SUICIDAL BEHAVIOR AMONG ADOLESCENT STUDENTS IN PUERTO RICO, ACADEMIC YEARS 2002-03 AND 2003-04

by

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DEDICATION

To the most important person in my world, now and always,
and to whom I owe everything that I have ever achieved.

To Mrs. Lydia E. Figueroa,
my Mom.

¡Con todo mi amor!

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ABSTRACT

SUICIDAL BEHAVIOR AMONG ADOLESCENT STUDENTS IN PUERTO RICO, ACADEMIC YEARS 2002-03 AND 2003-04

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Linnette Rodríguez-Figueroa

Chair: Siobán D. Harlow

Few studies have explored suicidal behavior among Puerto Ricans. The objectives of this study were to estimate the prevalence of suicidal ideation and attempts among adolescents, to determine if prevalences clustered spatially, and to determine the association between suicidal behaviors and socio-demographic, individual, family, peer, school, and community characteristics.

This study is a secondary analysis of "Consulta Juvenil VI", a Puerto Rican-wide cross-sectional survey. The sample (n=55,227) was selected using a multi-stage stratified cluster sampling design, and is representative of all 7^{th}-12^{th} grade public school students in Puerto Rico. Weighted prevalence estimates were calculated, and correlates of their spatial patterns were explored. Multiple logistic regression analyses were performed.

Suicidal ideation was reported by 15.7% of the students; 12.8% reported attempts. Most students who reported ideation (75.5%) also reported attempts. Prevalences were significantly higher if female, not living with both parents, not born in the island, and with mother not high school graduate. The highest prevalences (attempts=18.0%; ideation=20.5%) clustered in the southeastern/eastern municipalities, with depression prevalence a possible explanation for the spatial clustering.

Individual and family characteristics were the most important predictors for suicidal behavior with the presence of depressive symptoms, sensation seeking behaviors, and family conflict being key risk factors. The presence of depressive symptoms was associated with a seven-fold increase in the odds of suicidal behavior. Family conflict in the presence of depressive symptoms greatly augmented risk among females (those reporting conflict had three times higher odds of reporting symptoms than those who reported no conflict). Community characteristics, particularly disorganization and perceived handgun availability, were more important determinants of suicidal behavior than were peer and school characteristics.

This is the first study in Puerto Rico to examine suicidal behavior and to explore its spatial patterns in an island-wide representative sample. It addresses the dearth of information about suicidal behavior among Puerto Ricans, and contributes to understanding how risk factors operate across multiple domains. Effective prevention strategies should target high risk groups in the geographic areas identified, and should

address depression, particularly when expressed as part of family conflict. Future research should focus on better understanding depression in this population.

CHAPTER I

INTRODUCTION

Suicidal behavior, a type of self-directed violence, is a broad term used to encompass several aspects of this important public health problem. It extends from thinking about killing oneself ("suicidal ideation"), to developing a plan, obtaining the means to do so, and finally carrying out the plan.[1] The plan can be successful ("completed suicide") or not ("attempted suicide", also called "parasuicide" or "deliberate self-injury" in some countries). Consequently, deaths from suicide are only a small part of a much larger problem. In fact, the American Association of Suicidology estimates that for every completed suicide there are approximately 20 attempted suicides in the United States.[2]

Suicide is the thirteenth (13^{th}) leading cause of death worldwide with an approximate mortality rate of 14.5 deaths per 100,000 population.[1, 3] In Puerto Rico, the rate is approximately 9.4 deaths per 100,000 population, making suicide the 16^{th} leading cause of death in the Island.[4]

Suicide rates vary with age.[1, 5] Death due to self-inflicted injuries is the fourth (4^{th}) leading cause of death and an important cause of ill health and disability among 15-29 year olds.[1, 3] The importance of suicide as a cause of death in this age group raises the question: what characteristics of some people in this particular age group (15-29 years) puts them at a higher risk for suicide than others?

SUICIDAL BEHAVIOR AMONG ADOLESCENTS

During adolescence, the child undergoes a sequence of significant biochemical, psychological, and physical transformations. He/she also adopts many patterns of behavior that may have long-term consequences for his/her health and quality of life. A new focus of study concerns which factors or behaviors "protect" the adolescent from engaging in risk behaviors, and from outcomes, such as suicidal behavior, that could compromise his/her health or life.

Suicidal behavior, especially suicide attempts and completed suicides, has been increasingly identified as an important clinical and public health problem among adolescents.[6-8] In 2000, an estimated 124,000 males and 93,000 females aged 15-29 died due to suicide around the world.[1] In many countries (China, India, Australia, and United States, among others) suicide is among the top causes of death among adolescents. [7, 9-12] In Puerto Rico, it is the 8th leading cause of death in the 10-14 age group and the 6th leading cause of death in the 15-19 group.[4] In 2001, 5.0% of all suicides occurred in the 10-19 age group.[4]

These statistics on completed suicide are probably underestimated. Some deaths might have been reported as due to accidents or unintentional injuries, since some of the methods include jumping from high places, and automobile and firearm "accidents".[8, 13-14] Underreporting may be substantial as, in the United States, unintentional injuries are the leading cause of death among children, adolescents, and adults 1-44 years old.[15]

Suicidal ideation, suicidal threats, and suicide attempts among children and adolescents are more common than the completed act.[8] The ratio of attempted suicide to completed suicide has been estimated at from 50:1 to 120:1. Many researchers hold that suicidal ideation, suicide attempts, and completed suicides are related but separate phenomena, so it is important to study each separately.[6]

SUICIDE ATTEMPTS

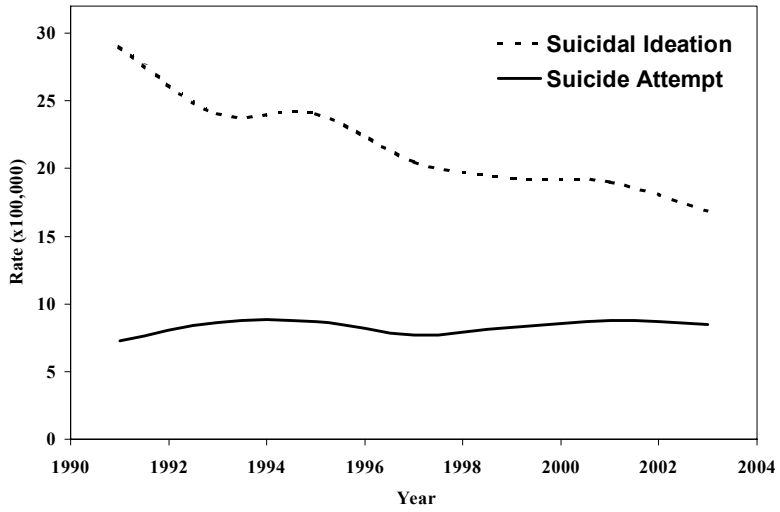
Few countries have reliable information on non-fatal suicidal behavior (i.e., suicidal attempts) due to the difficulty of collecting information.[1] It is estimated that only 25% of those who attempt suicide seek medical assistance, and these cases are not necessarily the most serious ones. So, as with many other diseases, cases that we are able to identify and report in death certificates are just the tip of the iceberg, that is, the majority of the cases remain unnoticed. Some institutions, such as the Centers for Disease Control and Prevention's (CDC) National Center for Injury Prevention and Control (NCIPC) and departments of justice (in some countries), keep records of non-fatal events.[1] According to these records, suicidal attempts are more prevalent in younger persons, and among females. Over half of those who attempted suicide tried more than once, with almost 20% of those trying for the second time doing so less than a year than the first attempt.

Suicide attempts seem to be very common among adolescents. In the United States, results from the *2003 Youth Risk Behavior Surveillance System (YRBSS)*, which uses a school-based self-administered survey, indicated that about 8.5% of students between 9th and 12th grade self-reported having attempted suicide at least once during the previous year. The prevalence has changed little in over ten years according to the National Center for Health Statistics (see Figure 1.1).[16] Information regarding suicide attempts among Puerto Ricans is sparse and mostly unpublished. In one study among 248 children and adolescents 9 to 17 years old residing in the San Juan metropolitan area in 1990, 5.2% reported attempting suicide at least once in their lifetime during an interview using the *Diagnostic Interview Schedule for Children*, a structured psychiatric interview.[17]

SUICIDAL IDEATION

Suicidal ideation is more common than other suicidal behaviors such as suicide attempt or completed suicide.[1] Since it is relatively common, some researchers do not consider it a useful indicator of suicide intent.[6] However, the full extent of suicide ideation is not clear, since it is more difficult to measure than attempted or completed suicides.

Figure 1.1. Suicidal Behavior among Students in Grades 9-12, United States, 1991-2003



Source: National Center for Health Statistics. *Health, United States, 2004 With Chartbook on Trends in the Health of Americans*. Hyattsville, Md; 2004.

Studies among adolescent student populations published after 1985 suggest that between 3.5-52.1% of the students have suicidal thoughts.[1] In the United States, approximately 16.9% of students between 9th and 12th grade in the United States reported having seriously considered attempting suicide in the previous year and 16.5% had made a specific plan to attempt suicide, according to the *2003 Youth Risk Behavior Surveillance System*.[18] However, in contrast to suicide attempts, prevalence of suicidal ideation among students in grades 9-12 has decreased considerably in the last decade (see Figure 1.1).[16]

Information regarding suicide ideation among Puerto Ricans is sparse. In the 1990 study described above among children and adolescents 9 to 17 years old, a total of 25.8% of the children reported ideation, with 25.0% reporting that they had thought a lot about death or dying in the last six months, and 2.8% reporting that they had thought about killing himself/herself during the same period.[17] Although this study has a very different design than the *Youth Risk Behavior Surveillance System*, and thus makes it difficult to compare results, it is the only Puerto Rican study that provides estimates from a non-clinical sample.

RISK FACTORS

Suicidal behavior is difficult to predict.[19] However, several risk factors have been identified including: history of depression, previous suicide attempt, family history of psychiatric disorders (especially depression and suicidal behavior), family disruption, certain chronic or debilitating physical disorders or psychiatric illness, alcohol use and alcoholism, substance use, living out of the home (in a group home or correctional facility), history of physical or sexual abuse, and psychosocial problems and stresses (conflicts with parents, breakups of relationships, school difficulties or failure, legal difficulties, social isolation, physical ailments – including hypochondriacal preoccupation).[20-21] Little is known about factors associated with suicidal behavior among Hispanics, including Puerto Ricans.

JUSTIFICATION

Suicide is often not recognized as a major public health problem due to the lack of statistics and the lack of research that would allow understanding of the problem.[22] This dissertation examines suicidal behavior among Puerto Rican adolescents. Adolescents constitute approximately 12.9% of the population in Puerto Rico (N=3,808,610) with approximately 491,533 persons aged 10-17 years.[23] Deaths in this age group are particularly striking, and of an immense social cost when we consider years of potentially productive life lost.[6] Suicide is the seventh (7^{th}) leading cause of potential life lost before age 75 in the United States. [6, 24]

Suicide prevention will require a greater understanding of its origins.[25] The extent to which we understand the relationships between different risk and protective factors for suicidal behavior, and their influence on the adolescent's behavior and lifestyle, will allow us to better identify adolescents who are at risk. Effective strategies for the prevention of suicidal behavior among adolescents should target these risk factors.[6]

SPECIFIC AIMS

The purpose of the present study was to gain a better understanding of suicidal behavior (attempt and ideation) among adolescents in Puerto Rico, and to determine risk and protective factors associated with these behaviors. The specific aims were:

1. To estimate the prevalence of suicidal ideation and suicide attempts among public school students (7^{th}-12^{th} grade) in Puerto Rico by gender, grade, and municipality.
2. To determine if there are spatial clusters in the prevalence of suicidal ideation and suicide attempts by municipality among public school students (7^{th}-12^{th} grade) in Puerto Rico.
3. To determine the association between suicidal ideation among public school students (7^{th}-12^{th} grade) in Puerto Rico and variables in the following six domains: socio-demographic characteristics, individual characteristics and behaviors, peers domain, school domain, family domain, and community domain.
4. To determine the association between suicide attempts among public school students (7^{th}-12^{th} grade) in Puerto Rico and variables in the above six domains.

OVERVIEW OF METHODS

This cross-sectional study is a secondary analysis of the "Consulta Juvenil VI" survey. "Consulta Juvenil", an island-wide bi-annual cross-sectional survey, was designed to monitor the prevalence of substance use among students enrolled in both public and private elementary (5^{th} and 6^{th} grade), middle (7^{th} to 9^{th} grade) and high schools (10^{th} to 12^{th} grade) in Puerto Rico. The survey was funded by the *Mental Health and Drug Addiction Administration* (ASSMCA, by its acronym in Spanish) and the *Puerto Rico Office of Drug Control,* and commissioned to the *Universidad Central del Caribe* (UCC) School of Medicine for its design and conduction. Six waves of this survey have been implemented in the following school years: 1990-91, 1992-93, 1994-95, 1997-98, 2000-02, and 2002-04. Data for this analysis was collected in the sixth wave over the period of two academic years: 2002-03 and 2003-04. Only the sixth wave of the survey included the risk factors of interest to study suicidal behavior, and is representative by municipality (as is needed for the spatial analyses).

The "Consulta Juvenil VI" survey included a representative sample of students from private (n=4,061) and public (n=55,504) secondary schools (grades 7th to 12th), and a representative sample of students from 5th and 6th grade (n=3,193). For this study, we analyzed data on students between 7th and 12th grade in public schools since only public secondary schools are represented in all municipalities.

Sampling Design

The sample was selected using a multi-stage stratified cluster sampling design.[25] The sampling frame consisted of a list of schools provided by the Puerto Rico Department of Education in 2002. This list included the number of students enrolled, stratified by municipality, school level, and grade. Only regular schools with at least two of the grades corresponding to the relevant school level of the school were included in the sampling frame. That is, middle schools needed to have at least two (2) grades between 7th and 9th grade, and high schools needed two (2) between grades 10th and 12th.

The primary sampling units in this design were the schools. Public schools were first stratified based on municipality. Within each municipality, schools were further stratified by school level (middle or high school). This created a total of 156 strata corresponding to the two school levels and the 78 municipalities in the island.

The next stage of the sampling design involved the selection of sections (groups, homerooms) within the school. The number of schools per strata and sections per school depended on the number of schools within that stratum:

- Municipalities with only one (1) school - The school was selected for the sample, and up to ten (10) randomly selected sections from the school were selected per year. The school was surveyed both years.
- Municipalities with two (2) schools – Both schools were selected, and up to ten (10) sections per school were selected. One (1) school was surveyed the first year, and the other one (1) was surveyed the second year.
- Municipalities with three (3) to five (5) schools – Two (2) schools were randomly selected, and up to ten (10) sections per school were selected. One

(1) school was surveyed the first year, and the other one (1) was surveyed the second year.

- Municipalities with over five (>5) schools – Five (5) schools were systematically selected using probability proportional to size. Schools were first ordered according to enrollment size. The number of sections in the school was divided to form segments with four (4) sections, and then five (5) sections were systematically selected (corresponding to the five schools). Two (2) of the schools were surveyed the first year, and three (3) were surveyed the second year. Within each school, four (4) sections were randomly selected.

A total of 348 schools were selected for the sample (208 middle and 140 high schools). All students within the selected section were selected for the final sample. A total of 3,184 sections were selected. It was expected that this design would recruit 800 students per municipality.

Out of the 348 public schools selected, four (4) refused to participate (98.9% school participation rate). In the chosen schools, 73,245 students were enrolled in the sections selected for the survey (see Table 1.1). A total of 27,837 middle and 27,667 high school students completed a self-administered questionnaire (n=55,504; participation rate=75.8%). A total of 16.6% were absent on the day of the survey, and 7.6% of the students present on the day of the interview did not participate (4.6% of the students refused and 3.0% of the parents did not sign the consent form). Approximately 700 students from each municipality participated.

Following application of the survey, an additional 277 questionnaires were invalidated since they were improperly completed or had illegible responses. The final sample analyzed for this study was 55,227 students, which represents 22.3% of the 247,334 students between 7^{th} and 12^{th} grade in public schools in Puerto Rico.

Table 1.1. Distribution of Participation Rates by School Level, "Consulta Juvenil VI" Survey, Puerto Rico, Academic Years 2002-03 and 2003-04

Classification of Students	*School Level (Grade)*		*Total*
	Middle (7^{th}-9^{th}) n (%)	*High (10^{th}-12^{th}) n (%)*	
Population of Enrolled	35,754 (100.0)	37,491 (100.0)	73,245 (100.0)
Participants	27,837 (77.9)	27,667 (73.8)	55,504 (75.8)
Absentees	4,530 (12.7)	7,660 (20.4)	12,190 (16.6)
Refused	2,035 (5.7)	1,316 (3.5)	3,351 (4.6)
No consent form	1,349 (3.8)	851 (2.3)	2,200 (3.0)

Data Collection Procedures

Before beginning data collection, authorization was requested from the Puerto Rico Department of Education. After the authorization was granted, field personnel (locators) contacted the schools, visited them, and talked to the school principal to explain the purpose of the study. After the principal granted permission, sections were selected for participation in the survey, and a date was set for its administration.

Once the sections to be sampled were chosen, the locator visited teachers of selected sections, and gave her/him the informed consent letter. This written letter was sent to the parents of all students within the section. The letter included the objectives of the study, guaranteed the anonymity and confidentiality of responses, and asked for voluntary participation of the students. This signed consent was then sent back to the student's teacher, and the interviewer collected them before administering the questionnaire.

Students without authorization of their parents or who did not want to participate in the survey remained in the classroom, but did not complete a self-administered questionnaire. Absentees were also excluded. To guarantee confidentiality, teachers were asked to remain outside the classroom. The interviewer then explained the purpose of the study, and distributed the questionnaire. Completion of the questionnaire took approximately 30 minutes.

All research procedures and forms were approved by the *Universidad Central del Caribe* School of Medicine's Institutional Review Board. To guarantee confidentiality, no personal information was requested in the questionnaire, analyses are presented in an aggregate form, and results cannot be presented by school or section.

