4%)
15	766 (24.5%)
16	752 (24%)
17	786 (25.1%)
18	391 (12.5%)
Missing	2 (0.1%)
Gender	
Male	1524 (48.7%)
Missing	9 (0.3%)
Ethnicity	
American In/Alaskan	14 (0.5%)
Asian	172 (5.7%)
Black/African-American	157 (5.1%)
Native Hawaiian/Pac Islander	16 (0.5%)
White	2062 (67.6%)
Hispanic/Latino	238 (7.8%)
Multiple (Hispanic)	264 (8.5%)
Multiple (Non-Hispanic)	125 (4.1%)
Missing	82 (2.6%)
Bullied (times during the past 12 months)	
0	2404 (78.7%)
1	199 (6.5%)
2 or 3	202 (6.6%)
4 or 5	74 (2.4%)
6 or 7	35 (1.1%)
8 or 9	17 (0.6%)
10 or 11	11 (0.4%)
12 or more	111 (3.6%)
Missing	77 (2.5%)

Table 1 continued

Violence (within past 30 days)	
Carried weapon	446 (14.5%)
Missing	58 (1.9%)
Carried gun	104 (3.4%)
Missing	50 (1.6%)
Carried weapon in school	153 (4.9%)
Missing	29 (0.9%)
Smoking	
Ever Tried Cigarettes	1388 (46.4%)
Missing	153 (4.9%)
Smoked cigarettes before 13	357 (12.1%)
Missing	180 (5.7%)
Smoked 1+ past 30 days	525 (17.6%)
Missing	156 (5.0%)
Smoked at school 1+ past 30 days	221 (7.3%)
Missing	99 (3.2%)
Drinking	
Had first drink before 13	607 (19.7%)
Missing	51 (1.6%)
Had 1+ drinks past 30 days	1400 (46.8%)
Missing	139 (4.4%)
Had 1+ drink at school 1+ 30 days	149 (4.8%)
Missing	54 (1.7%)
Marijuana	
Tried Marijuana before 13	276 (9.0%)
Missing	62 (2.0%)
Marijuana 1+ past 30 days	730 (24%)
Missing	93 (3.0%)
Used Marijuana at school 1+ 30 days	153 (5.0%)
Missing	54 (1.7%)
Sexual Behavior	
Sexually active	1261 (44.5%)
Missing	287 (9.2%)
Of sexually active, used condoms last time	560 (60.3%)
Missing	2202 (70.3%)

Table 2: Characteristics of study participants older than 13 with information available on victimization status (n=3040), from the MYRBS 2007.

	Victimized	
	Yes (n=643) n (%)	**No (n=2397) n (%)**
Ethnicity		
White	452 (22.5%)	1558 (77.5%)
Hispanic	89 (18.6%)	389 (81.4%)
Other	102 (18.5%)	450 (81.5%)
Missing: 76 (2.4%)		
Age		
14	123 (19.1%)	291 (12.2%)
15	206 (32%)	537 (22.4%)
16	141 (21.9%)	594 (24.8%)
17	107 (16.6%)	660 (27.6%)
18	66 (10.3%)	313 (13.1%)
Missing: 78 (2.5%)		
Gender		
Female	342 (53.3%)	1209 (50.5%)
Male	300 (46.7%)	1183 (49.5%)
Missing: 82 (2.6%)		

Table 3: Risky behaviors by Victimization of participants (n=3,040) in the MYRBS 2007.

	Victimized		
	Yes (n=643 (21%))	No (n=2397 (79%))	
Category	**n (%)**	**n (%)**	**Odds Ratio (95% CI)**
Smoked before 13	99 (28.5%)	248 (71.5%)	1.62 (1.26-2.09)**
Missing: 239 (7.7%)			
Smoked 1+ past 30 days	144 (28.1%)	368 (71.9%)	1.63 (1.31-2.03)**
Missing: 221 (7.1%)			
Smoked at school 1+ past 30 days	66 (31%)	147 (69%)	1.78 (1.31-2.41)**
Missing: 167 (5.4%)			
Drink before 13	163 (27.8%)	423 (72.2%)	1.60 (1.23-1.97)**
Missing: 122 (3.9%)			
Drink 1+ past 30 days	286 (21%)	1079 (79%)	0.98 (0.82-1.17)
Missing: 205 (6.6%)			
Drink 1+ at school past 30 days	42 (29.6%)	100 (70.4%)	1.62 (1.12-2.35)**
Missing: 123 (3.9%)			
Tried Marijuana before 13	74 (27.6%)	194 (72.4%)	1.50 (1.13-1.99)**
Missing: 128 (4.1%)			