Data Collection Instrument

The pre-coded questionnaire used in the survey (see Appendix 1) included questions about suicidal behavior as well as demographic characteristics of the students, their school experiences, patterns and attitudes towards substance use, substance use among parents, siblings and friends, suicidal behavior, family environment, relationship with parents, religion, violence, sexual history, and participation in prevention programs.

Most questions included in the instrument were used in previous "Consulta Juvenil" questionnaires. The substance use questions have remained unchanged throughout the previous administrations of this survey in order to facilitate the examination of trends in substance use. Most of these questions had originally been translated into Spanish from a similar USA study, the *Monitoring the Future* survey administered by the University of Michigan's Institute of Survey Research. Other questions were derived from the CDC's *Youth Risk Behavior Survey* (YRBS). Questions regarding risk and protective factors were translated and adapted from the *Student Survey of Risk and Protective Factors and Prevalence of Alcohol, Tobacco & Other Drug Use*, designed by Hawkins, Catalano and colleagues (1992), ensuring semantic equivalence of the questions and cultural adaptation.[27-28] Most of the scales used in this study were adapted from this instrument. The questionnaire was pre-tested in two (2) schools using four sections of students.

Data from valid questionnaires was data-entered using the SPSS (*Statistical Package for the Social Sciences*) program for Windows, version 11. The fidelity of data entry was verified by re-entering 10% of the questionnaires. Exploratory analysis of the data was performed to identify missing and inconsistent data. Questionnaires which lacked information or presented inconsistent data in over 3% of the responses were rejected.

Study Variables

The two dependent variables under study were suicidal ideation and suicide attempt. The ordinal questions on the questionnaire that measured these suicidal behaviors were "*Have you seriously considered attempting suicide?"* and *"How many times have you attempted suicide?"*. Both variables were dichotomized (ever/never).

Independent variables were conceptualized in six domains, including: (a) socio-demographic characteristics, (b) individual characteristics and behaviors, (c) peers domain, (d) school domain, (e) family domain, and (f) community domain. Multicollinearity between variables was assessed using the variance inflation factor and condition index diagnostics. The socio-demographic characteristics' ascertained included six variables: gender, grade, country of birth, father's and mother's educational level, and whether they lived with both parents.

The second domain included variables that described characteristics and behaviors intrinsic to the individual adolescent. Individual characteristics included: depressive symptoms, ever use of cigarettes, alcohol, or illicit drugs, perceived risks of drug use, favorable attitudes towards substance use, antisocial behavior, favorable attitudes towards antisocial behavior, sensation seeking, self-perceived health, sexual activity ever, and religiosity. The family domain included characteristics related to the adolescents' family and their relationships with them. Family characteristics included: family history of substance use, poor family oversight, family conflict, favorable parental attitudes toward substance use and to antisocial behavior, parental attachment, opportunities for pro-social involvement, and rewards for pro-social involvement.

Characteristics related to the adolescent's community included: community disorganization, laws and norms favorable to substance use, adolescents' transitions and mobility, opportunities for pro-social involvement, rewards for pro-social involvement, perceived availability of substances, and perceived availability of handguns. The peers domain included: friends' use of substances, interaction with antisocial peers, rewards for antisocial involvement. The school domain included: academic failure, low commitment

to school, opportunities for pro-social involvement, and rewards for prosocial involvement.

Data Analysis

The data was analyzed using SPSS (*Statistical Package for the Social Sciences*) for Windows (version 11.0.1), and SAS (*SAS Institute Inc*.) for Windows (version 9.1.3). In SAS, the SURVEYFREQ procedure, which takes into account the complex sample design, was used to estimate prevalences and their corresponding confidence limits. The SURVEYLOGISTIC procedure was used to estimate the odds ratios and their corresponding 95% confidence intervals.

In order to explore geographic distribution and spatial patterns of suicidal behavior in Puerto Rico, graphical methods were used to visualize the data. The weighted prevalences of suicidal behavior in each municipality are presented using choropleth maps which were created using ESRI ArcMap version 9.2 (Environmental Systems Research Institute, Inc., 1999-2006). The Moran's I Spatial Autocorrelation Statistic was used to detect spatial clustering; the null hypothesis being that no spatial clustering was present. Multiple linear regression models, using SAS PROC MIXED, were used to determine which municipality level characteristics were associated with the prevalences by municipality adjusting for spatial dependence.

This sample is representative of all students between 7^{th} and 12^{th} grade in public schools in Puerto Rico, and results were weighted to represent approximately 247,334 students. All analyses were performed on weighted data.

Multiple logistic regression models were used to assess the effect of variables in each specific domain on suicidal ideation and on suicide attempt, controlling first for socio-demographic characteristics, then for individual variables and family variables, and finally for peer, school, and community variables (following the ecological model). The variables within each domain included in the final multiple regression models were those that remained significantly associated ($p<0.05$) with suicidal behavior. A stepwise

regression approach was used with a backward selection method to build the final regression models.

Tests of interaction were performed by entering into the models selected interaction terms between gender, depression, and other risk factors. These interaction terms were defined according to results observed in previous studies. Since several interaction terms related to gender were significant (Wald test), the final multiple regression analyses were performed separately for each gender. Overall model significance was assessed using the Likelihood Ratio Test comparing the final model (full model) with the model that included only the socio-demographic variables (reduced model). The predictive power of the model was assessed using the Max-rescaled R-square statistic, also called Nagelkerke R^2, a pseudo R^2 statistic which is a measure of R^2 corrected so that the maximum value of one can be achieved. This R^2, which is based on likelihood statistics, describes how well the independent variables in the model predict the dependent variable by comparing the fitted model with the null model.

CONCLUSION

This dissertation presents a secondary analysis of the "Consulta Juvenil VI" survey, a cross-sectional study designed to monitor the prevalence of substance use among students that also included most of the risk factors for suicidal behavior. The main strengths of this study include that it is a representative sample of all students between 7^{th} and 12^{th} grade in public schools in Puerto Rico, that the participation rate was fairly high (75.8%), and that multiple domains of potential risk are considered simultaneously.

Chapter 2 provides an overview of the prevalence and etiology of suicidal ideation and suicide attempts, a review of several conceptual models that can be used as a reference when studying suicidal behavior, and a review of the literature on protective and risk factors for both suicidal behaviors. Chapter 3 presents the prevalence estimates of suicidal ideation and suicide attempts among students in the sample, and the results of the evaluation of spatial clustering of the prevalences. It also presents the estimated

magnitude of the association between socio-demographic characteristics and both suicidal behaviors. The next two chapters summarize the association analyses between suicidal behavior and variables from other domains: Chapter 4 explores the association with individual and family characteristics, and Chapter 5 explores the association with characteristics related to adolescents' peer, school, and community environments.

This study provides the first analysis in Puerto Rico to examine suicidal behavior in an island-wide representative sample of adolescent students. It is also the first study to explore spatial patterns of suicidal behavior. Results from this study should address the dearth of information about suicidal behavior in Puerto Ricans and contribute to understanding of which risk and protective factors across multiple domains contribute to suicide behavior in this population. As the data are derived from an island-wide representative sample, they also permit comparisons with other populations and can be used as baseline data to study the time trends of suicidal behavior in Puerto Rico.

Suicidal behavior (suicidal ideation and attempted suicide) is an important problem among adolescents. Effective strategies for the prevention of suicidal behavior among adolescents should target high-risk groups and the most important determinants of these behaviors. Results of this study should thus contribute to the development of effective prevention strategies and help safeguard the health of adolescents.

ACKNOWLEDGEMENTS

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APPENDIX 1

Número de Codificación:

☐☐☐☐ - ☐☐ - ☐☐ - ☐☐

INSTRUCCIONES:

√ **Escoge la mejor contestación para cada pregunta.**
√ **Marca la contestación que más se acerca a tu modo de pensar.**
√ **Esto no es un examen: NO ESCRIBAS TU NOMBRE.**

Sección I. Características demográficas

1. ¿En qué grado estás?
   - ☐ (1) Séptimo (7mo)
   - ☐ (2) Octavo (8vo)
   - ☐ (3) Noveno (9no)
   - ☐ (4) Décimo (10mo)
   - ☐ (5) Undécimo (11mo)
   - ☐ (6) Duodécimo (12mo)

2. ¿Cuántos años tienes hoy?
   - ☐ (1) 11 años o menos
   - ☐ (2) 12 años
   - ☐ (3) 13 años
   - ☐ (4) 14 años
   - ☐ (5) 15 años
   - ☐ (6) 16 años
   - ☐ (7) 17 años
   - ☐ (8) 18 años
   - ☐ (9) 19 años o más

3. ¿Cuál es tu sexo? ☐ (1) Femenino ☐ (2) Masculino

4. ¿Quiénes son las personas que viven contigo **la mayor parte del tiempo**? **(Puedes marcar todas las que apliquen)**
   - ☐ Madre
   - ☐ Madrastra o encargada
   - ☐ Padre
   - ☐ Padrastro o encargado
   - ☐ Hermano(a)/Hermanastro(a)
   - ☐ Abuelo o Abuela
   - ☐ Tío o Tía
   - ☐ Esposo(a)
   - ☐ Hijo(a)

5. ¿Dónde naciste?
   - ☐ (1) Puerto Rico
   - ☐ (2) Estados Unidos
   - ☐ (3) República Dominicana
   - ☐ (4) Otro _____ Indica

6. Marca los grados que has estudiado fuera de Puerto Rico. **(Puedes marcar todas las que apliquen)**
   - ☐ Ninguno
   - ☐ Antes de escuela elemental
   - ☐ Elemental (1-6)
   - ☐ Intermedia (7-9)
   - ☐ Superior (10-12)

7. ¿Cómo está tu salud la mayor parte del tiempo?
   - ☐ (1) Excelente
   - ☐ (2) Buena
   - ☐ (3) Regular
   - ☐ (4) Pobre

Sección II. Escuela - Esta sección contiene preguntas sobre tus experiencias en la escuela

1. En general, ¿cuáles fueron tus notas el año pasado?
   - ☐ (1) Todas o casi todas A's
   - ☐ (2) A's y B's
   - ☐ (3) Todas o casi todas B's
   - ☐ (4) B's y C's
   - ☐ (5) Todas o casi todas C's
   - ☐ (6) C's y D's
   - ☐ (7) Todas o casi todas D's
   - ☐ (8) D's y F's

2. Las siguientes preguntas están relacionadas con tu escuela... **(Marca una respuesta para cada oración)**

	Siempre	Casi siempre	A veces	Casi nunca	Nunca
	(1)	(2)	(3)	(4)	(5)
a. Mis maestros(as) se dan cuenta cuando estoy haciendo un buen trabajo y me lo dejan saber	☐	☐	☐	☐	☐
b. Me siento seguro(a) en mi escuela	☐	☐	☐	☐	☐
c. En la escuela le dejan saber a mis padres cuando he hecho algo bien	☐	☐	☐	☐	☐
d. Mis maestros me alaban cuando trabajo duro en la escuela	☐	☐	☐	☐	☐
e. Mis notas en la escuela, son mejores que las notas de la mayoría de los estudiantes de mi salón	☐	☐	☐	☐	☐
f. Las cosas que estoy aprendiendo en la escuela me van a servir en el futuro	☐	☐	☐	☐	☐
g. Mis maestros me piden que participe en proyectos especiales del salón de clases	☐	☐	☐	☐	☐
h. Los estudiantes tienen oportunidad para ayudar a decidir las actividades en clase y reglas del salón	☐	☐	☐	☐	☐
i. En mi escuela hay muchas actividades en las que los estudiantes pueden participar	☐	☐	☐	☐	☐

1

3. ¿Cuán a menudo sientes que el trabajo que haces en la escuela es importante y de valor?
   - ☐ (1) Nunca
   - ☐ (2) Raramente
   - ☐ (3) Algunas veces
   - ☐ (4) A menudo
   - ☐ (5) Casi siempre

4. ¿Cuán interesantes son la mayoría de tus clases?
   - ☐ (1) Muy interesantes
   - ☐ (2) Bastante interesantes
   - ☐ (3) A veces son interesantes
   - ☐ (4) Un poco aburridas
   - ☐ (5) Muy aburridas

5. **En el año pasado**, ¿cuán a menudo... **(Marca una respuesta para cada oración)**

	Siempre (1)	Casi siempre (2)	A veces (3)	Casi nunca (4)	Nunca (5)
a. disfrutas de la escuela?	☐	☐	☐	☐	☐
b. odiaste la escuela?	☐	☐	☐	☐	☐
c. trataste de hacer tu mejor trabajo en la escuela?	☐	☐	☐	☐	☐
d. pensaste hacer trampa en la escuela?	☐	☐	☐	☐	☐

6. En los **últimos 30 días**, ¿cuántas veces has faltado a la escuela?... **(Marca una respuesta para cada oración)**

	11 veces o más (1)	6-10 veces (2)	4-5 veces (3)	3 veces (4)	2 veces (5)	1 vez (6)	Nunca (7)
a. por enfermedad?	☐	☐	☐	☐	☐	☐	☐
b. porque faltaste sin permiso o "cortaste clase"?	☐	☐	☐	☐	☐	☐	☐
c. por otra razón?	☐	☐	☐	☐	☐	☐	☐

7. ¿Has repetido algún grado? **(Puedes marcar todas las que apliquen)**
   - ☐ Nunca
   - ☐ Sí, en la escuela elemental (1-6)
   - ☐ Sí, en la escuela intermedia (7-9)
   - ☐ Sí, en la escuela superior (10-12)

8. ¿Estas pensando dejar la escuela?
   - ☐ (1) No estoy pensando dejar la escuela
   - ☐ (2) Quizás deje la escuela
   - ☐ (3) Estoy casi seguro de que voy a dejar la escuela

9. ¿Cuántas veces has cambiado de escuela desde que estabas en primer grado?
   - ☐ (1) Nunca he cambiado de escuela
   - ☐ (2) 1 ó 2 veces
   - ☐ (3) 3 ó 4 veces
   - ☐ (4) 5 ó 6 veces
   - ☐ (5) 7 veces ó más

Sección III. Uso de substancias

1. **Alguna vez**, ¿has fumado cigarrillos?
   - ☐ (1) Nunca
   - ☐ (2) Una o dos veces
   - ☐ (3) De vez en cuando, pero no regularmente
   - ☐ (4) Regularmente, en el pasado
   - ☐ (5) Regularmente ahora

2. En el **último año**, ¿cuántos cigarrillos has fumado?
   - ☐ (1) No he fumado
   - ☐ (2) De vez en cuando, pero no regularmente
   - ☐ (3) De uno a cinco cigarrillos al día
   - ☐ (4) Aproximadamente la mitad de una cajetilla al día
   - ☐ (5) Una cajetilla al día o más

3. En los **últimos 30 días**, ¿cuántos cigarrillos has fumado?
   - ☐ (1) No he fumado
   - ☐ (2) De vez en cuando, pero no regularmente
   - ☐ (3) De uno a cinco cigarrillos al día
   - ☐ (4) Aproximadamente la mitad de una cajetilla al día
   - ☐ (5) Una cajetilla al día o más

4. En los **últimos 30 días**, ¿dónde has conseguido cigarrillos?
   - ☐ No he fumado en los últimos 30 días
   - ☐ Los compré en una tienda, colmado, o gasolinera
   - ☐ En una máquina de cigarrillos
   - ☐ De mis padres
   - ☐ De otro adulto
   - ☐ De mis amigos
   - ☐ De otra forma_____
     Indica

5. La **última vez** que fuiste a comprar cigarrillos, ¿te pidieron identificación?
   - ☐ (1) No he ido a comprar cigarrillo
   - ☐ (2) Sí, me pidieron identificación
   - ☐ (3) No pidieron identificación

6. **Alguna vez** en tu vida has probado bebidas alcohólicas más allá de un sorbo? (cerveza, vino, ron, "breezers", ginebra, u otro licor)
   - ☐ (1) Nunca
   - ☐ (2) Una o dos veces
   - ☐ (3) De vez en cuando, pero no regularmente
   - ☐ (4) Regularmente, en el pasado
   - ☐ (5) Regularmente ahora

7. En el **ÚLTIMO AÑO**, ¿cuántas veces tomaste bebidas alcohólicas?
(cerveza, vino, ron, "breezers", ginebra u otro licor)
- ☐ (1) Ninguna vez
- ☐ (2) 1-5 veces
- ☐ (3) 6-10 veces
- ☐ (4) 11-25 veces
- ☐ (5) 26 veces o más

8. En los **ÚLTIMOS 30 DÍAS**, ¿cuántas veces tomaste bebidas alcohólicas?
(cerveza, vino, ron, "breezers", ginebra u otro licor)
- ☐ (1) Ninguna vez
- ☐ (2) 1-5 veces
- ☐ (3) 6-10 veces
- ☐ (4) 11-25 veces
- ☐ (5) 26 veces o más

9. Durante las últimas **DOS SEMANAS**, ¿cuántas veces has tomado 5 ó más tragos o cervezas de corrido?
- ☐ (1) Ninguna vez
- ☐ (2) 1 vez
- ☐ (3) 2 veces
- ☐ (4) 3-5 veces
- ☐ (5) 6-9 veces
- ☐ (6) 10 veces o más

10. ¿Has usado inhalantes (pega, "thinner", pintura) para coger una nota o endrogarte...
(Marca una respuesta para cada oración)

	26 veces o más	11-25 veces	6-10 veces	1-5 veces	Nunca
a. alguna vez en tu vida?	(1)	(2)	(3)	(4)	(5)
b. en el último año?					
c. en el último mes?					

11. ¿Has usado marihuana...
(Marca una respuesta para cada oración)

	26 veces o más	11-25 veces	6-10 veces	1-5 veces	Nunca
a. alguna vez en tu vida?	(1)	(2)	(3)	(4)	(5)
b. en el último año?					
c. en el último mes?					

12. ¿Has usado heroína...
(Marca una respuesta para cada oración)

	26 veces o más	11-25 veces	6-10 veces	1-5 veces	Nunca
a. alguna vez en tu vida?	(1)	(2)	(3)	(4)	(5)
b. en el último año?					
c. en el último mes?					

13. ¿Has usado crack...
(Marca una respuesta para cada oración)

	26 veces o más	11-25 veces	6-10 veces	1-5 veces	Nunca
a. alguna vez en tu vida?	(1)	(2)	(3)	(4)	(5)
b. en el último año?					
c. en el último mes?					

14. ¿Has usado pastillas no recetadas (sedantes, tranquilizantes, xanax, palitroque, etc.) para coger una nota... ¿Cuál?_____
(Marca una respuesta para cada oración)

	26 veces o más	11-25 veces	6-10 veces	1-5 veces	Nunca
a. alguna vez en tu vida?	(1)	(2)	(3)	(4)	(5)
b. en el último año?					
c. en el último mes?					

15. ¿Has usado cocaína...
(Marca una respuesta para cada oración)

	26 veces o más	11-25 veces	6-10 veces	1-5 veces	Nunca
a. alguna vez en tu vida?	(1)	(2)	(3)	(4)	(5)
b. en el último año?					
c. en el último mes?					

16. ¿Has usado...
(Marca una respuesta para cada oración)

	Alguna vez en tu vida	En el último año	En el último mes	Nunca
	(1)	(2)	(3)	(4)
a. Extasis?	☐	☐	☐	☐
b. Ketamina (K, "Special K")?	☐	☐	☐	☐
c. LSD (gota, ácido, otros psicodélicos)?	☐	☐	☐	☐
d. GHB ("G")	☐	☐	☐	☐
e. Rohypnol ("Roofies")?	☐	☐	☐	☐
f. Kripy?	☐	☐	☐	☐
g. Metanfetaminas ("Cristal Meth")	☐	☐	☐	☐
h. Hongos?	☐	☐	☐	☐
i. Derbisol?	☐	☐	☐	☐
j. Tabaco de mascar?	☐	☐	☐	☐
k. Diablillo?	☐	☐	☐	☐
l. Blonqui?	☐	☐	☐	☐
m. Esteroides anabólicos?	☐	☐	☐	☐

17. ¿Has usado otra(s) droga(s) que no se haya mencionado?
☐ (1) No
☐ (2) Sí, ¿cuál?_____

18. **Aunque no las uses**, si quisieras conseguir las siguientes cosas, ¿cuán fácil se te haría?
(Marca una respuesta para cada oración)

	Muy fácil	Un poco fácil	Un poco difícil	Muy difícil
	(1)	(2)	(3)	(4)
a. bebidas alcohólicas (cerveza, vino, ron o vodka)	☐	☐	☐	☐
b. cigarrillos	☐	☐	☐	☐
c. marihuana	☐	☐	☐	☐
d. alguna otra droga (cocaína, heroína, LSD o anfetaminas)	☐	☐	☐	☐
e. un arma de fuego	☐	☐	☐	☐

19. ¿Qué edad tenías cuando probaste o usaste por primera vez alguna de estas substancias...
(Marca una respuesta para cada oración)

	11 años o menos	12	13	14	15	16	17	18	No la he probado
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
a. cigarrillos?	☐	☐	☐	☐	☐	☐	☐	☐	☐
b. bebidas alcohólicas?	☐	☐	☐	☐	☐	☐	☐	☐	☐
c. marihuana?	☐	☐	☐	☐	☐	☐	☐	☐	☐
d. otras drogas ¿cuál?_____	☐	☐	☐	☐	☐	☐	☐	☐	☐

20. ¿Cuándo fue la última vez que usaste...
(Marca una respuesta para cada oración)

	Esta semana	La semana pasada	El mes pasado	El año pasado	Hace más de un año	Nunca
	(1)	(2)	(3)	(4)	(5)	(6)
a. cigarrillos?	☐	☐	☐	☐	☐	☐
b. bebidas alcohólicas?	☐	☐	☐	☐	☐	☐
c. inhalantes (pega, thinner, etc.)?	☐	☐	☐	☐	☐	☐
d. marihuana?	☐	☐	☐	☐	☐	☐
e. cocaína?	☐	☐	☐	☐	☐	☐
f. heroína?	☐	☐	☐	☐	☐	☐
g. crack?	☐	☐	☐	☐	☐	☐
h. pastillas no recetadas?	☐	☐	☐	☐	☐	☐
i. esteroides anabólicos?	☐	☐	☐	☐	☐	☐

21. ¿Estás de acuerdo con que alguien de tu edad use...
(Marca una respuesta para cada oración)

	Sí	No
	(1)	(2)
a. cigarrillos?	☐	☐
b. bebidas alcohólicas?	☐	☐
c. inhalantes (pega, "thinner", etc.)?	☐	☐
d. marihuana?	☐	☐
e. cocaína?	☐	☐
f. heroína?	☐	☐
g. crack?	☐	☐

22. ¿Cuán a menudo tus padres o encargados usan...
(Marca una respuesta para cada oración)

	A diario	Varias veces a la semana	Sólo los fines de semana	Varias veces al mes	Varias veces al año	Nunca
	(1)	(2)	(3)	(4)	(5)	(6)
a. cigarrillos?	☐	☐	☐	☐	☐	☐
b. bebidas alcohólicas?	☐	☐	☐	☐	☐	☐
c. marihuana?	☐	☐	☐	☐	☐	☐
d. cocaína?	☐	☐	☐	☐	☐	☐
e. otras drogas ¿cuál?_____	☐	☐	☐	☐	☐	☐

23. ¿Cuán a menudo tus hermano(s) usan...
(Marca una respuesta para cada oración)

	A diario	Varias veces a la semana	Sólo los fines de semana	Varias veces al mes	Varias veces al año	Nunca	No tengo hermano(s)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
a. cigarrillos?	☐	☐	☐	☐	☐	☐	☐
b. bebidas alcohólicas?	☐	☐	☐	☐	☐	☐	☐
c. marihuana?	☐	☐	☐	☐	☐	☐	☐
d. cocaína?	☐	☐	☐	☐	☐	☐	☐
e. otras drogas? ¿cuál?_____	☐	☐	☐	☐	☐	☐	☐

24. Piensa en tus mejores amigos. En el **último año**, ¿cuántos han...
(Marca una respuesta para cada oración)

	Todos	La mayoría	Alguno	Ninguno
	(1)	(2)	(3)	(4)
a. fumado cigarrillos?	☐	☐	☐	☐
b. probado cerveza, vino, licor, ron, vodka, whisky o ginebra sin que sus padres lo supieran?	☐	☐	☐	☐
c. usado marihuna?	☐	☐	☐	☐
d. usado LSD, cocaína, anfetaminas, u otras drogas ilegales?	☐	☐	☐	☐
e. usado inhalantes para coger una nota?	☐	☐	☐	☐
f. usado pastillas no recetadas para coger una nota?	☐	☐	☐	☐
g. sido suspendidos de la escuela?	☐	☐	☐	☐
h. andado con un arma de fuego?	☐	☐	☐	☐
i. vendido drogas ilegales?	☐	☐	☐	☐
j. robado o tratado de robar un vehículo de motor como un carro o una motora?	☐	☐	☐	☐
k. sido arrestados?	☐	☐	☐	☐
l. abandonado la escuela y los estudios?	☐	☐	☐	☐

25. Piensa en tus mejores amigos, ¿cómo te verían si tú...
(Marca una respuesta para cada oración)

	Te admirarían	Te rechazarían	No les importaría
	(1)	(2)	(3)
a. fumaras cigarrillos?	☐	☐	☐
b. empezaras a tomar bebidas alcohólicas regularmente?	☐	☐	☐
c. fumaras marihuana?	☐	☐	☐
d. usaras otras drogas ilegales?	☐	☐	☐
e. andaras con un arma de fuego?	☐	☐	☐
f. tuvieras relaciones sexuales?	☐	☐	☐

26. En tu opinión, ¿cuánto daño o riesgo hay en...
(Marca una respuesta para cada oración)

	No sé	Mucho daño	Poco daño	No hay daño
	(1)	(2)	(3)	(4)
a. fumar una o más cajetillas de cigarrillos al día?	☐	☐	☐	☐
b. fumar marihuana ocasionalmente?	☐	☐	☐	☐
c. usar pastillas no recetadas para coger una nota regularmente?	☐	☐	☐	☐
d. usar crack ocasionalmente?	☐	☐	☐	☐
e. usar cocaína ocasionalmente?	☐	☐	☐	☐
f. tomar uno o dos tragos casi diariamente?	☐	☐	☐	☐
g. tomar cinco o más tragos de corrido?	☐	☐	☐	☐

27. ¿Cuántos años tenías la primera vez que...
(Marca una respuesta para cada oración)

	10 años o menos	11	12	13	14	15	16	17	Nunca
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
a. te suspendieron de la escuela?	☐	☐	☐	☐	☐	☐	☐	☐	☐
b. te arrestaron?	☐	☐	☐	☐	☐	☐	☐	☐	☐
c. llevaste encima un arma de fuego?	☐	☐	☐	☐	☐	☐	☐	☐	☐
d. atacaste a alguien con la intención de lastimarlo seriamente?	☐	☐	☐	☐	☐	☐	☐	☐	☐

28. ¿Cuán malas crees que son las siguientes cosas para alguien de tu edad?
(Marca una respuesta para cada oración)

	Nada malo	Un poco malo	Malo	Muy malo
	(1)	(2)	(3)	(4)
a. Llevar una pistola a la escuela	☐	☐	☐	☐
b. Robar algo	☐	☐	☐	☐
c. Empezar una pelea con alguien	☐	☐	☐	☐
d. Atacar a alguien con la intención de lastimarlo seriamente	☐	☐	☐	☐
e. Quedarse fuera de la escuela todo el día cuando los padres piensan que estás en la escuela	☐	☐	☐	☐

29. Durante el ÚLTIMO AÑO...
(Marca una respuesta para cada oración)

	Sí (1)	No (2)
a. has sido suspendido de la escuela?	☐	☐
b. has andado con un arma de fuego?	☐	☐
c. has vendido drogas?	☐	☐
d. has robado o tratado de robar un vehículo?	☐	☐
e. has sido arrestado?	☐	☐
f. has herido a alguien lo suficiente como para necesitar un vendaje o un doctor?	☐	☐
g. has ido a la escuela borracho o endrogado?	☐	☐
h. has llevado un arma a la escuela?	☐	☐
i. has pertenecido a una ganga?	☐	☐
j. le pegaste a tu maestro?	☐	☐
k. has dañado la propiedad escolar u otro sitio a propósito?	☐	☐

30. ¿Cuán a menudo has...
(Marca una respuesta para cada oración)

	Muchas veces (1)	Pocas veces (2)	Nunca (3)
a. hecho algo porque te dio la gana?	☐	☐	☐
b. hecho algo peligroso porque alguien te retó?	☐	☐	☐
c. hecho locuras aunque fueran un poco peligrosas?	☐	☐	☐
d. hecho cosas sin pensar en lo que sucederá?	☐	☐	☐

	Sí (1)	No (2)
31. Creo que es importante pensar antes de actuar	☐	☐
32. Tengo que tener todo al momento	☐	☐
33. Cambio de actividad en actividad con frecuencia, en vez de hacer una cosa a la vez	☐	☐
34. Algunas veces siento que la vida no vale la pena	☐	☐
35. A veces pienso que no soy bueno en nada	☐	☐
36. Creo que soy un fracaso	☐	☐
37. Durante el pasado año, me sentí deprimido o triste la mayoría de las veces aunque en ocasiones me sentía bien	☐	☐

ALGUNAS VECES LAS PERSONAS PUEDEN CONSIDERAR EL SUICIDIO, ES DECIR, HACER ALGO PARA TERMINAR CON SU VIDA.

1. ¿Has considerado seriamente intentar suicidarte?
   - ☐ (1) Nunca
   - ☐ (2) Sí, hace más de un año
   - ☐ (3) Sí, en el último año

2. ¿Cuántas veces has tratado de suicidarte?
   - ☐ (1) Ninguna vez
   - ☐ (2) Una vez
   - ☐ (3) Dos o tres veces
   - ☐ (4) Cuatro o más veces

Sección IV. Familia

Las siguientes preguntas están relacionadas con tu familia.

1. ¿Qué grado de educación tiene tu papá o encargado?
   - ☐ (1) Nunca fue a la escuela
   - ☐ (2) Escuela elemental
   - ☐ (3) Escuela intermedia
   - ☐ (4) Escuela superior
   - ☐ (5) Instituto técnico o comercial
   - ☐ (6) Universidad
   - ☐ (7) No sé
   - ☐ (8) Otro_____
     Indica

2. ¿Dónde nació tu papá?
   - ☐ (1) Puerto Rico
   - ☐ (2) Estados Unidos
   - ☐ (3) República Dominicana
   - ☐ (4) Otro_____
     Indica

3. ¿Qué grado de educación tiene tu mamá o encargada?
   - ☐ (1) Nunca fue a la escuela
   - ☐ (2) Escuela elemental
   - ☐ (3) Escuela intermedia
   - ☐ (4) Escuela superior
   - ☐ (5) Instituto técnico o comercial
   - ☐ (6) Universidad
   - ☐ (7) No sé
   - ☐ (8) Otro_____
     Indica

4. ¿Dónde nació tu mamá?
   - ☐ (1) Puerto Rico
   - ☐ (2) Estados Unidos
   - ☐ (3) República Dominicana
   - ☐ (4) Otro_____
     Indica

5. Para tus papás, ¿cuán malo es el que tú...
(Marca una respuesta para cada oración)

	Nada malo (1)	Un poco malo (2)	Malo (3)	Muy malo (4)
a. tomes cerveza, vino, licor, ron, vodka o ginebra regularmente?	☐	☐	☐	☐
b. fumes cigarrillos?	☐	☐	☐	☐
c. fumes marihuana?	☐	☐	☐	☐
d. robes algo?	☐	☐	☐	☐
e. dibujes graffiti, escribas cosas o dibujes en edificios u otras propiedades sin permiso del dueño?	☐	☐	☐	☐
f. busques una pelea con alguien?	☐	☐	☐	☐

6. Si estás haciendo las cosas bien, ¿tus padres te lo dicen?
   - ☐ (1) Nunca
   - ☐ (2) Casi nunca
   - ☐ (3) Casi siempre
   - ☐ (4) Siempre

7. ¿Cuán a menudo tus padres te dicen que están orgullosos de ti por algo que has hecho?

☐ (1) Nunca ☐ (3) Casi siempre
☐ (2) Casi nunca ☐ (4) Siempre

8. En tu familia... **(Marca una respuesta para cada oración)**	No (1)	Sí (2)
a. ¿Puedes opinar sobre las decisiones familiares?	☐	☐
b. ¿Eres bien apegado a tu mamá?	☐	☐
c. ¿Le cuentas tus cosas a tu mamá?	☐	☐
d. ¿Te gusta pasar tiempo con tu mamá?	☐	☐
e. ¿Eres bien apegado a tu papá?	☐	☐
f. ¿Le cuentas tus cosas a tu papá?	☐	☐
g. ¿Te gusta pasar tiempo con tu papá?	☐	☐
h. ¿Podrías pedirle ayuda a tu papá o a tu mamá, si tuvieses un problema personal?	☐	☐
i. ¿Tus padres te invitan a menudo a hacer cosas que te gustan?	☐	☐
j. ¿Te preguntan tus padres si has hecho tus asignaciones?	☐	☐

9. En tu familia... **(Marca una respuesta para cada oración)**	No (1)	Sí (2)
a. ¿Hay discusiones fuertes en tu casa?	☐	☐
b. ¿Se dan cuenta tus padres si no llegas a tiempo a casa?	☐	☐
c. ¿Son claras las reglas en tu casa?	☐	☐
d. ¿Se insultan o gritan con frecuencia los miembros de tu familia?	☐	☐
e. ¿Tus padres quieren que les avises si vas a llegar tarde a casa?	☐	☐
f. ¿Alguno de tus padres sabe donde estás y con quién estás cuando no estás en casa?	☐	☐
g. ¿Alguien en tu familia ha tenido alguna vez un problema severo de alcohol o drogas?	☐	☐
h. ¿Se darían cuenta tus padres si bebieras cerveza, vino o licor (ron, vodka, whisky o ginebra) sin su permiso?	☐	☐
i. ¿En tu casa tienen reglas claras sobre el uso de alcohol y drogas?	☐	☐
j. ¿Se darían cuenta tus padres si andaras con un arma de fuego sin su permiso?	☐	☐
k. En tu casa, ¿discuten siempre por las mismas cosas?	☐	☐
l. ¿Puedes faltar a la escuela sin que tus padres se den cuenta?	☐	☐

Sección V. Comunidad

Las siguientes preguntas están relacionadas con tu ambiente social.

1. ¿Con cuánta frecuencia vas a actividades religiosas o servicios religiosos?

☐ (1) No voy nunca
☐ (2) En ocasiones especiales
☐ (3) Dos o tres veces al mes
☐ (4) Una o más veces a la semana

2. ¿Cuán importante es la religión en tu vida?