Table 3 continued

Used Marijuana 1+ past 30 days	148 (20.8%)	565 (79.2%)	0.99 (0.81-1.22)
Missing: 159 (5.1%)			
Used Marijuana 1+ at school past 30 days	44 (29.5%)	105 (70.5%)	1.62 (1.13-2.34)**
Missing: 124 (4%)			
Current sex, used condom	114 (20.8%)	433 (79.2%)	0.96 (0.69-1.33)
Missing: 2211 (71%)			
Carried weapon 1+ past 30 days	118 (32.9%)	314 (67.1%)	1.53 (1.21-1.63)**
Missing: 129 (4.1%)			
Carried gun 1+ past 30 days	30 (31.6%)	65 (68.4%)	1.77 (1.14-2.75)*
Missing: 120 (3.9%)			
Carried weapon at school 1+ past 30	48 (32.9%)	98 (67.1%)	1.92 (1.34-2.74)**
Missing: 99 (3.2%)			

* $p < 0.05$; ** $p < 0.01$

Table 4: Effect Modification by Ethnicity on Victimization and Risky Behaviors among participants in the MYRBS 2007.

	Victimized		
	Yes (n=643 (21%)) n (%)	**No** (n=2397 (79%)) n (%)	**Odds Ratio** (95% CI)
Carried weapon 1+ past 30 days (p value=0.655)†			
White	74 (28%)	190 (72%)	1.44 (1.08-1.93)*
Hispanic	19 (25.7%)	55 74.3%)	1.64 (0.91-2.93)
Other	25 (26.6%)	69 (73.4%)	1.90 (1.13-3.20)*
Carried gun 1+ past 30 days (p value=0.422)†			
White	13 (28.3%)	33 (71.7%)	1.38 (0.72-2.64)
Hispanic	8 (34.8%)	15 (65.2%)	2.52 (1.03-6.14)*
Other	9 (34.6%)	17 (65.4%)	2.48 (1.07-5.75)*
Carried weapon in school 1+ past 30 days (p value=0.448)†			
White	26 (31.3%)	57 (68.7%)	1.63 (1.01-2.62)*
Hispanic	10 (37%)	17 (63%)	2.78 (1.23-6.31)*
Other	12 (33.3%)	24 (66.7%)	2.42 (1.17-5.02)*
Smoked cigarettes before 13 (p value=0.694)†			
White	67 (31.9%)	143 (68.1%)	1.75 (1.28-2.39)**
Hispanic	14 (21.5%)	51 (78.5%)	1.28 (0.67-2.46)
Other	18 (25%)	54 (75%)	1.73 (0.96-3.13)
Smoked 1+ past 30 days (p value=0.23)†			
White	105 (28%)	270 (72%)	1.47 (1.13-1.89)**
Hispanic	15 (25%)	45 (75%)	1.60 (0.85-3.04)
Other	24 (31.2%)	53 (68.8%)	2.48 (1.43-4.30)**

Table 4 continued

Smoked at school 1+ past 30 days (p value <0.01)†			
White	41 (26.6%)	113 (73.4%)	1.290 (0.887-1.875)
Hispanic	10 (37%)	17 (63%)	2.78 (1.23-6.32)*
Other	15 (46.9%)	17 (53.1%)	4.66 (2.24-9.73)**
Had first drink before 13 (p value=0.309)†			
White	95 (29.1%)	232 (70.9%)	1.53 (1.18-2.00)**
Hispanic	30 (23.3%)	99 (76.7%)	1.54 (0.94-2.55)
Other	38 (29.2%)	92 (70.8%)	2.31 (1.45-3.67)**
Had 1+ drinks in the past 30 days (p value=0.079)†			
White	201 (20.9%)	761 (79.1%)	0.84 (0.68-1.04)
Hispanic	42 (21.1%)	157 (78.9%)	1.20 (0.75-1.92)
Other	43 (21.1%)	161 (78.9%)	1.41 (0.90-2.21)
Had 1+ drinks at school 1+ in past 30 days (p value=0.449)†			
White	22 (28.6%)	55 (71.4%)	1.409 (0.85-2.34)
Hispanic	10 (35.7%)	18 (64.3%)	2.60 (1.15-5.85)*
Other	10 (27%)	27 (73%)	1.755 (0.820-3.757)
Tried Marijuana before 13 (p value=0.946)†			
White	46 (28.9%)	113 (71.1%)	1.48 (1.04-2.13)*
Hispanic	14 (25%)	42 (75%)	1.51 (0.79-2.91)
Other	14 (26.4%)	39 (73.6%)	1.69 (0.88-3.24)