☐ (1) No es importante ☐ (3) Bastante importante
☐ (2) Un poco importante ☐ (4) Bien importante

3. Perteneces o participas en... **(Marca una respuesta para cada oración)**	No (1)	Sí (2)
a. Equipos deportivos	☐	☐
b. Otros clubes	☐	☐

4. ¿Crees que alguien te pueda hacer daño, dar un golpe o herirte... **(Marca una respuesta para cada oración)**	No (1)	Sí (2)
a. dentro de tu casa?	☐	☐
b. en tu vecindario?	☐	☐
c. en la escuela?	☐	☐
d. en el parque, la cancha o donde pasas el tiempo con tus amigos?	☐	☐

5. Para la mayor parte de los adultos de tu vecindario, ¿cuán malo es que alguien de tu edad... **(Marca una respuesta para cada oración)**	Nada malo (1)	Un poco malo (2)	Malo (3)	Muy malo (4)
a. tome alcohol?	☐	☐	☐	☐
b. fume cigarrillos?	☐	☐	☐	☐
c. use marihuana?	☐	☐	☐	☐

6. ¿En tu comunidad... **(Marca una respuesta para cada oración)**	Hay mucho (1)	Hay poco (2)	No hay (3)
a. hay graffiti?	☐	☐	☐
b. hay crimen?	☐	☐	☐
c. hay venta de drogas?	☐	☐	☐
d. hay peleas?	☐	☐	☐
e. hay edificios vacíos o abandonados?	☐	☐	☐

7. En tu vecindario...

	No (1)	Sí (2)
a. hay vecinos que se sienten orgullosos de ti cuando haces las cosas bien?	☐	☐
b. algunos de tus vecinos te felicitan cuando haces las cosas bien?	☐	☐
c. tienes vecinos que te motivan a hacer las cosas bien hechas?	☐	☐

Sección VI. Relaciones sexuales y VIH

Las siguientes preguntas están relacionadas con sexualidad y VIH

1. ¿Qué edad tenías cuando tuviste relaciones sexuales por primera vez?
   - ☐ (1) Nunca he tenido relaciones
   - ☐ (2) 12 años o menos
   - ☐ (3) 13 años
   - ☐ (4) 14 años
   - ☐ (5) 15 años
   - ☐ (6) 16 años
   - ☐ (7) 17 años
   - ☐ (8) 18 años o más

2. Durante TU VIDA, ¿con cuántas personas has tenido relaciones sexuales?
   - ☐ (1) Nunca he tenido relaciones
   - ☐ (2) 1 persona
   - ☐ (3) 2 personas
   - ☐ (5) 3-4 personas
   - ☐ (6) 5-6 personas
   - ☐ (7) Más de 6 personas

3. La ÚLTIMA VEZ, que tuviste relaciones, ¿qué método usaron para evitar el embarazo?
   (Puedes marcar todas las que apliquen)
   - ☐ Nunca he tenido relaciones
   - ☐ No usamos ningún método
   - ☐ Píldoras anticonceptivas
   - ☐ Condones
   - ☐ Otro método anticonceptivo
   - ☐ Separarse antes del orgasmo
   - ☐ No sé exactamente

4. En las relaciones sexuales que has tenido, ¿cuántas veces has usado un condón?
   - ☐ (1) Nunca he tenido relaciones sexuales
   - ☐ (2) Nunca lo he usado
   - ☐ (3) Casi nunca
   - ☐ (4) A veces
   - ☐ (5) Casi siempre
   - ☐ (6) Siempre

5. En las relaciones sexuales que has tenido, ¿cuántas veces has usado **alcohol y/o drogas**?
   - ☐ (1) Nunca he tenido relaciones
   - ☐ (2) No he usado alcohol y/o drogas en las relaciones sexuales
   - ☐ (3) Casi nunca
   - ☐ (4) A veces
   - ☐ (5) Casi siempre
   - ☐ (6) Siempre

Sección VII. Prevención

1. ¿En cuáles actividades relacionadas a las drogas has participado? **(Puedes marcar todas las que apliquen)**
   - ☐ Parte de una clase
   - ☐ Una charla especial sobre drogas
   - ☐ Películas o lecturas
   - ☐ Presentaciones artísticas sobre drogas
   - ☐ Entrevista con orientador, trabajador social o maestro
   - ☐ Actividades de ASSMCA
   - ☐ Ninguna

2. ¿De dónde has obtenido la mayor información sobre...
   (Puedes marcar todas las que apliquen)

	Otro lugar	En la escuela	En mi casa	Radio	Televisión	Periódicos	No he obtenido información
a. drogas y sus efectos?	☐	☐	☐	☐	☐	☐	☐
b. sexualidad y embarazo?	☐	☐	☐	☐	☐	☐	☐
c. el SIDA y enfermedades de transmisión sexual?	☐	☐	☐	☐	☐	☐	☐

Nos gustaría saber...

1. ¿Te has sentido en libertad de contestar honestamente las preguntas relacionadas con el uso de drogas?
   - ☐ (1) Sí, en todas ellas
   - ☐ (2) Sí, en la mayor parte de ellas
   - ☐ (3) Sí, en algunas de ellas
   - ☐ (4) No, en ninguna de ellas

2. ¿Cuál tú crees que es el mayor problema que tienen los jóvenes en puerto Rico?

_____

_____

_____

_____

_____

¡MUCHAS GRACIAS POR TU PARTICIPACION!

REFERENCES

1. Krug EG, Dahlberg LL, Mercy JA, eds. *World Report on Violence and Health.* Geneva, World Health Organization; 2002.

2. McQuillan CT, Rodríguez J. Adolescent suicide: A review of the literature. *Bol Asoc Med P R*. 2000;92(1-3):30-38.

3. World Health Organization. *Causes of Death: Global, Regional and Country-Specific Estimates of Death by Cause, Age and Sex.* Geneva, World Health Organization; 2003.

4. Puerto Rico Department of Health. *Informe anual de estadísticas vitales 2001 [2001 Annual Vital Statistics Report]*. San Juan, Puerto Rico: ASPESIS, Division of Statistics; 2003.

5. Gonzalez-Manrique MA, Rodríguez-Llauger A. Epidemiological trends of suicide in Puerto Rico: 1931 to 1985. *P R Health Sci J*. 1988;7(3):245-250.

6. Bloch DS. Adolescent suicide as a public health threat. *J Child Adolesc Psychiatr Nurs*. 1999;12(1):26-38.

7. Cantor C, Neulinger K. The epidemiology of suicide and attempted suicide among young Australians. *Aust N Z J Psychiatry*. 2000;34(3):370-387.

8. Joffe RT, Offord DR. Epidemiology. In: MacLean G, ed. *Suicide in Children and Adolescents.* Lewiston, NY: Hogrefe & Huber Publishers; 1990:1-14.

9. Aaron R, Joseph A, Abraham S, et al. Suicides in young people in rural southern India. *Lancet*. 2004;363(9415):1117-1118.

10. Kim WJ, Singh T. Trends and dynamics of youth suicides in developing countries. *Lancet.* 2004;363:1090-1091.

11. Phillips MR, Yang G. Suicide and attempted suicide-China, 1990-2002. *MMWR Morb Mortal Wkly Rep.* 2004;53(22):481-484.

12. Scribante L, Blumenthal R, Saayman G, Roos JL. A retrospective review of 1018 suicide cases from the capital city of South Africa for the period 1997-2000. *Am J Forensic Med Pathol*. 2004;25(1):52-55.

13. MacLean G. Clinical perspectives. In: MacLean G, ed. *Suicide in Children and Adolescents.* Lewiston, NY: Hogrefe & Huber Publishers; 1990:15-39.

14. Pfeffer CR. Manisfestation of risk factors. In: MacLean G, ed. *Suicide in Children and Adolescents.* Lewiston, NY: Hogrefe & Huber Publishers; 1990:65-88.

15. National Center for Health Statistics Vital Statistics System, Office of Statistics and Programming, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention. *WISQARS Leading Causes of Death Reports, 1998 – 2002*. Retrieved January 4, 2005, from http://webapp.cdc.gov/sasweb/ncipc/leadcaus10.html

16. National Center for Health Statistics. *Health, United States, 2004 With Chartbook on Trends in the Health of Americans*. Hyattsville, Md; 2004.

17. Hassan-Ríos E. *Estudio epidemiológico sobre sicopatología y su relación con la ideación e intento suicida en niños y adolescentes de 9 a 17 años del área metropolitana de San Juan, Puerto Rico, para el 1990 [Epidemiologic Study about Psychopathology and its Relationship with Suicide Ideation and Attempt in Children and Adolescents 9 to 17 Years Old from the San Juan Metropolitan Area, Puerto Rico, for 1990]* [master's thesis]. San Juan, Puerto Rico: University of Puerto Rico; 1993.

18. Grunbaum JA, Kann A, Kinchen S, et al. Youth risk behavior surveillance - United States, 2003. *MMWR Morb Mortal Wkly Rep*. 2004; 53(SS-2):1-96.

19. Weiner IB. Suicidal behavior. In: *Psychological Disturbance in Adolescence*. 2nd ed. New York, NY: John Wiley & Sons, Inc.; 1992: 357-384.

20. American Academy of Pediatrics Committee on Adolescence. Suicide and suicide attempts in adolescents. *Pediatrics*. 2000;105(4 pt 1):871-874.

21. Woods ER, Lin YG, Middleman A, Beckford P, Chase L, DuRant RH. The associations of suicide attempts in adolescents. *Pediatrics*. 1997; 99(6):791-796.

22. Sánchez-Lacay JA, Parrilla-Cruz CE, Pagán-Castro AL. Intentos suicidas en adolescentes [Suicide attempts in adolescents]. *Bol Asoc Med P R*. 1985;77(7):273-277.

23. U.S. Census Bureau, Census 2000. *P12. SEX BY AGE [49] - Universe: Total population Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data (Puerto Rico)*. Retrieved January 14, 2005, from http://factfinder.census.gov/servlet/DTTable?_bm=y&-context=dt&-ds_name=DEC_2000_SF1_U&-mt_name=DEC_2000_SF1_U_P012&-CONTEXT=dt&-tree_id=4001&-all_geo_types=N&-geo_id=04000US72&-search_results=01000US&-format=&-_lang=en

24. Ikeda RM, Crosby A, Thomas RG, Annest JL, Berrios-Torres SI. Suicide among Hispanics-United States, 1997-2001. *MMWR Morb Mortal Wkly Rep*. 2004; 53(22):478-481.

25. Kaufman KR. The last straw-suicide: prevention, policy, and prevalence. *Ann Clin Psychiatry*. 2001;13(1):11-12.
26. Moscoso MR, Colón HM, Parrilla I, Reyes-Pulliza JC, Robles RR. *EncuestaJuvenil.Municipal: Uso de substancias entre adolescentes escolares del nivel secundario estimados para cada municipio, sistema público, años escolares 2002-2004 [Municipal.YouthSurvey: Substance Use Estimates among Adolescent Students from the Secondary School Level for each Municipality, Public System, School Years 2002-04]*. Puerto Rico: Oficina de Control de Drogas; 2004.

27. Hawkins JD, Catalano RF, Millar JY. Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: implications for substance abuse prevention. *Psychol Bull.* 1992;112(1):64-105.

28. Arthur MW, Hawkins JD, Pollard JA, Catalano RF, Baglioni AJ Jr. Measuring risk and protective factors for substance use, delinquency, and other adolescent problem behaviors. The Communities That Care Youth Survey. *Eval Rev*. 2002;26(6):575-601.

CHAPTER II

BACKGROUND AND SIGNIFICANCE

This chapter defines the main suicidal behaviors under study: suicidal ideation and suicide attempt. It provides an overview of the prevalence and etiology of these behaviors, a review of several conceptual models that can be used as a reference when studying suicidal behavior, and reviews the literature on protective and risk factors for suicidal behavior.

DEFINITIONS

Suicide is considered a type of violence. The World Heath Organization defines violence as "the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation".[1] Violence is a leading public health problem that can be divided into three different types: interpersonal violence, collective violence, and self-directed violence, which can be further subdivided into self-abuse and suicidal behavior.

Suicidal behavior is a broad term that includes suicide gestures, attempted suicide, and completed suicide.[2] Suicide gestures, which are predominantly communicative, include suicide plans and actions that appear unlikely to succeed. They should be considered as pleas for help. Attempted suicide is a non-fatal suicidal act, which might be a plea for help or the result of using a low lethality method. Completed suicide is when the act results in death. It is difficult to distinguish between attempted and completed suicide since some people who are really determined to kill themselves are discovered on time

and resuscitated, and some people who really are crying for help may unintentionally miscalculate and kill themselves. Suicidal ideation (thinking about killing oneself), suicide attempts, and completed suicides are classified as direct self-destructive behaviors.[2] An indirect self-destructive behavior is characterized by taking life-threatening risks without intending to die, generally repeatedly and often unconsciously, with consequences that are ultimately likely to be self-destructive (for example, excessive drinking, drug use, criminal behavior, and reckless driving).

Many people consider suicidal behavior a mental disorder. A mental disorder is defined as a health condition characterized by alterations in thinking, mood, or behavior (or some combination of these) that are mediated by the brain and associated with distress, impaired functioning or both.[3] However, suicide, even though a major public health problem, is not considered a mental disorder per se but a consequence of one.

In the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD-9-CM), the Public Health Service and the Health Care Financing Administration of the U.S. Department of Health and Human Services present guidelines for coding and reporting injuries obtained in suicide and attempted suicide, also called intentional self-inflicted injuries.[4] The ICD-9-CM codes E950- E959 represent codes for suicide and self-inflicted poisoning (solid or liquid substances; gases in domestic use; other gases and vapors), for suicide and self-inflicted injury (hanging, strangulation, and suffocation; submersion [drowning]; firearms, air guns, and explosives; cutting and piercing instrument; jumping from high place; other and unspecified means), and for late effects of self-inflicted injury (late effects include conditions reported as such or occurring as sequelae one year or more after attempted suicide or self-inflicted injury). These behaviors are <u>not</u> presented under mental disorders in the ICD-9-CM (codes 290-319). Also, in the Tenth Revision of the *International Statistical Classification of Diseases and Related Health Problems* (ICD-10), intentional self-harm (including purposely self-inflicted poisoning or injury, and suicide) is coded and reported as an external cause of morbidity and mortality (codes X60 to X84) in the *ICD-10 Classification of Mental and Behavioural Disorders*, even though it is not considered a mental disorder.[5]

Suicidal behavior is also not included as a mental disorder in the *Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition* (DSM-IV). A new diagnosis of suicidality in children and adolescents was considered for inclusion as a child disorder in the DSM-IV, since suicidal behavior is a common reason for clinical assessment and intervention.[6] However, since suicidal behavior commonly occurs together with other mental disorders, it was thought that having a single symptom diagnosis might lead to underreporting of those disorders.

Even though suicidal behavior is not considered a mental disorder per se, it is an important symptom of poor health. One of the goals of *Healthy People 2010* (a set of health objectives for USA to be achieved by the year 2010) is to "improve mental health and ensure access to appropriate, quality mental health services" with the first two (2) of fourteen (14) objectives being: (Objective 18-1) *Reduce the suicide rate*, and (Objective 18-2) *Reduce the rate of suicide attempts by adolescents*.

It is important to consider mental disorders when studying suicidal behavior since "mental and behavioral disorders, and serious emotional disturbances, in children and adolescents can lead to school failure, alcohol and illicit drug use, violence and suicide".[3] At least 20% of children and adolescents 9-17 years old have a diagnosable mental disorder, and about 25% of them are extremely impaired by mental, behavioral, and emotional disorders.

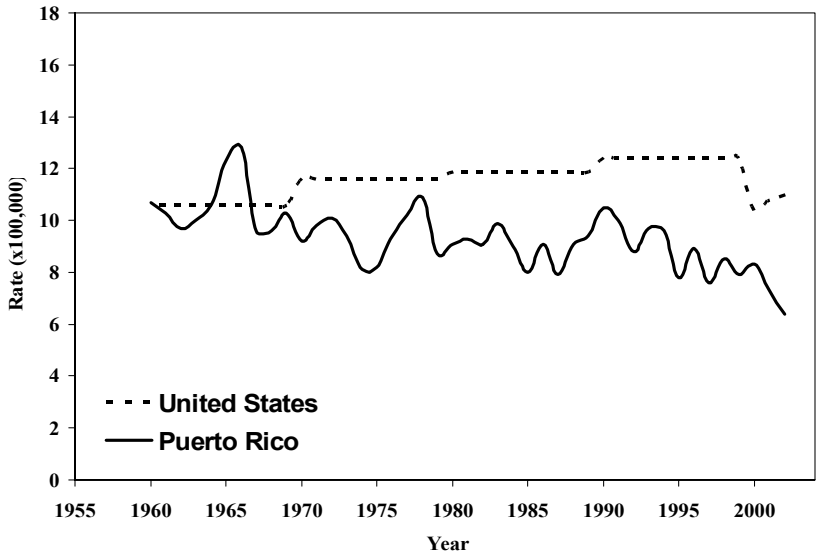
MAGNITUDE OF THE PROBLEM

Suicide is the thirteenth (13^{th}) leading cause of death worldwide, representing approximately 1.5% of all deaths.[1, 7] In 2000, it was estimated that 815,000 persons died from suicide around the world.[1] This represents an approximate mortality rate of 14.5 deaths per 100,000 population. It is among the leading fifteen causes of death in both high-income countries (13^{th}), and low and middle-income countries (14^{th}). However, suicide rates vary considerably among the countries that report to the World Health Organization.[1, 8] The highest suicide rates worldwide are found among Eastern European

countries, for example, Lithuania with a suicide rate of 51.6/100,000.[1] The lowest rates are reported in Latin American countries, such as Paraguay (4.2/100,000), and in some Asian countries, such as the Philippines (2.1/100,000). The United States of America (USA) and Puerto Rico fall in the middle of this range, with suicide rates of 13.9 and 10.8 per 100,000, respectively.

The mortality rates for completed suicide in the USA and in Puerto Rico (see Figure 2.1) have not changed dramatically in over 40 years.[9-11] In Puerto Rico, suicide mortality was relatively stable between 1960 and 1985, with a rate of approximately 9.2 deaths per 100,000 population, although some evidence suggests that rates may have decreased slightly in recent years.[9, 12] Currently, the rate is approximately 9.4 deaths per 100,000 population, making suicide the 16th leading cause of death in Puerto Rico.[11] In the USA, suicide is currently the 11th leading cause of death.[10]

Figure 2.1. Suicide Rates, Puerto Rico and United States, 1960-2002



Source: Puerto Rico Department of Health, ASPESIS, Division of Statistics, San Juan, Puerto Rico.
Source: National Center for Health Statistics. *Health, United States, 2004 With Chartbook on Trends in the Health of Americans*. Hyattsville, Md; 2004.