Table 4 continued

Used Marijuana 1+ times past 30 days (p value=0.308)†			
White	104 (20.8%)	396 (79.2%)	0.89 (0.70-1.15)
Hispanic	17 (19.3%)	71 (80.7%)	1.07 (0.59-1.93)
Other	27 (21.6%)	98 (78.4%)	1.37 (0.83-2.26)
Used Marijuana at school 1+ times past 30 days (p value=0.061)†			
White	22 (24.7%)	67 (75.3%)	1.16 (0.71-1.89)
Hispanic	11 (37.9%)	18 (62.1%)	2.97 (1.346-6.536)**
Other	11 (35.5%)	20 (64.5%)	2.62 (1.21-5.66)*
Current sex, Used condom (p value=0.073)†			
White	84 (23.2%)	278 (76.8%)	1.26 (0.83-1.89)
Hispanic	14 (15.4%)	77 (84.6%)	0.66 (0.29-1.51)
Other	16 (17%)	78 (83%)	0.51 (0.24-1.08)

†: p values obtained from the Breslow-Day test for homogeneity of the odds ratios

Table 5: Results of logistic regression models, unadjusted and adjusted† of risk behaviors among study participants, students in grades 9 - 12 from the Massachusetts Youth Risk Behaviors Study (MYRBS) 2007: comparing those who were victims of bullying to those who were not.		
	Unadjusted OR (95% CI)	**Adjusted OR (95% CI)**
Violence		
Carried weapon 1+ past 30 days	1.53 (1.21-1.63)**	1.78 (1.39-2.28)**
Carried gun 1+ past 30 days	1.77 (1.14-2.75)*	2.32 (1.46-3.69)**
Carried weapon in school 1+ past 30	1.92 (1.34-2.74)**	2.16 (1.50-3.12)**
Smoking		
Smoked cigarettes before 13	1.62 (1.26-2.09)**	1.75 (1.35-2.26)**
Smoked 1+ past 30 days	1.63 (1.31-2.03)**	1.88 (1.50-2.36)**
Smoked at school 1+ past 30 days	1.78 (1.31-2.41)**	2.06 (1.50-2.81)**
Drinking		
Had first drink before 13	1.60 (1.30-1.97)**	1.58 (1.28-1.96)**
Had 1+ drinks past 30 days	0.98 (0.82-1.17)	1.09 (0.91-1.31)
Had 1+ drink at school 1+ 30 days	1.62 (1.12-2.35)*	1.86 (1.27-2.71)**
Marijuana		
Tried Marijuana before 13	1.50 (1.13-1.99)**	1.62 (1.21-2.17)**
Marijuana 1+ past 30 days	0.99 (0.81-1.22)	1.15 (0.93-1.42)
Used Marijuana at school 1+ 30 days	1.62 (1.13-2.34)**	1.93 (1.33-2.80)**
Sexual Behavior		
Of current sex, used condoms last time	0.96 (0.69-1.33)	0.88 (0.63-1.23)

†Adjusted for age and gender
* $p < 0.05$; ** $p < 0.01$

Table 6: Results of logistic regression models stratified by ethnicity, unadjusted and adjusted† of risk behaviors among study participants, students in grades 9 - 12 from the Massachusetts Youth Risk Behaviors Study (MYRBS) 2007: assessing effect modification by ethnicity in comparisons of those who were victims of bullying to those who were not.

	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Carried weapon 1+ past 30 days		
White	1.44 (1.08-1.93)*	1.72 (1.26-2.36)**
Hispanic	1.64 (0.91-2.93)	2.14 (1.12-4.09)*
Other	1.90 (1.13-3.20)*	1.98 (1.15-3.42)*
Carried gun 1+ past 30 days		
White	1.38 (0.72-2.64)	1.69 (0.862-3.327)
Hispanic	2.52 (1.03-6.14)*	3.11 (1.19-8.13)*
Other	2.48 (1.07-5.75)*	3.03 (1.25-7.34)*
Carried weapon in school 1+ past 30 days		
White	1.63 (1.01-2.62)*	1.86 (1.14-3.05)*
Hispanic	2.78 (1.23-6.31)*	3.42 (1.43-8.18)**
Other	2.42 (1.17-5.02)*	2.33 (1.11-4.90)*
Smoked cigarettes before 13		
White	1.75 (1.28-2.39)**	1.95 (1.41-2.69)**
Hispanic	1.28 (0.67-2.46)	1.33 (0.68-2.57)
Other	1.73 (0.96-3.13)	1.75 (0.95-3.22)
Smoked 1+ past 30 days		
White	1.47 (1.13-1.89)**	1.86 (1.42-2.43)**
Hispanic	1.60 (0.85-3.04)	1.78 (0.93-3.42)
Other	2.48 (1.43-4.29)**	2.71 (1.54-4.75)**

Table 6 continued

Smoked at school 1+ past 30 days		
White	1.29 (0.89-1.88)	1.59 (1.08-2.34)*
Hispanic	2.784 (1.23-6.32)*	3.23 (1.388-7.49)*
Other	4.66 (2.24-9.73)**	5.22 (2.44-11.16)**
Had first drink before 13		
White	1.53 (1.18-2.00)**	1.467 (1.12-1.93)**
Hispanic	1.54 (0.94-2.55)	1.62 (0.97-2.70)
Other	2.31 (1.45-3.67)**	2.19 (1.36-3.53)**
Had 1+ drinks in the past 30 days		
White	0.84 (0.68-1.04)	1.04 (0.83-1.30)
Hispanic	1.20 (0.75-1.92)	1.22 (0.76-1.97)
Other	1.41 (0.90-2.21)	1.48 (0.94-2.35)
Had 1+ drinks at school 1+ in past 30 days		
White	1.41 (0.85-2.34)	1.78 (1.06-3.00)*
Hispanic	2.60 (1.15-5.85)*	2.59 (1.14-5.92)*
Other	1.76 (0.82-3.76)	1.79 (0.82-3.88)
Tried Marijuana before 13		
White	1.48 (1.05-2.13)*	1.64 (1.13-2.38)**
Hispanic	1.51 (0.79-2.91)	1.54 (0.79-3.01)
Other	1.69 (0.88-3.24)	1.74 (0.89-3.39)
Used Marijuana 1+ times past 30 days		
White	0.89 (0.70-1.15)	1.13 (0.87-1.46)
Hispanic	1.07 (0.59-1.93)	1.14 (0.63-2.08)
Other	1.37 (0.83-2.26)	1.49 (0.89-2.49)

Table 6 continued

Used Marijuana at school 1+ times past 30 days		
White	1.16 (0.71-1.89)	1.47 (0.88-2.44)
Hispanic	2.97 (1.35-6.57)**	3.20 (1.43-7.17)**
Other	2.62 (1.21-5.66)*	3.01 (1.36-6.69)**
Current sex, Used condom		
White	1.26 (0.83-1.89)	1.10 (0.72-1.69)
Hispanic	0.66 (0.29-1.51)	0.68 (0.30-1.57)
Other	0.51 (0.24-1.08)	0.46 (0.20-1.07)

†Adjusted for age and gender
* $p < 0.05$; ** $p < 0.01$

CHAPTER VII

RESULTS

Our population consisted of n=3,131 students in grades 9 through 12, from 59 public schools (each contributing six classes) in Massachusetts. After initial analysis, it was observed that the mean age of respondents was approximately 17 years old, and the gender radio was almost 1:1 (Table 1). As expected, the highest ethnic group of MYRBS respondents was White (67.6%) and the second highest ethnic group was Multiple-Latino (8.5%). Victimization was consistent with nationwide estimates at 20.9%, and females (53.3%) were slightly more likely to have been victims than males (46.7%, Table 2). Those who were victimized were more likely to be 15 years old (32%) and were also more likely to be White (22.5%) in comparison to other ethnic groups (18.6% Hispanic, 18.5% other). For assessment of effect modification by ethnicity, a Hispanic ethnic category was created by merging the “Hispanic/Latino” group to the “Mixed-Hispanic” group, thereby giving us a larger population (and therefore better power) for our analysis. Due to the small cell sizes for each of the racial groups, remaining ethnic groups were collapsed into a group of other ethnicities. When we compared the groups with regard to bully victimization we saw the White group consisting of 22.5% and the Hispanic group of 18.6% with other being close to the Hispanic group with 18.5% (Table 2).