Suicide rates vary with age.[1, 9] Even though death due to self-inflicted injuries is not among the top ten (10) causes of death worldwide, it is the fourth (4th) leading cause of death and an important cause of ill health and disability among 15-29 year olds.[1, 7]

In many countries, suicide is one of the most important causes of death among adolescents. In China and India, it is the leading cause of death among adolescents.[8, 13-14] In Australia, it is the second leading cause of death among 15-24 year olds, second only to motor vehicle accidents.[15] In the last few years, suicide has been the third (3er) leading cause of death among adolescents in the USA.[16-17] In Puerto Rico, it is the 8th leading cause of death in the 10-14 age group, and the 6th leading cause of death in the 15-19 group.[11] The proportion of suicides among adolescents in Puerto Rico is slightly higher than in the USA.[11] These statistics on completed suicide are probably underestimated.[17-20]

Suicide Attempts

Suicidal ideation, suicidal threats, and suicide attempts among children and adolescents are more common than the completed act.[18] The ratio of attempted suicide to completed suicide has been estimated at from 50:1 to 120:1. Attempts are very common among adolescents. Between 1996 and 2000, two thirds of all suicide attempts in China were among those aged 15-34.[14] In the USA, between 3-9% of adolescents students attempt suicide each year.[21-24] These prevalences have remained relatively unchanged over ten years (see Figure 1.1). Information regarding suicide attempts among Puerto Ricans is sparse. In one study among children and adolescents 9 to 17 years old residing in the San Juan metropolitan area in 1990, 5.2% reported attempting suicide at least once in their lifetime.[25]

Suicidal Ideation

Suicidal ideation is a more common event than other suicidal behaviors such as suicide attempt or completed suicide.[1] However, the extent of suicidal ideation is not clear, since it is more difficult to measure than attempted or completed suicides. Studies among adolescent student populations published after 1985 suggest that between 3.5-52.1% of the students had suicidal thoughts (suicidal ideation).[1] These large differences in the estimates may be due to different definitions used or the different reference periods in the studies.[1] In the USA, approximately 5.2% of children and adolescents aged 9-17 expressed suicidal ideation in the early 1990's.[23] More recently, approximately 16.9%

adolescent students in the USA reported having seriously considered attempting suicide in the previous year and 16.5% had made a specific plan to attempt suicide. However, unlike suicide attempts, prevalence of suicidal ideation among students in grades 9-12 has significantly decreased in the last decade (see Figure 1.1).[24] Information regarding suicidal ideation among Puerto Ricans is also sparse. In the previously mentioned study, approximately 25.8% of children and adolescents 9 to 17 years old residing in the San Juan metropolitan area in 1990 reported ideation in the last six months.[25]

ETIOLOGY

Some psychological mechanisms for suicidal behavior have been described. These mechanisms resemble those frequently implicated in other forms of self-destructive behavior like alcoholism and reckless acts.[2] For example, traumatic childhood experiences, particularly the distress of a broken home or parental deprivation, are more common among those with self-destructive behavior.

Suicidal acts usually result from multiple and complex reasons. The main factors include mental disorders (mainly depression), social factors (losses, divorce), personality abnormalities (aggression), and physical disorders.[2] Depression, one of the most important risk factors for suicide, may be precipitated by social factors (such as disputes with parents) or by physical disorders (cancer, heart disease, sexually transmitted disease).[18, 25-31] Alcohol intensifies a depressive mood swing and reduces self-control, so it can predispose to suicidal acts.

Depression is one of the core affective components of mood disorders, which are the most prevalent of psychiatric disorders.[2] Mood disorders are a group of heterogeneous and typically recurrent illnesses that are characterized by pervasive mood disturbances, psychomotor dysfunction, and vegetative symptoms. The role of heredity in the etiology of these disorders is uncertain. However, the final common pathway of mood disorders is believed to be impaired limbic-diencephalic (brain) function. There also appears to be dysregulation of cholinergic, catecholaminergic (noradrenergic or dopaminergic), and

serotonergic (5-HT) neurotransmission. Abnormal levels of neurotransmitters (and their metabolites) from the noradrenergic, serotonergic, cholinergic, and dopaminergic systems have been detected in depressed patients.[29]

Many neurologic and psychiatric diseases are caused by pathologic over- or under-activity of neurotransmission.[29] Many drugs can modify neurotransmission; some (hallucinogens) cause adverse effects and some (antipsychotic drugs) correct pathologic conditions. A neurotransmitter is a chemical that is selectively released from a nerve terminal, interacts with a specific receptor on an adjacent structure, and, if received in adequate amounts, elicits a specific physiologic response. Many chemicals act as neurotransmitters. There are at least 18 major neurotransmitters, one of which is serotonin. Serotonin dysfunction appears to be one of the biochemical factors in suicide, and prophylaxis with lithium (which stabilizes the serotonin system) is effective in suicide prevention.

Other biochemical abnormalities associated with depressive disorder include: cortical hypersecretion, dexamethasone nonsuppression, hyposecretion of growth hormone in response to an insulin challenge, hypersecretion of growth hormone during sleep, functional and structural brain imaging changes, and sleep electroencephalographic abnormalities.[29]

CONCEPTUAL MODELS

An adolescent is a person who, while no longer a child, is still not an adult. In most Western societies, adolescence is roughly equivalent to the term “teen”, and it spans approximately the ages between 13 and 18 years old. This period is a transitional phase of growth and development that occurs between childhood and adulthood during which the child undergoes a sequence of significant biochemical, psychological, and physical transformations. He/she adopts patterns of behavior that may have long-term consequences for his/her health and quality of life. Some of these behaviors put the adolescent at risk for negative consequences.

Research studies of suicidal behavior among adolescents have identified a number of risk and protective factors associated with these problems. These factors interrelate with each other in complex ways; no single factor can explain suicidal behavior. Several conceptual models can be used as a reference when studying suicidal behavior. They all provide theoretical ways to group variables, and give us insight into the interactions among the risk characteristics. The models examined as background for this research were: the ecological model (which groups variables in individual, relationship, social, cultural, and environmental levels), Richard Jessor's conceptual model of risk behavior (which mentions risk and protective factors, risk behaviors, and risk outcomes), Annette L. Beautrais' conceptual model (which deals with domains of risk factors for suicide and suicide attempt), and the Hawkins and Catalano theoretical framework of risk and protective factors. Only Jessor's and Beautrais' models explicitly include suicide as a specific outcome within their conceptual models, although Hawkins and Catalano include violence as a health and behavior outcome (and suicide is a type of violence). The questionnaire used in the survey analyzed for this dissertation was developed under the conceptual framework of the Hawkins and Catalano model of adolescent health and behavior problems. However, the characteristics of all the models will be discussed.

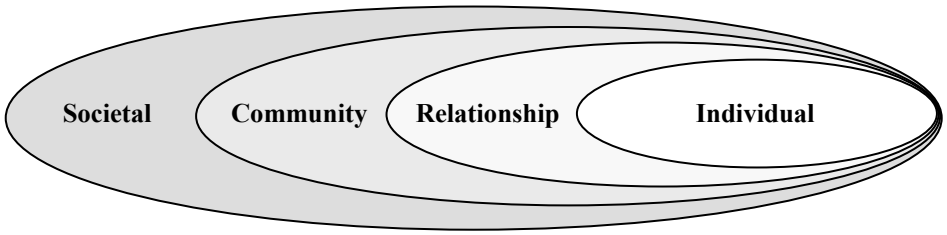
Ecological Model

An ecological model (see Figure 2.2) was first introduced in the late 1970's to better understand the multifaceted nature of violence.[1] It has been applied to child abuse, youth violence, intimate partner violence, and abuse of the elderly. This model states that violence results from a complex interplay of several factors that can be grouped in the following levels: individual, relationship, social, cultural, and environmental.

The first level (individual) seeks to identify the individual's biological, demographic, and physical factors that impact on his/her behavior. Some examples of factors classified under this level include: low educational attainment, substance abuse, and history of abuse. The second level (relationship) explores proximal social relationships, for example, relations with peers and family. The third level (community) examines the community contexts into which those social relationships are embedded, for example,

school and neighborhood. The last level (societal) examines the larger societal factors. Some examples include those factors that create an acceptable climate for risk behaviors, cultural norms, attitudes that regard suicide as a matter of individual choice and not a preventable act, policies, etc.

Figure 2.2. Ecological Model for Understanding Violence



Source: Krug EG, Dahlberg LL, Mercy JA, eds. *World Report on Violence and Health.* Geneva, World Health Organization; 2002.

Multiple factors interact within each level and outwards towards broader contexts. The links between suicidal behavior and all the factors under study, and the interaction of these factors in all of these levels, suggest that we need to address these factors across the various levels of this ecological model.

Alternative theoretical models have been developed to study suicidal behavior, but all are adaptations of the main grouping of characteristics first introduced in the ecological model.

Richard Jessor's Conceptual Model

Early work on adolescent risk behaviors, often termed "problem behaviors", traditionally studied behaviors that involved transgressions of the law and norms and that usually brought social sanctions, such as drug and alcohol use.[32] Today, the study of risk behaviors includes other domains of adolescent activity that also compromise healthy development, such as lifestyles and the environment. Richard Jessor sought to capture some of these new trends in thinking about adolescent risk behavior. Figure 2.3 portrays the interrelation of several variable domains using a generic conceptual framework he developed in 1992.[32] The model attempts to represent the relationships between different

risk and protective factors grouped in different multilevel domains and their joint influence on adolescent risk behaviors, risky lifestyles, and different health/life-compromising outcomes, one of which is depression/suicide.

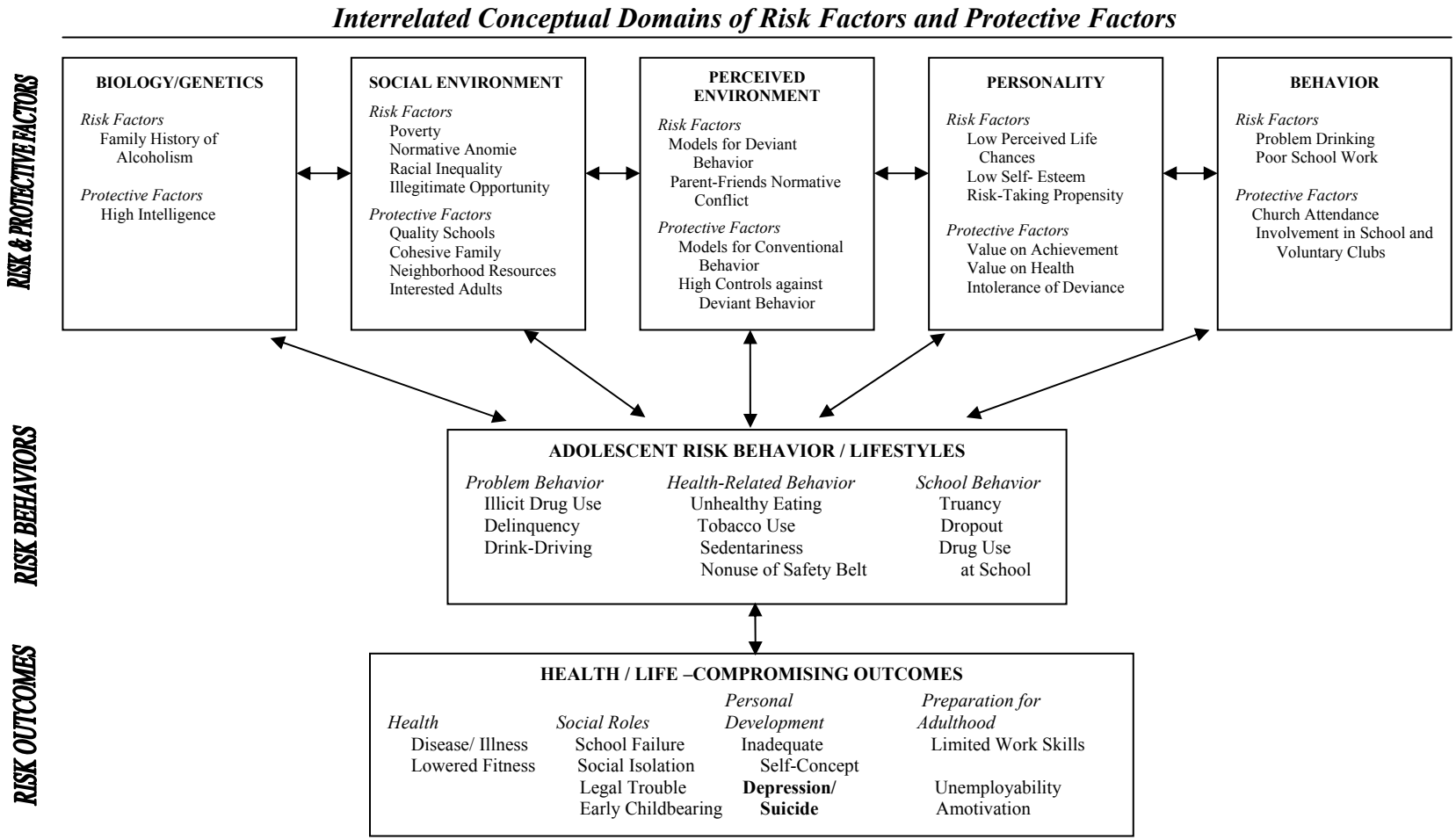
In Jessor's model, risk and protective factors are grouped into several domains: biology/genetics, social environment, perceived environment, personality, and behavior. The model also includes a domain of adolescent risk behaviors/lifestyles (divided into problem behaviors, health-related behaviors, and school behaviors), and health-compromising outcomes (divided into health, social roles, personal development, and preparation for adulthood). In the model, a series of arrows represent the interaction between the factors and behaviors, thus creating a web of causation for these health/life-compromising outcomes. Depression/suicide is classified as a "personal development" health/life-compromising outcome in this model.

As we can appreciate from this complex model, a variety of factors need to be considered when studying determinants of different health/life-compromising outcomes. Understanding the complex relationships between the variables, and their association with suicide, is what will be required to better understand this problem.

Annette L. Beautrais' Conceptual Model

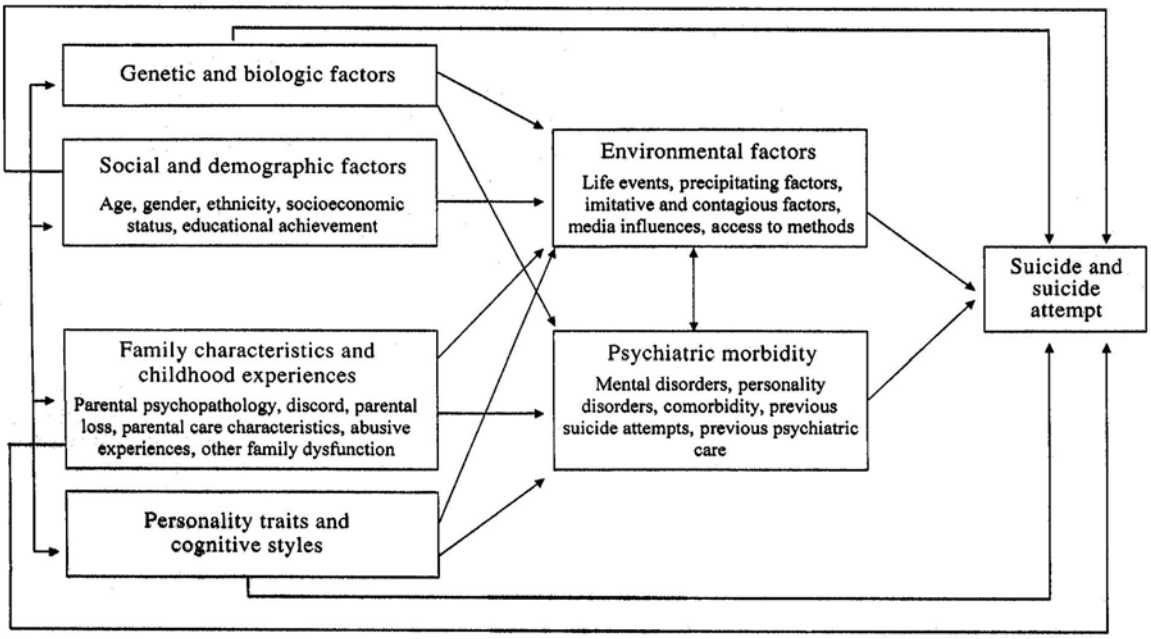
Figure 2.4 describes the contributions of several domains of risk factors for suicide and attempted suicide in a conceptual model published in 2000 by Annette L. Beautrais, who also attempted to capture some of the trends in thinking about risk for suicidal behavior in young people.[33] According to this model, suicidal behaviors (suicide and suicide attempt) appear to be a consequence of adverse life sequences in which multiple risk factors from several domains combine to increase the risk of suicidal behavior. The model derives from the author's evaluation of research studies which suggested that "suicidal behaviors in young people are frequently, although not invariably, the end-point of adverse life sequences in which multiple risk factors combine to encourage the development of suicidal behaviors".

Figure 2.3. Richard Jessor's Conceptual Framework for Adolescent Risk Behavior: Risk and Protective Factors, Risk Behaviors and Risk Outcomes



Source: Jessor R, ed. *New Perspectives on Adolescent Risk Behavior.* New York, NY: Cambridge University Press; 1998.

Figure 2.4. Annette Beautrais' Conceptual Model of Domains of Risk Factors for Suicide and Suicide Attempt among Young People



This model groups risk factors in several domains: (1) genetic and biologic factors, (2) social and demographic factors, (3) family characteristics and childhood experiences; (4) personality traits and cognitive styles, (5) environmental factors, and (6) psychiatric morbidity. Two of the domains (genetic and biologic factors; personality traits and cognitive styles) refer to individual vulnerabilities. They include those personality characteristics, genetic backgrounds or biological predispositions that increase the risk for suicidal behavior. A third domain (social and demographic factors) refers to variables related to social and economic disadvantages that increase the risk for suicidal behavior. It includes the socioeconomic status of the family and the educational achievement of its members, among others. Another domain (family characteristics and childhood experiences) refers to exposure to childhood and family adversity. It includes variables such as parental psychopathology, family discord, impaired parenting, abusive experiences, and other family dysfunctions that increase the risk for suicidal behavior. One other domain (environmental factors) refers to exposure to a variety of stressors and adverse circumstances that increase the risk for suicidal behavior. It includes exposure to

adverse life events (interpersonal losses, conflicts, disciplinary problems, etc.), media publicity that encourages suicidal behavior, imitative suicidal behavior, and accessibility to means to commit suicide. The last domain (psychiatric morbidity) refers to mental disorders, particularly with mood and substance use disorders, and antisocial or conduct disorders which increase the risk for suicidal behavior. It also includes comorbidities, previous suicide attempts, and previous psychiatric care.

Beautrais' model assumes the existence of several correlated sets of risk factors which determine the adolescent's vulnerability to suicide or suicide attempt. These sets of factors have contributed both indirectly and directly to an adolescent's risk of suicidal behavior. Although the model suggests an excellent way of synthesizing current knowledge about risk factors for suicidal behavior among adolescents, whether factors associated with suicide are similar to those associated with suicide attempts remains to be tested. Many researchers hold that suicidal ideation, suicide attempts, and completed suicides are related but separate phenomena. Thus, it may be important to study each separately.[34]

Hawkins and Catalano's Theoretical Framework

In the 90's, J. David Hawkins and Richard F. Catalano developed a self-report survey instrument, the *Student Survey of Risk and Protective Factors and Prevalence of Alcohol, Tobacco & Other Drug Use*, for prevention needs assessment among adolescents aged 11-18.[35-36] This instrument measures a broad array of risk and protective factors previously identified in prospective longitudinal research as associated with adolescent health and behavior problems, including substance abuse, mental health disorders, delinquency, violence, teenage pregnancy, and dropping out of school. The survey measures these factors across multiple ecological domains (community, school, family, peer, and individual), and also measures health and behavior outcomes including substance use, violence and delinquency. The objective of this new instrument was to enable risk and protection focused prevention planning specific to each community's unique profile, i.e., "to help prioritize specific risk and protective factors in specific populations as targets for preventive intervention".[35-36]

Questions in the *Student Survey of Risk and Protective Factors and Prevalence of Alcohol, Tobacco & Other Drug Use* were grouped into over thirty scales or factors, and were considered to be risk factor constructs. The scales varied in the number of items. Table 2.1 lists the scales (categorized as risk or protective) and outcome measures identified in the 2004 survey. These scales have been shown to predict adolescent antisocial behavior (including delinquency, substance abuse, and violence), which make them valuable tools for assessing prevention needs and for planning strategic prevention.[35, 37]

The conceptual models described above share several similarities. Since they are all adaptations of the ecological model, variables are grouped in different levels or domains. However, some of the models classify the variables which were originally from only one domain into several domains. For example, Jessor's model separates variables from the individual domain (ecological model) into five domains: biology/genetics, personality, behavior, risk behavior lifestyles, and health compromising outcomes. Beautrais segregates psychiatric morbidity from the individual domain. Also, depending on the model, family variables can be grouped with peer variables (ecological, and Hawkins and Catalano models) or with social environment (Jessor). Likewise, school variables can be grouped with individual variables (Jessor) or with community variables (ecological; Hawkins and Catalano). No two models include the same set of variables, thus they all need to be evaluated when examining suicidal behavior.

Table 2.1. Risk and Protective Factors by Domain in Hawkins and Catalano's Theoretical Framework

Risk Factors	*Protective Factors*
COMMUNITY DOMAIN	
• Low neighborhood attachment • Community disorganization • Transitions and mobility • Perceived availability of drugs • Perceived availability of handguns • Laws and norms favorable to drug use	• Opportunities for prosocial involvement • Rewards for prosocial involvement
SCHOOL DOMAIN	
• Academic failure • Low commitment to school	• Opportunities for prosocial involvement • Rewards for prosocial involvement
FAMILY DOMAIN	
• Family history of antisocial behavior • Poor family management • Family conflict • Parental attitudes favorable towards drug use • Parental attitudes favorable to antisocial behavior	• Attachment • Opportunities for prosocial involvement • Rewards for prosocial involvement
PEER-INDIVIDUAL DOMAIN	
• Rebelliousness • Gang involvement • Perceived risk of drug use • Early initiation of drug use • Early initiation of antisocial behavior • Favorable attitudes towards drug use • Favorable attitudes towards antisocial behavior • Sensation seeking • Rewards for antisocial involvement • Friends' use of drugs • Interaction with antisocial peers • Intentions to use	• Interaction with prosocial peers • Belief in the moral order • Prosocial involvement • Rewards for prosocial involvement • Social skills • Religiosity
OUTCOME MEASURES	
○ Depression ○ High substance use frequency ○ Substance use frequency ○ Antisocial behavior ○ Antisocial behavior frequency	

RISK AND PROTECTIVE FACTORS

In this next section, a review of the literature on protective and risk factors for both suicidal behaviors is presented. First, several key studies that provide the most relevant information about suicidal behavior among adolescents are described. In the United States, the *Youth Risk Behavior Surveillance System* (YRBSS) is a national school-based survey conducted by CDC that monitors six categories of priority health-risk behaviors. It also includes state and local school-based surveys conducted by state and local education and health agencies. Surveys are conducted among students between 9th and 12th grade. The *National Longitudinal Study of Adolescent Health* (NLSAH) is a school-based longitudinal nationally representative study of the health-related behaviors of adolescents between 7th and 12th grade and their outcomes in young adulthood. It seeks to examine how social contexts (families, friends, peers, schools, neighborhoods, and communities) influence adolescents' health and risk behaviors. *NIMH's Methods for the Epidemiology of Child and Adolescent Mental Disorders (MECA) Study* is a collaborative study conducted to develop methods for surveys of mental disorder and service utilization in unscreened population-based samples of youths 9 through 17 years of age.

In Puerto Rico, the unpublished *Epidemiologic Study about Psychopathology and its Relationship with Suicide Ideation and Attempt in Children and Adolescents 9 to 17 Years Old from the San Juan Metropolitan Area, Puerto Rico, for 1990* (non-clinical sample) used the *Diagnostic Interview Schedule* as the assessment tool. The *Health Services to Adolescents Project or the Adolescent Suicide Prevention Project* was a study conducted among adolescents 11-19 years old in Puerto Rico, and another study was conducted in a clinical sample of adolescents aged 13-18 in one mental health clinic.

Socio-Demographic Characteristics

Risk factors for suicidal behavior among adolescents include being female, 15 years old or younger, of low socioeconomic status, and Hispanic. [18, 28, 21, 22, 31, 39-41] Gender is one of the most important predictors of suicidal behavior in the USA, particularly among adolescents.[38] Adolescent females are more likely to report suicidal ideation and suicide attempts, but completed suicide is more commonly reported among males.[3, 9, 15, 18, 21-23, 28,

[30-31, 38-39] Female students are 2.2-3.2 times more likely to report a suicide attempt, particularly if the girls are white or Hispanic. [21, 31, 39] Similar results have been found in Puerto Rico. [40-41] This gender difference in suicidal behavior is not seen during childhood.[38]

When studying suicidal behavior, it is important to study gender, not only because it is one of the most important predictors of suicidal behavior, but also because males and females are prone to different mental disorders and risk factors for suicide attempt.[31, 38] Females are more likely to be diagnosed as suffering from a depressive, eating or panic disorder, while males are more likely to be diagnosed as suffering from a paraphilia (sexual deviation), conduct or explosive disorder. Even if males and females exhibit similar forms of a psychological problem such as suicidal behavior, women's problems are frequently perceived as personal (and dealt with through the mental health care system), while men's problems are seen as social , i.e., an indication of cultural, economic or social problems and are dealt with via social programs and the legal system.[38]

Mean age among adolescents who attempt suicide has been found to be significantly lower (15 years) than the age of those who have never made an attempt.[21, 41] Several studies have shown increased rates of suicidal behavior among those from lower socioeconomic status.[18, 28] Low socioeconomic status is also a major risk factor for childhood psychopathology, an important risk factor for suicidal behavior. Suicide attempts are more common among adolescents with parent(s) who receive welfare.[21]

In the USA, gender differences in rates of non-lethal suicidal behavior seem not to be uniform across ethnic groups.[38] According to the 2003 *Youth Risk Behavior Surveillance System*, Hispanic students (18.1%) were more likely to seriously consider attempting suicide than white (16.5%) and black students (12.5%).[22] However, in some studies suicide attempts have been more common in white girls.[21]

Individual Characteristics and Behaviors

Individual characteristics considered to be risk factors for suicidal behavior among adolescents include a history of previous suicidal attempts, mental disorders (particularly depression, substance use, and antisocial behaviors), violence, history of abuse, sexual activity, poor physical health, weight dissatisfaction, and stressful life events. [3, 18-23, 25-31, 33-34, 39-45] Religious identity has been found to be a protective factor.

A history of previous suicide attempts is one of the strongest predictors for attempted suicide, particularly among adolescent Hispanic boys and white girls.[19, 21] In Puerto Rico, about half (46%) of the adolescents who made a suicide attempt had two or more previous attempts.[41] Most of these attempts were planned, and occurred while the adolescent was alone, usually at night.

Among the strongest risk factors for youth suicide are mental disorders (especially affective/mood disorders, substance use, and antisocial behaviors), and a history of psychopathology.[33] Several studies indicate that over 90% of all youthful suicide victims have suffered from at least one major psychiatric disorder, most commonly affective disorders (which encompass major depression and manic depressive illness) or substance abuse.[28] Suicidal attempts have been associated with depressed mood and negative self-evaluation.[20, 28, 31]

Most studies agree that depression is an important feature of suicidal behavior among adolescents.[18, 28, 30-31] It has been associated with a higher risk of suicide and risk-taking behavior in adolescence, particularly among females.[25-27, 29] Suicidal ideation has been associated with several specific symptoms of depressive disorder: depressed mood, negative self-image, hopelessness, insomnia, poor concentration, anhedonia (the absence of pleasure or the ability to experience it), guilt, low energy, poor appetite, and social withdrawal.[20] Depression has also been linked with psychoactive substance abuse; it can be a biologic effect of chronic substance abuse.[42]

Vulnerability to depression, and to other psychiatric disorders, involves the interplay of different forces, including genetic, biochemical, and psychosocial/ environmental. There is evidence of a strong genetic component and heritability operating in the transmission of major depression, even though 1/3 to 1/2 of children develop depression in the absence of family history.[29] Stressful events can precipitate depression in these children with no inherited susceptibility, but those with inherited vulnerability are more likely to develop depression. Suicide victims usually had a psychiatric disorder for a considerable period (usually over 36 months) before committing suicide. Also, a history of mental health treatment (emotional/psychological counseling in the last year) has predicted attempted suicide among adolescent students, particularly among girls.[21] Having suicidal thoughts has been considered to be an unambiguous indicator of adolescent psychopathology.[34]

Conduct disorders (truancy, membership in gangs, lying, stealing, and violence) and antisocial behavior (carrying guns, selling illegal drugs, stealing or trying to steal a motor vehicle, being arrested, or taking a gun to school) have also been associated with suicidal behavior among adolescents.[20, 39] In Puerto Rico, adolescents in the mental health clinic who attempted suicide presented a series of behavioral problems, perceptual and thought problems, and affective, somatic, behavioral manifestations.[41] Approximately 22% presented behavioral problems (abuse, school absenteeism, marital problems, fights, running away from home, problems with in-laws, and school problems-grades).

An increasingly important area regarding mental health is the co-occurrence of addictive disorders with mental disorders.[3, 28] Substance abuse (alcohol and drugs) has been associated with suicidal behavior among adolescents.[20-21, 28, 31, 42] However, some studies suggest that substance abuse was more likely to be a risk factor for suicide if co-occurring with an affective illness.[28] Marijuana use (adjusting for the presence of a mood, anxiety or disruptive disorder) has been associated with suicidal ideation and attempts among children and adolescents aged 9-17 in the USA.[23] Psychoactive substance abuse appears to be associated with a greater frequency and repetitiveness of suicide attempts and greater suicidal ideation among adolescents.[42] This is of note since, as the prevalence

of substance use has increased in the last few decades, so has the proportion of adolescents who attempted suicide that abused psychoactive drugs.

Alcohol use and abuse, current smoking, and regular cigarette and smokeless tobacco use have also been associated with both suicide attempts and suicidal ideation among adolescents.[20-21, 23, 31, 42-43] Chronic substance abuse might lead to disruption of social relationships, which in turn produce social isolation and hopelessness.[42] Pessimism, hopelessness, and impulsivity have been associated with suicide in adults, and in some studies, hopelessness was more highly correlated with suicidal behavior than depression.[20]

The emotional well-being of the adolescent (feeling loved and wanted, happy; not depressed, sad, lonely; like herself/himself; hopeful about the future) has been found to protect against attempted suicide among adolescent students.[21, 27] Female students, in all ethnic groups and grades, are significantly more likely to report having felt so sad and hopeless almost every day for 2 or more weeks in a row in the last year that they stopped doing some usual activities.[22] Hispanic students are significantly more likely to report feeling sad or hopeless than black and white students.[22]

A history of violence victimization (having witnessed or been a victim of a shooting, stabbing or assault in the past year) and violence perpetration (having a physical fight, injuring someone, being in a group fight, threatening someone with a weapon, using a weapon in a fight, history of carrying weapons to school or shooting or stabbing someone in the past year) have been found to predict attempted suicide among adolescent students.[21, 23, 31, 45] A history of carrying weapons to school has been found to predict attempted suicide among boys. A history of emotional/verbal, physical and/or sexual abuse has been associated with suicidal behavior among adolescents in several studies.[20, 28, 39-40] The association of reported suicidal behavior is stronger when both abuse and molestation occur.[39]

Furthermore, physical fighting and sexual activity have been associated with suicidal ideation among children and adolescents aged 9-17 in the USA after adjusting for the presence of a mood, anxiety or disruptive disorder.[23] Suicidal and fighting behaviors have similar risk factors such as aggressiveness, impulsivity, substance use, depression, and hopelessness. Additional research is needed to examine the relationship between these behaviors. Sexual activity, substance use before last sexual activity, ever having a sexually transmitted disease, and same gender sexual experiences have also been associated with suicide attempts among pre-adolescent students.[31]

The presence of a chronic physical illness or hypochondriacal preoccupation with illness are also important factors in suicide.[19] A history of somatic symptoms (frequency of headaches, stomach aches, fatigue, weakness or feeling sick in the past year) has been found to predict attempted suicide among adolescent female students.[21] Poor physical health is strongly associated with depression, a very strong factor in suicidal behavior.[29] Poor perceived general health has been found to predict attempted suicide among adolescent students.[21] Weight dissatisfaction has also been found to predict attempted suicide only among Hispanic and white girls.[21]

There is some evidence that suicidal ideation/attempts are associated with stressful life events among children and adolescents.[23] It has been suggested that it may not be the amount of stress experienced by the adolescent that predicts suicide intent, but rather the manner in which stress is handled (coping ability).[27] Among adolescents, suicidal behavior is often triggered by several immediate stresses that are perceived in crisis proportions.[20] Interpersonal loss (such as the loss of a sibling or other family member), especially among substance abusers, has been associated with suicidal behavior and suicide in several studies, including one in Puerto Rico.[28, 40] Events that might precipitate suicidal attempts can include seemingly minor rebuffs to severe circumstances such as separation, loss (of love, support), or the death of a parent.[19] These losses and separations include death, illness, and hospitalization. However, several studies find no evidence that parental loss is associated with suicidal behavior.[18]

In a study in Puerto Rico, most (70%) adolescents who made a suicide attempt presented moderate or severe life stressors.[41] Severity of these stressors was significantly associated with an increase in the number of attempts. Severe life stressors included: rape, multiple deaths, prostitute mother, murder of a close relative, abandonment by mother, father in jail, seduction attempt, pregnancy, death of father, marriage, divorce, and death of grandmother. Moderate stressors included: frequent fights with parents, academic difficulties, parent's separation, birth of siblings, economic problems, physical illnesses, mother's multiple unions, alcoholic or drug addict father or siblings, surgery, physical aggression among parents, and learning problems. A recent move and loss of something very valuable have also been associated with suicidal behavior and suicide in several studies.[28, 40]

Some studies suggest that religious factors may have a similar role for adolescent suicide as for adult suicide, with suicidal behavior less common among Catholics than in Protestants in some but not all studies.[18, 41, 44] It has been suggested that this religious difference in risk could relate to belief systems, but it may also be related to the emotional outlets provided by religious practices.[44] Protestants have been shown to report more depressive symptoms than Roman Catholics, and depression is associated with suicidal behavior.[44] Furthermore, religious identity (praying frequently, viewing self as religious, affiliation with a religion) has been found to protect against attempted suicide only among white adolescent male students.[21]

School Domain

Factors related to school are thought to be of considerable importance since adolescents spend more time within school than elsewhere. The school has replaced the mother (whose role was to integrate faith and morals) as the main educator of children.[44] However, in public schools this education does not include religious and moral education. Risk factors for suicidal behavior in this domain include lower grade, a history of school problems, and poor school performance. Protective factors include high grade point average (GPA) and parental school expectations.

In the USA, the proportion of students that seriously considered attempting suicide (ideation) is similar in grades from 9th to 12th.[22, 39] However, the proportion of students that attempted suicide in the previous year decreases with school grade. A history of school problems (how often had trouble paying attention and getting homework done in the current school year) was found to predict attempted suicide in adolescent students.[21] Most studies report that suicidal adolescents show poor school performance.[18, 31] In Puerto Rico, adolescents who attempted suicide evidenced a higher degree of academic delay.[41]

Grade point average in the most recent reporting period (English, math, history/ social studies, and science) has been found to protect against attempted suicide among adolescent male students.[21] Parental school expectations (parents' expectations for the student to complete high school and college) has been found to protect against attempted suicide, but only among white boys.

Peers Domain

Risk factors in this domain include interpersonal problems involving family, friends and teachers, and low instrumental and social competence. As children grow into adolescence, they strive to develop their individual identities and go beyond their family setting to a world filled with friends, romantic relationships, and expectations.[29] They try to go from depending on their parents to developing their own emerging identities. Social acceptance by their peers, and conformity with them, thus becomes a bridge between the two. This process is accompanied by an undercurrent of sadness (resulting from the separation) which is commonly manifested by tension, but it can also precipitate depressed mood.

One of the characteristics found among many persons of all ages that have committed suicide seems to be their inability to create or maintain a supportive social network.[46] This network can be defective or absent due to many reasons: bereavement, other losses, psychiatric disorders, other external reasons, self-inflicted reasons, etc. Out-of-home relationships, peer relationships, and maintenance of self-esteem are also important

factors that might precipitate suicidal behavior.[20] Establishing supportive social interactions could be a factor that might stabilize, that might be helpful in preventing suicidal behavior.[20]

Interpersonal problems involving parents, siblings, teachers, and friends (such as problems with their boyfriends/ girlfriends), particularly among persons with depressive disorders, should be considered as important potentiating factors for suicidal risk.[20, 28] Problems with their boyfriends/girlfriends and having a same-sex romantic attraction have been found to predict attempted suicide among adolescent students.[21, 41]

Low instrumental and social competence has also been associated with suicidal ideation and attempts (even after adjusting for the presence of a mood, anxiety or disruptive disorder) among children and adolescents aged 9-17 in the USA.[23] Furthermore, suicidal behavior by a friend (having a friend attempt or complete suicide) has been found to predict attempted suicide among adolescent students, especially among black or white girls.[21]

Family Domain

Risk factors in this domain include family dysfunction or discord, problems with their family, poor family environment, low parental monitoring, lack of support, family rigidity, marital discord, suicidal behavior by a family member, having a large family, broken homes, parents with low education level, parental delinquency, and parental psychopathology. Protective factors include perceived family connectedness.