Alcohol proved to be the most prevalent risky behavior, with 46.8% of respondents consuming alcohol in the past 30 days (Table 1). Those who were

victimized were more likely to have an early onset of alcohol use (27.8%) than not, and they tended to drink alcohol at school (29.6%) more than those who were not victimized (Table 3).

Those who were victimized were at greater risk for an early onset of smoking (28.5%) compared to those who were not victimized as can be seen in Table 3. Victims were also likely to have greater odds for smoking at least once in the past 30 days (1.63 OR, 95% CI 1.31-2.03). Bully victims also had an increased risk for smoking at school in the past 30 days (1.78 OR, 95% CI 1.31-2.41).

Unprotected sexual intercourse was only at 39.7%, and roughly half of the respondents had not engaged in intercourse prior to the study (55.5%) as seen in Table 1. There were no definitive correlations between unprotected sex and being victimized.

For our drug risky behavior, marijuana use, those who were victimized had a greater risk of using marijuana at school at least once in the past 30 days (1.62 OR, 95% CI 1.13-2.34, Table 3). In addition, those who were bullied were also more likely to have tried marijuana before the age of 13 (1.50 OR, 95% CI 1.13-1.99). These results appear to be consistent with the trends presented by the previously discussed risky behaviors.

When we assessed carrying weapons, it appeared that those who were victimized were more likely to carry guns (31.6%) or any other type of weapon (32.9%, Table 3) than those who were not victims. Those who were bully victims tended to bring weapons to school (32.9%) more often than those who were not

victimized, with an odds ratio of 1.92 (95% CI 1.34-2.41).

To evaluate our second hypothesis, we assessed effect modification by looking for differences between Whites, Hispanics and others with regard to the association between bully victimization and risky behaviors. Although some small differences were observed for point estimates of the odds ratios, p-values from the Breslow-Day test of homogeneity of the odds ratio for each outcome question of interest suggested the absences of effect modification in general. The difference in odds ratios between the ethnicities was not significant with the exception of smoking at school in the past 30 days (p value <0.01). For this outcome, those in the 'other' category were at increased risk compared to Whites and Hispanics, which was in line with a general trend, at least for point estimates. Odds ratios for Hispanics were higher for nearly all of the risky behaviors of interest in comparison to Whites, and others had variable risk in comparison to Whites and Hispanics.

For weapon violence, Hispanics were more likely to engage in all three risky behaviors, with the most pronounced effect being the likelihood of carrying a weapon to school (2.78 OR, 95% CI 1.23-6.31, Table 6) in comparison to Whites (1.63 OR, 95% CI 1.01-2.62) and others (2.42 OR, 95% CI 1.17-5.02).

Smoking presented similar results for the behaviors of smoking for the past 30 days and smoking at school. However, Whites (1.75 OR, 95% CI 1.28-2.39) were more likely to have an early onset of smoking than Hispanics (OR 1.28, 95% CI 0.67-2.46), but not others (1.73 OR, 95% CI 0.96-3.13, Table 4).

In marked contrast, alcohol did not have a higher risk for two of the

questions of interest, but Hispanics once again had a higher risk (2.60 OR, 95% CI 1.15-5.85) than Whites (1.41 OR, 95% CI 0.85-2.34) and others (1.76 OR, 95% CI 0.820-3.757, Table 4) for drinking at school in the past 30 days.

Hispanics also had higher odds for all marijuana outcomes of interest, which is generally consistent in following the trends of the other risky behaviors (Table 4).

Unprotected sex use presented Whites as having the higher “risk” (1.26 OR, 95% CI 0.83-1.89) of using a condom than Hispanics (0.66 OR, 95% CI 0.29-1.51) and others (0.51 OR, 95% CI 0.24-1.08, Table 4), who were more likely to not use protection.

Logistic regression was conducted for each outcome of interest. After controlling for age and gender, we observed that for violence risky behavior, the adjusted odds ratios comparing those who were victims of bullying to those who were not increased. The same was true for smoking, and for marijuana. Drinking, on the other hand, exhibited a slight decrease when covariates were applied, except for the question on drinking at school in the past 30 days. As was consistent with the prior analysis, unprotected sex displayed no significance. Some of the results from the logistic regression gave us odds ratios with confidence intervals that included 1, indicating a lack of significance, which was seen with drinking and marijuana use in the past 30 days. The other results were statistically significant with p-values less than 0.05.

CHAPTER VIII

DISCUSSION

In our assessment of the association between bully victims and risky behaviors from the Massachusetts Youth Risk Behavior Survey (MYRBS), we found those who were victimized were more likely to engage in risky behaviors prior to the age of thirteen, and were also more likely to engage in the same risky behaviors while at school. However, one of the risky behaviors we investigated, unprotected sex, showed no significant relationship with victimization. When assessing our second hypothesis on ethnicity being an effect modifier, we saw some differences between the three ethnicities being investigated, White, Hispanics and others. In general, others and Hispanics appeared to have a greater risk for all risky behaviors in comparison to Whites. However, the differences were not significant according to the Breslow-Day test, suggesting the association does not vary significantly by ethnic group.

Our study found appreciable and significant differences between those who were victimized and those who were not, and our 95% confidence intervals were tight. In addition, our study was able to look at multiple outcomes, with multiple measures of each outcome, which is something that hasn't been done in prior literature. Our exploration of our risky behaviors of interest was also strong as we were able to measure the behaviors within school grounds in addition to outside of school. The MYRBS gave us the chance to explore a larger range of ages than previously researched, allowing us to determine if there was any

significance associated with age and victimization. Finally, as the MYRBS was conducted in 2007, we have the most up-to-date information available on school-going youth in the state of Massachusetts.

We did encounter some difficulties with our study. The MYRBS was conducted in the spring of 2007, from February to April. If the survey was given to a certain group of students in February, the questions regarding the past 30 days may have been compromised. For example, it is reasonable to assume that during New Year's Eve celebrations, students may have had an alcoholic beverage. As such, the question that asks, "During the past 30 days, on how many days did you have at least one drink of alcohol" would be biased. Then we faced a challenge when it came to ethnic groups. As seen in Table 1, the ethnic groups present in the MYRBS were varied. However, the number of subjects in most ethnic groups was severely limited in comparison to the others. In order to circumvent that problem, we combined the "Hispanic" group with the "Multiple (Hispanic)" group to create the combined "Hispanic" group. We combined these two groups for several reasons. One reason was the combined cell size would be great enough to give detectable and significant results. We conducted some preliminary analysis on effect modification with all the other ethnic groups, and found that the cell sizes from the initial analysis were very small, sometimes having a cell size of zero. These cell sizes gave us some unusual odds ratios and very wide confidence intervals. Since we did not wish to miss the effect other ethnicities had on victimization and risky behaviors, we combined the other ethnic groups into an "other" category. Therefore, even though we wanted to

assess ethnicity as an effect modifier across the board, we had to limit our ethnic groups to White, Hispanics and others.

As previously mentioned in our methods section, we removed respondents who identified themselves as being twelve or thirteen years old. This was due to possible bias that may have been caused by insincere respondents. The respondents who reported their age to be twelve or thirteen may have been lying and therefore could have lied on the questions of interest. Even if the respondents did not lie about their age and were in fact twelve or thirteen, they were removed prophylactically since their behaviors might be a deviation from what may be considered the norm in Massachusetts's high schools.

Another problem we encountered was in regard to the sampling strategy used by the MYRBS. For the original dataset, certain groups were oversampled; weights are required to use the dataset for comparability with the Massachusetts state population. For our study, we did not use sampling weights, and thus our study population may not represent the population of the school-going youth of Massachusetts. Nevertheless, estimates remain internally valid given assumptions, though they may not have external validity.

One of the largest problems we face in our study is the design of the study itself. As a cross-sectional study based on a self-reported survey, we have difficulty in establishing temporality. We cannot be certain that being bullied caused one to engage in risk behaviors, or the converse. This issue of temporality places us in a quandary, but regardless we can still see a difference

between those who have been victimized and those who have not. Therefore, the results can still be used effectively in adapting existing intervention programs.