The role of family factors in suicidal behavior is not clear. In some studies, family factors appear to play a role in suicidal behavior by increasing the vulnerability of the adolescent.[18] Family dysfunction or discord (for example, fights or discussions among family members) has been associated with suicidal behavior and suicide in several studies.[28, 40-41] In Puerto Rico, most of the adolescents who had suicidal ideation or suicide attempts reported arguments in their homes, mostly with their mothers, and usually regarding parental permission to go out or regarding studies.[40]

One of the main motivations for a suicide attempt expressed by adolescents is problems with their family, particularly with their parents.[27, 41] Most adolescents who had suicidal ideation or suicide attempts presented these behaviors when they had problems with a family member that lived or not in the same house.[40] Most of these adolescents solve problems with family members in dysfunctional ways: 31.3% ignore the problem, 28.1% use hitting and yelling, and 20.3% do not try to solve the problems. Furthermore, it is significant that 14.3% of the adolescents report that their parents or guardians use them as intermediaries when there are problems between the adults, and 6.3% indicate that their parents do not take into consideration the adolescent's opinion. However, a third (34.9%) of the adolescents are not interested in intervening.

In the USA, having a poor family environment and having low parental monitoring have been found to be associated with suicidal ideation/attempts among children and adolescents aged 9-17, even after adjusting for the presence of a mood, anxiety or disruptive disorder.[23] Low support, lack of a supportive family network, family functioning (mother's and children's perception of the quality of the family environment), interpersonal discord with parents and high or moderate level of family tension at their homes have also been associated with adolescent's suicidal behavior.[19, 28, 40, 47] Findings indicate that family functioning mediates the relationship between maternal depression history and adolescent suicide symptoms. Also, most of the adolescents who had suicidal ideation or suicide attempts, reported their parents or guardians make them feel that life has no meaning.[40]

Marital discord has also been identified as risk factor for suicidal behavior, and as a major risk factor for childhood psychopathology.[18] Not having an intact family, having a single-parent family, and having large families and overcrowding have been associated with suicide and suicidal behavior among adolescents in several studies.[18, 21, 25, 28, 41] However, perceived parent and family connectedness (closeness to parents, perceived caring by parents, satisfaction with the relationship with parents, feeling loved and wanted by family members) have been found to be protective against suicide attempts among students.[21]

Family rigidity, i.e., a family where there are inflexible relationships that do not facilitate functional changes in response to problems or developmental needs, has been associated with adolescent suicidal behavior.[48] It affects suicidal ideation indirectly through its effect on the problem-solving abilities (problem orientation, problem definition and formulation, generation of alternative solutions, decision-making, and verification) of the adolescent. Low adaptability has been associated with suicidal behavior and suicide in several studies.[28] The effect of exposure to the suicide of a parent, sibling, or friend is conflicting.[29, 49]

Young parental age (under age 20 at time of birth) and lower level of parental education have been associated with suicide and suicidal behavior in several studies.[25, 28, 40] In Puerto Rico, prevalence of attempted suicide among children and adolescents decreased as the father's educational level increases, but increased with the mother's educational level.[25] Paternal delinquency, parental psychiatric history/psychopathology, and family history of affective disorders have also been identified as risk factors for suicidal behavior.[18, 23, 28, 41, 47] However, the mother's current level of depression does not predict adolescent suicide symptoms. Also, findings indicate that the relationship between maternal depression history and adolescent suicide symptoms is mediated by negative family functioning.[47]

Community Domain

Few studies have explored the association between suicidal behavior and risk factors related to the community environment. Only easy household access to guns (reported easy availability of a gun in the home) has been found to predict attempted suicide among adolescent students.[21, 41]

CONCLUSION

Suicidal behavior among adolescents has been increasingly identified as an important clinical and public health problem.[15, 18, 34] Suicidal ideation and attempts are difficult to predict, but several risk factors across several domains have been identified, and theoretical models have been developed to integrate our understanding of the relationship between these diverse domains and suicide risk.[31, 50-51] Despite our emerging knowledge of risk, few studies have explored risk factors among Hispanics, especially among Puerto Ricans, despite evidence that risk profiles and patterns do differ by ethnicity. This lack of information is of particular concern in the United States since it is expected that by 2020 Hispanics will be the largest racial/ethnic minority population in the USA, representing 17% of the population.[16] Augmenting our ability to identify factors and behaviors associated with suicidal behavior will allow us to provide health care workers with a list of those "early warning signs" that can guide us in our prevention activities. The subsequent chapters of this dissertation use Hawkins and Catalano's theoretical model to assess risk of attempt and ideation in Puerto Rican middle and high school students since the questionnaire was developed following their proposed variables and scales.

REFERENCES

1. Krug EG, Dahlberg LL, Mercy JA, eds. *World Report on Violence and Health.* Geneva, World Health Organization; 2002.

2. Beers MH, Berkow R, eds. Section 15-Psychiatric disorders. Chapter 190-Suicidal behavior. In: *The Merck Manual of Diagnosis and Therapy.* 17th ed. Whitehouse Station, NJ: Merck Research Laboratories; 1999:1544-1549.

3. U.S. Department of Health and Human Services. Chapter 18-Mental health and mental disorders. In: *Healthy People 2010, Volume II, Objectives for Improving Health (Part B: Focus Areas 15-28)*. 2nd ed. Washington, DC: U.S. Government Printing Office; 2000: 18.1-18.32.

4. Puckett CD. E Code. In: *The Educational Annotation of ICD-9-CM: Diseases and Procedures Tabular Lists, Volume I.* Reno, Nev: Channel Publishing, Ltd.; 1986:1360-1361.

5. World Health Organization. *The ICD-10 Classification of Mental and Behavioural Disorders: Clinical Descriptions and Diagnostic Guidelines.* Geneva, World Health Organization; 1992.

6. Widiger TA, Frances AJ, Pincus HA, Ross R, First MB, Davis W, Kline M, eds. *DCM-IV Sourcebook, Volume 4.* DC, American Psychiatric Association; 1994.

7. World Health Organization. *Causes of Death: Global, Regional and Country-Specific Estimates of Death by Cause, Age and Sex.* Geneva, World Health Organization; 2003.

8. Kim WJ, Singh T. Trends and dynamics of youth suicides in developing countries. *Lancet.* 2004;363:1090-1091.

9. Gonzalez-Manrique MA, Rodríguez-Llauger A. Epidemiological trends of suicide in Puerto Rico: 1931 to 1985. *P R Health Sci J*. 1988;7(3):245-250.

10. Miniño AM, Arias E, Kochanek KD, Murphy SL, Smith BL. Deaths: final data for 2000. *Natl Vital Stat Rep*. 2002;50(15):1-119.

11. Puerto Rico Department of Health. *Informe anual de estadísticas vitales 2001 [2001 Annual Vital Statistics Report]*. San Juan, Puerto Rico: ASPESIS, Division of Statistics; 2003.

12. Cruz-Feliciano MA. *Tendencias de muertes por suicidio, Puerto Rico: 1986-1997 [Suicide Death Trends, Puerto Rico: 1986-1997]* [master's thesis]. San Juan, Puerto Rico: University of Puerto Rico; 2002.

13. Aaron R, Joseph A, Abraham S, et al. Suicides in young people in rural southern India. *Lancet*. 2004;363(9415):1117-1118.

14. Phillips MR, Yang G. Suicide and attempted suicide-China, 1990-2002. *MMWR Morb Mortal Wkly Rep.* 2004;53(22):481-484.

15. Cantor C, Neulinger K. The epidemiology of suicide and attempted suicide among young Australians. *Aust N Z J Psychiatry*. 2000;34(3):370-387.

16. Ikeda RM, Crosby A, Thomas RG, Annest JL, Berrios-Torres SI. Suicide among Hispanics-United States, 1997-2001. *MMWR Morb Mortal Wkly Rep*. 2004; 53(22):478-481.

17. National Center for Health Statistics Vital Statistics System, Office of Statistics and Programming, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention. *WISQARS Leading Causes of Death Reports, 1998 – 2002.* Retrieved January 4, 2005, from http://webapp.cdc.gov/sasweb/ncipc/leadcaus10.html

18. Joffe RT, Offord DR. Epidemiology. In: MacLean G, ed. *Suicide in Children and Adolescents.* Lewiston, NY: Hogrefe & Huber Publishers; 1990:1-14.

19. MacLean G. Clinical perspectives. In: MacLean G, ed. *Suicide in Children and Adolescents.* Lewiston, NY: Hogrefe & Huber Publishers; 1990:15-39.

20. Pfeffer CR. Manisfestation of risk factors. In: MacLean G, ed. *Suicide in Children and Adolescents.* Lewiston, NY: Hogrefe & Huber Publishers; 1990:65-88.

21. Borowsky IW, Ireland M, Resnick MD. Adolescent suicide attempts: risks and protectors. *Pediatrics*. 2001;107(3):485-493.

22. Grunbaum JA, Kann A, Kinchen S, et al. Youth risk behavior surveillance - United States, 2003. *MMWR Morb Mortal Wkly Rep*. 2004; 53(SS-2):1-96.

23. King RA, Schwab-Stone M, Flisher AJ, et al. Psychosocial and risk behavior correlates of youth suicide attempts and suicidal ideation. *J Am Acad Child Adolesc Psychiatry.* 2001; 40(7):837-846.

24. National Center for Health Statistics. *Health, United States, 2004 With Chartbook on Trends in the Health of Americans*. Hyattsville, Md; 2004.

25. Hassan-Ríos E. *Estudio epidemiológico sobre sicopatología y su relación con la ideación e intento suicida en niños y adolescentes de 9 a 17 años del área metropolitana de San Juan, Puerto Rico, para el 1990 [Epidemiologic Study about Psychopathology and its Relationship with Suicide Ideation and Attempt in Children and Adolescents 9 to 17 Years Old from the San Juan Metropolitan Area, Puerto*

Rico, for 1990] [master's thesis]. San Juan, Puerto Rico: University of Puerto Rico; 1993.

26. Alvira-Robles LL, Diaz-Villafañe W, Torres-Giovannetti J. *Salud mental en adolescentes: percepción de los adolescentes con diagnósticos psiquiátricos que reciben servicios en los hospitales de salud mental públicos y privados en Puerto Rico sobre su funcionamiento familiar, académico y social a agosto de 1995 [Mental Health among Adolescents: Perception of Adolescents with Psychiatric Diagnoses that Receive Services about their Family, Academic and Family Functioning in Public and Private Mental Health Hospitals in Puerto Rico, August 1995]* [master's thesis]. San Juan, Puerto Rico: University of Puerto Rico; 1995.

27. Barthel CA. *Sociodemographic Variables as Predictors in Adolescent Suicide Attempts in Outpatient Psychiatric Settings* [master's thesis]. Ann Arbor, Mich: The University of Michigan; 1989.

28. Brent DA. Risk factors for adolescent suicide and suicidal behavior: mental and substance abuse disorders, family environmental factors, and life stress. *Suicide Life Threat Behav.* 1995;25(suppl):52-63.

29. Jellinek MS, Snyder JB. Depression and suicide in children and adolescents. *Pediatr Rev*. 1998; 19(8):255-264.

30. Makikyro TH, Hakko HH, Timonen MJ, et al. Smoking and suicidality among adolescent psychiatric patients. *J Adolesc Health*. 2004;34(3):250-253.

31. Woods ER, Lin YG, Middleman A, Beckford P, Chase L, DuRant RH. The associations of suicide attempts in adolescents. *Pediatrics*. 1997; 99(6):791-796.

32. Jessor R, ed. *New Perspectives on Adolescent Risk Behavior.* New York, NY: Cambridge University Press; 1998.

33. Beautrais AL. Risk factors for suicide and attempted suicide among young people. *Aust N Z J Psychiatry*. 2000;34(3):420-436.

34. Bloch DS. Adolescent suicide as a public health threat. *J Child Adolesc Psychiatr Nurs*. 1999;12(1):26-38.

35. Arthur MW, Hawkins JD, Pollard JA, Catalano RF, Baglioni AJ Jr. Measuring risk and protective factors for substance use, delinquency, and other adolescent problem behaviors. The Communities That Care Youth Survey. *Eval Rev*. 2002;26(6):575-601.

36. Hawkins JD, Catalano RF, Millar JY. Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: implications for substance abuse prevention. *Psychol Bull.* 1992;112(1):64-105.

37. Arthur MW, Briney JS, Hawkins JD, Abbott RD, Brooke-Weiss BL, Catalano RF. Measuring risk and protection in communities using the Communities That Care Youth Survey. *Eval Program Plann*. 2007 May;30(2):197-211.

38. Canetto SS. Meanings of gender and suicidal behavior during adolescence. *Suicide Life Threat Behav*. 1997;27(4):339-351.

39. Bensley LS, Van Eenwyk J, Spieker SJ, Schoder J. Self-reported abuse history and adolescent problem behaviors. I. Antisocial and suicidal behaviors. *J Adolesc Health*. 1999;24(3):163-172.

40. González-Cancel LJ, Ramos-Lozano AV, Rivera-Vargas J, Torres-González AE. *Suicidio en adolescentes: factores de la dinámica familiar asociados a las ideas e intentos suicidas de los adolescentes participantes del Programa de Servicios de Salud a Adolescentes y del Proyecto de Prevención del Suicidio en Adolescentes, Hospital Regional de Caguas, a mayo de 1998 [Suicide in Adolescents: Family Dynamic Factors Associated with Suicidal Ideation and Suicide Attempts among Adolescents Participating in the Health Services to Adolescents Project and the Adolescent Suicide Prevention Project, Caguas Regional Hospital, May 1998]* [master's thesis]. San Juan, Puerto Rico: University of Puerto Rico; 1998.

41. Sánchez-Lacay JA, Parrilla-Cruz CE, Pagán-Castro AL. Intentos suicidas en adolescentes [Suicide attempts in adolescents]. *Bol Asoc Med P R*. 1985;77(7):273-277.

42. Crumley FE. Substance abuse and adolescent suicidal behavior. *JAMA*. 1990;263(22):3051-3056.

43. Hintikka J, Hintikka U, Koskela K, Kontula O. Common mental disorders, suicidality and use of health care services during late adolescence in Finland. *J Adolesc Health*. 2000;26(1):2-3.

44. McQuillan CT, Rodríguez J. Suicide, adolescents and Puerto Rico. *Bol Asoc Med P R*. 2000;92(1-3):22-29.

45. Swahn MH, Lubell KM, Simon TR. Suicide attempts and physical fighting among high school students-United States, 2001. *MMWR Morb Mortal Wkly Rep*. 2004;53(22):474-476. Heikkinen et al., 1994.

46. Heikkinen M, Aro H, Lönnqvist J. Recent life events, social support and suicide. *Acta Psychiatr Scand*. 1994;377(suppl):65-72.

47. Garber J, Little S, Hilsman R, Weaver KR. Family predictors of suicidal symptoms in young adolescents. *J Adolesc*. 1998;21(4):445-457.

48. Carris MJ, Sheeber L, Howe S. Family rigidity, adolescent problem-solving deficits, and suicidal ideation: a mediational model. *J Adolesc*. 1998;21(4):459-472.
49. Pfeffer CR. Childhood suicidal behavior: a developmental perspective. *Psychiatr Clin North Am*. 1997;20(3):551-562.

50. American Academy of Pediatrics Committee on Adolescence. Suicide and suicide attempts in adolescents. *Pediatrics*. 2000;105(4 pt 1):871-874.

51. Weiner IB. Suicidal behavior. In: *Psychological Disturbance in Adolescence*. 2nd ed. New York, NY: John Wiley & Sons, Inc.; 1992: 357-384.

CHAPTER III

PREVALENCE, SOCIO-DEMOGRAPHIC CORRELATES AND SPATIAL DISTRIBUTION OF SUICIDAL BEHAVIOR AMONG ADOLESCENT STUDENTS IN PUERTO RICO, ACADEMIC YEARS 2002-03 AND 2003-04

ABSTRACT

Background: Suicide is a leading cause of death among adolescents in many countries. Suicidal behavior also includes suicidal ideation and attempted suicide. The magnitude of suicidal behavior has been difficult to establish due to the lack of data, particularly among Hispanics. Little is known about the magnitude of the problem in Puerto Rico. The objectives of this study were to estimate the prevalence of suicidal ideation and attempts among students, to determine the association between suicidal behaviors and socio-demographic characteristics, and to determine if there are spatial clusters in the prevalence of suicidal behavior among Puerto Rican teenagers. ***Methods:*** This study is a secondary analysis of the "Consulta Juvenil VI" survey, an island-wide bi-annual cross-sectional survey. The sample (n=55,227) was selected using a multi-stage stratified cluster sampling design, and is representative of all 7^{th}-12^{th} grade public schools students in Puerto Rico. Weighted prevalence estimates for suicidal behavior were calculated. Multiple logistic regression analyses were performed to assess the strength of the association between each suicidal behavior and socio-demographic variables. Multiple linear regression models adjusted for spatial dependence were evaluated to determine which municipality-level characteristics were associated with the prevalence by municipality of each suicidal behavior. ***Results:*** Approximately 15.7% of the students reported suicidal ideation, and 12.8% reported at least one suicide attempt. Prevalences of both suicidal behaviors were significantly higher among females and high school students, among those who did not live with both parents, among those not born on the

island, and among those whose mothers had not finished high school. Prevalences of ideation and attempts were highest in the southeastern and eastern municipalities of the island. A high proportion of the students who reported suicidal ideation (75.5%) also reported suicide attempts. Prevalence of self-reported depressive symptoms was the only characteristic in the adolescent's spatial environment found to be a possible explanation for the spatial clustering of both suicidal behaviors. ***Conclusions:*** Effective strategies for the prevention of suicidal behavior among adolescents should target these high risk groups, particularly in the high-risk geographic areas identified.