We were also looking at risky behaviors conducted in the past 30 days, which can be limiting. For example, a student might have engaged in marijuana use two months before the survey was administered, but refrained from marijuana in the past month, thereby causing us to miss out on exposure for that particular student. Yet due to the construction of the survey, we are unable to alter this, and consider that the past 30 days is a reasonable measure of someone who consistently engages in a particular risky behavior.

Overall, our results have been consistent with what little research exists. From prior studies, victims had a higher chance of becoming delinquent in comparison to those who were not victimized.[14] The two studies that looked at different ethnic groups in terms of victimization did find that different ethnicities experienced varying levels of victimization.[22, 23] We found that there was a similar result in our study, but we took it a step further by analyzing a possible effect modification by ethnicity. We found that Whites were less likely to engage in risky behaviors than Hispanics and others when they were victims in comparison to those who were not victimized. However, once we conducted the Breslow-Day test, we found that the differences were not significant, except for smoking at school in the past 30 days.

In our study, we saw that those who were victimized were more likely to engage in risky behaviors prior to the age of thirteen. There was no prior studies that investigated the association between bullying, age and the time when a risky

behavior was initiated. Yet it seems logical to find that those who were bullied at a younger age are more likely to engage in risky behaviors at a younger age. Unfortunately, our question of exposure only looks at the past year, and as previously mentioned our study has difficulty in establishing a temporal association. In addition, our study saw that those who were victims were more likely to engage in risky behaviors in school comparison to those who weren't. It is difficult to say if this result was consistent with other studies, since other studies did not clarify *where* the risky behaviors took place. Again, those who were victimized could have decided to engage in risky behaviors in school, as they would be out of sight from their parents, and thus had greater freedom. It may be that engaging in risky behaviors at school is considerably riskier than engaging in behaviors outside of school as the chances of being caught dramatically increases.

We may also consider another line of reasoning. Even though engaging in a risky behavior by the age of thirteen was correlated with being victimized, we know that the risky behavior came first since victimization was only determined from the past 12 months. Clearly, victimization between age 13 and 18 cannot be considered a precursor or cause for engaging in risky behaviors before 13. We do know that there is a definitive correlation between engaging in risky behaviors before the age of 13 and engaging in the same risky behaviors in the present. We also saw a connection between being a victim, and present risky behavior. Some unknown factor may have contributed to a subject's predisposition to engaging in a risky behavior before 13, and may also have contributed to a

subject being the target of bullies. Victimization could be a predictor of a student's chances to engage in risky behaviors throughout their school career.

Psychosocial development of an individual is comprised of numerous aspects and can be affected in a multitude of ways.[6, 9] A link between the psyche and victimization has not been proven, but it is clear that those who have been victims of bullying experience isolation, internalization of emotion, and have quite some difficulty in handling emotion.[5, 6, 11] Victims also tend to have a steady progression to depression[7], which has been shown to increase the likelihood in engaging in risky behaviors.[12] We also know that victims are more likely to have higher levels of total delinquency than bullies[7] and it appears that our results definitely predict a higher level of delinquency in victims.

The results presented in our study may inform interventions. We found an association between victims and beginning a risky behavior before the age of thirteen, suggesting the possibility of identifying at-risk students at a young age. Victims were also more likely to engage in these risky behaviors in school, which suggests that interventions that target behaviors might have an impact in reducing the incidence of occurrence on school grounds. Thus, our study reinforces the hazards posed by victimization on the psychological and social development of youth.

Study Limitations

Nondifferential Misclassification

Nondifferential misclassification of our exposure of interest could occur if there is a misrepresentation of those who are victimized. There is a chance that those who are victimized may feel embarrassed about their victimization and will report that they are not victims. However, because the self-administered questionnaires are anonymous, the chance of this misclassification occurring is quite small. Finally, we would miss victimization not on school grounds. If this type of misclassification of victimization were to occur, then the odds ratio between victimization and risky behavior would be biased toward the null.

Nondifferential misclassification of risky behavior is also a possibility. It is likely that subjects may be hesitant in reporting use of drugs, alcohol, unprotected sex, *et cetera*. because of the social stigma associated with the risky behaviors of interest. On the other hand, the opposite might occur when reporting alcohol use, due to its popularity amongst students. In order to confirm our values for all the possible misclassifications of exposure or outcome, we will compare the data obtained with previous data from Massachusetts's schools. There is a possibility that our question on 30 days of use for a particular risky behavior may miss outcomes that occurred greater than 30 days ago. We considered that students would not understand questions on victimization or risky

behaviors, leading to an underestimation of the relative risk. However, this is an unlikely scenario as each question was expressly defined in the questionnaire. Regardless of whether or not risky behavior is over or underestimated, the relative risk would shift toward the null. There is also the chance that younger student would rush through the study, also causing a misclassification of both outcome and exposure.

Differential Bias

Selection Bias

We considered the possibility that some subjects would choose not to complete the survey, however we consider this possibility to be remote at best. Since the test is administered in Massachusetts schools, the only way a student would be unable to take it would be if they were absent that day or if they were unwilling to answer the questionnaire as a whole or individual questions. One very important thing to note is that we are looking at students who were *attending* school at the time of administration. Therefore we do not have a sampling of youth who either dropped out or were being homeschooled at the time, and do not have any information regarding those who were not present. In addition, the survey was given to 6 classes per school, and therefore students who belonged to classes that were not selected might have been victims, but were excluded.

Information Bias

Students might also feel the need to explain their risky behaviors as a result of being victimized. For example, a student might have felt that their drinking or smoking, *et cetera* was due to the stress experienced from being victimized, therefore shifting the bias away from the null. This is minimized by the spread of questions and questions on victimization are distanced from those on risky behaviors. Students could also want to "look cool" and may over report their risky behaviors, result in a shift away from the null. Students may also have recorded their results on the survey according to how they believed they should answer, shifting toward the null. Other possible problems due to study design could be recall bias with the self-report questionnaire. This is unlikely since risky behaviors and victimization are difficult to forget. Finally, information bias may also occur if those who partake in risky behavior feel as though they need to explain their socially negative behavior, shifting toward the null.

Confounding

We collected information on age, gender and ethnicity and consider these in the analysis. We evaluated ethnicity as a potential effect modifier. It is possible that some respondents will misreport other ethnic background, as some may decide that one ethnicity represents them better than another ethnicity. However, the chance of this occurring is remote. In addition, some respondents may be of

mixed heritage, but because the questionnaire includes an answer choice for "other/multiple ethnicity" there should be no problem. There could be some other confounding factors that we may not have foreseen which could move our relative risk values toward or away from the null. For example, those who are being abused in their home could have a greater chance of being targeted by bullies due to their social isolation, and it might also cause them to partake in risky behaviors at high levels. This would cause the odds ratio to increase. In another case, those who are prone to being victimized (social outcasts, etc) might have a greater desire to get involved in risky behaviors, which would also cause the odds ratio to increase.

Cross-Sectional Design Limitations

Because our study design is cross-sectional, survival bias is a potential concern. In our study, it might result if those who experience high levels of victimization partake in higher levels of risky behavior resulting in possible death- due to lethal drug and alcohol overdoses, for example. The results would therefore shift to the null. However, this is unlikely to occur to an appreciable extent, and therefore survival bias is not likely to have real impact on findings. The biggest limitation inherent to cross-sectional design is the issue of temporality. It is difficult if not impossible to determine if victimization caused risky behaviors or vice versa. Yet ultimately the cross-sectional design is an efficient way to measure our exposure and outcome of interest.

Generalizeability

The study was conducted in Massachusetts, consisting of school-going youth aged 14 to 18, who may not necessarily be representative of the nation. Since the study sample was also not weighted, we cannot say that our study is representative of all school-going youth in Massachusetts. Additionally, the state of Massachusetts may not be representative of the nation, and this limits the ability to generalize findings from this study to the rest of the nation. Similarly, the experiences of individuals in the United States during childhood may vary from the rest of the world and so we cannot generalize our results to any other country.

CHAPTER IX

SIGNIFICANCE

Victimization continues to be a problem in *and* out of schools. One way to address this problem is through intervention programs that target victims as well as those who bully. The results of this study will allow us to use victimization as a possible predictor for risky behavior use in the present and use of a risky behavior before the age of 13 as a predictor for being a bully victim. As such, interventions may be developed to target the predictors in order to reduce the level of victimization or risky behaviors. Our findings regarding the association between victimization and risky behavior could inform new intervention methods for use with different ethnicities, adjusting programs to help different ethnicities in ways that are more effective, thereby reducing the rate of victimization and therefore risky behaviors.

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