INTRODUCTION

Suicidal behavior among adolescents, especially suicide attempts and completed suicides, has been increasingly identified as an important clinical and public health problem.[1-3] Suicidal ideation, suicidal threats, and suicide attempts among children and adolescents are more common than the completed act, and represent an important dimension of the suicide continuum.[3] In many countries, suicide is among the top ten leading causes of death among adolescents.[2,4-7] In Puerto Rico, it is the 8th leading cause of death in the 10-14 year old age group and the 6th leading cause of death in the 15-19 year old group.[8]

Few countries have reliable information on non-fatal suicidal behavior (i.e., suicidal ideation and attempts) due to the difficulty of collecting information.[9] It is estimated that only 25% of those who attempt suicide seek medical assistance, and these cases are not necessarily the most serious ones. Thus, as with many conditions, cases that we are able to identify are just the tip of the iceberg. The majority of the suicidal individuals remain unidentified. In the USA, 3-9% of adolescent students reporting attempting suicide each year.[10-13] These prevalences have remained relatively unchanged over the last ten years. Information regarding suicide attempts among Puerto Ricans is sparse. In one study among children and adolescents 9 to 17 years old residing in the San Juan metropolitan area in 1990, 5.2% reported having attempted suicide at least once in their lifetime.[14]

Suicidal ideation is more common than other suicidal behaviors.[9] Over the last twenty years, studies among adolescent student populations suggest that between 3.5% and 52.1% of students have suicidal thoughts. In the USA, approximately 16.9% of students between 9th and 12th grade reported having seriously considered attempting suicide in the previous year (based on self-repot from the *2003 Youth Risk Behavior Surveillance System)*. In contrast to suicide attempts, prevalence of suicidal ideation among students in grades 9-12 appears to have decreased in the last decade.[13] Information regarding suicidal ideation among Puerto Ricans is also sparse. In the 1990 San Juan study described above, a total of 25.8% of children and adolescents 9 to 17 years old reported ideation.[14]

Suicidal behavior varies by socio-demographic characteristics with females, adolescents 15 years old or younger, those from lower socioeconomic status, and Hispanics at greater risk.[2-3, 10-12, 15-23] Gender is one of the most important predictors of suicidal behavior in the USA, particularly among teenagers. Females are more likely to report ideation and attempts, but completed suicide is more common among males.[2-3, 10-12, 16-22] Similar results have been found in Puerto Rico.[15, 23] Other socio-demographic characteristics such as low socioeconomic status, lower level of parental education, and a Hispanic ethnicity have also been associated with suicidal behavior.[3, 14, 17, 23]

Suicide is an under-appreciated public health problem due to the lack of statistics and the lack of research about interventions that would allow understanding of the problem.[15] The purpose of the present study is to gain a better understanding of suicidal behavior (attempt and ideation) among adolescents in Puerto Rico. Specific aims were to estimate the prevalence and socio-demographic correlates of suicidal ideation and suicide attempts among Puerto Rican adolescent students, and to assess whether there are spatial clusters in the prevalence of these behaviors among 7th-12th grade public school students in Puerto Rico.

METHODS

This cross-sectional study is a secondary analysis of data from the "Consulta Juvenil" survey, an island-wide bi-annual cross-sectional survey designed to monitor the prevalence of substance use among students in Puerto Rico. The survey was funded by the *Mental Health and Drug Addiction Administration* (ASSMCA, by its acronym in Spanish) and the *Puerto Rico Office of Drug Control,* and commissioned to the *Universidad Central del Caribe* (UCC) School of Medicine for its design and conduction. Data used in this analysis was collected in the sixth wave of the survey over two academic years: 2002-03 and 2003-04.

Sampling Design

The "Consulta Juvenil VI" survey includes a representative sample of students from public secondary schools (grades 7^{th} to 12^{th}). Public school students represent 93.2% of all students in the island. The sample was selected using a multi-stage stratified cluster sampling design with the primary sampling units being the public schools.[24] Public schools were first stratified based on municipality. Within each of the 78 municipalities, schools were further stratified by school level (middle or high school), creating a total of 156 strata. The next sampling stage involved the selection of sections (homerooms) within the school. The number of schools per strata and sections per school depended on the number of schools within that stratum. All students within the selected homeroom sections were included in the sample. A total of 348 schools (208 middle and 140 high schools), and 3,184 sections were selected.

Four (4) schools refused to participate (98.9% school participation rate). In the participating schools, 73,245 students were enrolled in the sections selected for the survey. A total of 27,837 middle and 27,667 high school students completed a self-administered pre-coded questionnaire (n=55,504; participation rate=75.8%). A total of 16.6% were absent on the day of the survey, and 7.6% of the students present did not participate (4.6% of the students refused and 3.0% of the parents did not sign the consent form). Following application of the survey, an additional 277 questionnaires were invalidated because they were incomplete or illegible. The final sample was 55,227

students, representing 22.3% of the 247,334 students between 7th and 12th grade in public schools in Puerto Rico.

Data Collection Procedures

The pre-coded self-administered questionnaire used in the survey included questions about suicidal behavior as well as demographic characteristics of the students, their school experiences, patterns and attitudes towards substance use, substance use among parents, siblings and friends, family environment, relationship with parents, religion, violence, sexual history, and participation in prevention programs. The questionnaire was pre-tested in two (2) schools using four sections of students.

A written informed consent letter was sent to the parents and collected before administering the questionnaire. Students without authorization of their parents or who did not want to participate in the survey remained in the classroom, but did not complete the questionnaire. Teachers were asked to remain outside the classroom during the survey administration. Completion of the questionnaire took approximately 30 minutes. All research procedures and forms were approved by the *Universidad Central del Caribe* School of Medicine's Institutional Review Board.

Study Variables

Suicidal ideation and suicide attempt were measured, respectively, by the following questions: "*Have you seriously considered attempting suicide?"* and *"How many times have you attempted suicide?"*. Both variables were dichotomized (ever/never).

Socio-demographic characteristics evaluated in this analysis were: gender (male/female), grade (seventh to twelfth), country of birth (Puerto Rico, other), father's and mother's educational level (less than high school, high school or more), whether they lived with both parents most of the time (yes/no), and Puerto Rico health region (Aguadilla, Arecibo, Bayamón, Caguas, Fajardo, Mayagüez, Metropolitan, Ponce). A health region is a group of municipalities grouped with the purpose of maximizing health care delivery, particularly secondary and tertiary health services.

Statistical Analyses

Data was data-entered using the SPSS (*Statistical Package for the Social Sciences*) program for Windows, version 11. The fidelity of data entry was verified by re-entering a 10% randomly selected sample of the questionnaires. Exploratory analysis of the data was performed to identify missing and inconsistent data.

The data was analyzed using SPSS (*Statistical Package for the Social Sciences*) for Windows (version 11.0.1), and SAS (*SAS Institute Inc*.) for Windows (version 9.1.3). In SAS, the SURVEYFREQ procedure, which takes into account the complex sample design, was used to estimate the prevalences and corresponding confidence limits. The SURVEYLOGISTIC procedure was used to estimate the odds ratios and their corresponding 95% confidence intervals. This sample is representative of all students between 7^{th} and 12^{th} grade in public schools in Puerto Rico, and results are weighted to represent approximately 247,334 students. All analyses were performed on weighted data.

Frequencies of both suicidal behaviors were estimated for the total Puerto Rican school age population. Simple logistic regressions were performed to evaluate the presence of an association between each suicidal behavior (ideation and attempt) with each socio-demographic variable (crude odds ratio). Multiple logistic regressions models were used to assess the effect of all socio-demographic variables on suicidal ideation and on suicide attempt simultaneously.

In order to explore geographic distribution and spatial patterns of suicidal behavior in Puerto Rico, graphical methods were used to visualize the data. The weighted prevalences of suicidal behavior in each municipality are presented using choropleth maps which were created using ESRI ArcMap version 9.2 (Environmental Systems Research Institute, Inc., 1999-2006). The Moran's I Spatial Autocorrelation Statistic was used to detect spatial clustering; the null hypothesis being that no spatial clustering was present.

Fourteen municipality-level characteristics were evaluated as potential explanations for spatial clustering of the suicidal behaviors. Information obtained from the 2000 U.S. Census Bureau included: total population, percentage of population with income below poverty level, median household income, percentage of total population classified as urban, and percentage of total population aged 10-17 years old. Information obtained from the Puerto Rico Continuous Health Survey ("Proyecto Estudio Contínuo de Salud para los Municipios de Puerto Rico"), a cross-sectional study in a representative sample of the population in the Island, included: percentage of adolescents who exercised, percentage with mental or behavioral disorders, percentage with a depressive episode, and annual average number of visits to the doctor. We also considered the following variables from the current study: percentage of respondents who had ever used cigarettes, percentage who had ever used alcohol, percentage who had ever used illicit drugs, percentage who reported at least some community disorganization (perceiving that somebody could harm, hit or injure them in their community, and the presence of graffiti, crime, drug selling, fights, and/or empty or abandoned buildings in the community), and percentage who reported at least one symptom of depression.

The geographic distribution of each municipality-level characteristic was explored using choropleth maps. A simple linear regression was performed for each characteristic, and the unstandardized residuals for each regression were tested for spatial clustering. Residuals from multiple linear regression analyses were also tested for clustering. In addition, multiple linear regression models were evaluated using SAS PROC MIXED, which adjusts for spatial dependence, to determine which of the municipality-level characteristics were associated with the prevalence by municipality of each suicidal behavior.

RESULTS

Table 3.1 presents the distribution of the socio-demographic characteristics of the 55,227 students in the sample, 55.4% of whom were in middle school (grades 7-9). Slightly over half of the participants (52.4%) were female, and most (55.2%) were between 13 and 15

years old (median age = 14 years). Almost all of the students (88.9%) were born in Puerto Rico. Slightly over half reported that their mother (56.4%) or father (50.1%) had some post-secondary education, and that they did not live with both parents (51.6%).

Prevalences

Table 3.2 presents the prevalence of suicidal behavior among surveyed students. Approximately 15.7% of the students reported ever seriously considering attempting suicide (ideation), 38.4% of whom reported seriously considering attempting suicide in the year previous to the survey. Also, 12.8% of the students reported at least one suicide attempt in their lives, 39.4% of which had attempted suicide more than once. Three quarters (75.5%) of the students who reported suicide ideation also reported having attempted to kill themselves, whereas only 1.1% of those who reported no ideation also reported attempting suicide. Conversely, almost all of the students who attempted suicide (92.8%) had seriously thought about it.

Table 3.3 presents the prevalence of suicidal ideation and attempts by socio-demographic characteristics. Prevalence of ideation was almost twice as high among females compared to males (21.3% vs. 9.5%), and among high school students (20.0%) compared to middle school students (12.1%). Furthermore, the proportion of students with suicidal ideation was higher among those not born in Puerto Rico, among those whose parents did not finish high school, and among those who did not live with both parents.

Like ideation, prevalence of suicide attempts was over twice as high among females (17.4% vs. 7.6%), and higher among high school students (15.6% vs. 10.6%). Prevalences of attempts were also higher among those not born in the island, among those with parents who did not finish high school, and among those not living with both parents.

Gender appears to be the socio-demographic characteristic most strongly associated with suicidal behavior (see Table 3.3). Females had 2.58 times higher odds of reporting suicidal ideation and 2.54 times higher odds of reporting suicide attempts than males,

after controlling for other socio-demographic characteristics. Not living with both parents was also an important predictor of suicidal behavior. Students who did not live with both parents had a 45% higher odds of ideation and a 49% higher odds of attempts than those who lived with both. In addition, their mother's educational level was associated with suicidal behavior, but not their father's level.

Spatial Analysis

Prevalence estimates of suicidal behavior were higher in southeastern and eastern municipalities, with the Fajardo region having the highest prevalence (see Table 3.3, Figures 3.1 to 3.2, Appendices 1 to 3). There was significant spatial clustering of the prevalences for suicidal ideation (Moran's I=0.08; Z score=5.7; $p<0.01$) and for suicide attempts (Moran's I=0.11; Z score=8.16; $p<0.01$).

Upon evaluating which municipality-level characteristics were potential explanations for spatial clustering of the suicidal behaviors (see Appendices 4 to 17), only the percentage of students in the municipality who reported at least one symptom of depression was associated with the prevalence of both suicidal ideation ($p=0.0005$) and suicide attempts ($p=0.0005$). Suicide attempts were also associated with the annual average number of visits to the doctor ($p=0.012$), and suicidal ideation was associated with the percentage of students who had ever used alcohol ($p=0.032$).

DISCUSSION

This research is the first study in Puerto Rico to provide prevalence estimates of suicidal ideation and suicide attempts in an island-wide representative sample of adolescent students, and to explore socio-demographic correlates of these behaviors. This is also the first study to explore spatial patterns of suicidal behavior. Prevalence of suicidal behavior among Puerto Rican adolescent students was higher than among students in the USA. Being female was the socio-demographic characteristic most strongly associated with suicidal behavior; not living with both parents was also an important risk factor. There was significant spatial clustering of the prevalences for both suicidal behaviors in

the southeastern and eastern municipalities of the island. Results from this study begin to address the dearth of information about suicidal behavior in Hispanics, specifically among Puerto Ricans, and have important implications for existing and future suicide prevention programs.

Prevalence of suicidal ideation among Puerto Rican students was approximately 12% higher than that observed among students in the United States. In the USA, 16.9% of students between 9th and 12th grade reported having seriously considered attempting suicide in the previous year, according to the 2003 *Youth Risk Behavior Surveillance System*, compared to 19.1% of students in our sample in the same grades.[25] Prevalence of suicide attempts among these Puerto Rican students also appears to be higher than that observed in the USA, although results are not completely comparable. In our study, 15.0% of 9th to 12th grade students reported attempts in their lifetimes; in the USA, 8.5% of students reported having attempted suicide at least once during the previous year.[25] Future studies are needed to assess the prevalence of attempts in the previous year among Puerto Rican students. However, a history of previous attempts is one of the strongest predictors for attempted suicide, so these results do provide insight into the potential burden of suicide in this population and the service demand for the Puerto Rican mental health system.[10, 15, 26]

Based on these frequencies, it is projected that 37,834 of the students between 7th-12th grade in Puerto Rico have had suicidal ideation, and 30,988 have attempted suicide, which represents a considerable number of teens at risk. Most of these adolescents are likely not served by the mental health system. Primary health care services personnel should be made aware of these frequencies since they are the most important health care providers to identify mental disorders and suicidality, particularly during late adolescence.

In this study, adolescent females had over 2.5 times higher odds of suicidal ideation and suicide attempts than their male counterparts. These results are consistent with previous

studies that have found adolescent females to be at higher risk of ideation and attempts, but males tend to have a higher probability of completed suicide.[2, 3, 10-12, 15-22] This gender difference in suicidal behavior is not observed during childhood.[18] Our results underscore the importance of considering gender when evaluating suicidal behavior. Gender is considered to be one of the most important predictors of suicidal behavior; risk factors for suicide attempts differ by sex.[18, 21] Men and women are prone to different mental disorders, with women more likely to be diagnosed as suffering from a depressive disorder, a condition that has been strongly associated with suicidal behavior.[18, 21] More research is needed to understand the cause of these gender differences in the Puerto Rican community, and to identify variables from other domains that might mediate the gender-suicide behavior association.

In the current study, not living with both parents was an important predictor of suicidal behavior. Also, only the mother's educational level was associated with suicidal behavior, not the father's. Lower level of parental education has previously been associated with suicidal behavior.[3, 10, 14, 17, 23] This is not consistent with results from a previous study in a community sample in Puerto Rico where the prevalence of attempted suicide among adolescents decreased as the father's educational level increased, but increased with the mother's educational level.[14] Our results, where substantially more students lived with their mother (89.2%) than with their father (51.7%), suggest that a mother's presence and characteristics may be of more consequence in the teen's development. Divorce and death of the parent have been identified as risk factors for suicidal behavior, for self-destructive behaviors, and for other childhood psychopathologies.[3, 27] Suicide prevention programs should target these high risk teens.

Our results indicate that suicidal behavior was higher among those born outside Puerto Rico, most of whom (90.2%) were born in the USA. Hispanic populations are culturally very different from USA populations. Since a wide variety of social and cultural factors have been associated with suicidal behavior, it is possible that the impact of re-location and acculturation might make teens more vulnerable to suicidal behavior. Re-location to a new country is a major life stress event, and stressful life events have been associated

with suicidal behavior and other mental health problems.[12, 15, 17, 19, 27-29] Prevention efforts should be directed at teens who have newly arrived to the country to improve their coping skills, while further research is needed to elucidate factors which underlie the higher risk among them.

The most compelling finding in this study was that the prevalence of each suicidal behavior clustered spatially. The use of geographic information systems (GIS), a new tool in the study of public health problems, provides us with a way of exploring patterns and relationships between people and their environments. Finding geographic clusters in this public health problem suggests that we should look for determinants of suicidal behavior in the teens' environment. Our study clearly identifies target areas for future prevention efforts, including prevalence of adolescent depression and its determinants within the community. We had expected to find that the municipalities with the highest prevalence of ideation and attempts were more urban, more populous, and had a higher proportion of people with an income below poverty level and a lower median household income. However, clustering did not appear to be related to either urbanicity or income. Again, contrary to our expectations, adolescents living in municipalities with the highest prevalences were not the ones with the lowest proportion of adolescents who reported having an exercise regime. However, care should be taken when interpreting these geographical associations since the unit of observation was aggregate data for the municipalities, thus we cannot make inferences on individual risks as doing so could lead to an ecological fallacy. Results from this analysis point to the need of examining these relationships using an analytic study design.

Depression and other mental and behavioral disorder are likely to be undiagnosed since the municipalities with the highest prevalences of suicidal behavior were not the ones with a high proportion of adolescents reporting actually going to the doctor or being hospitalized due to these problems. However, municipalities with the highest prevalences of ideation and attempts had among the highest number of annual visits to the doctor, and a higher proportion of teens reporting at least one depressive symptom. Primary health care providers in these municipalities at higher risk of suicide should

implement routine screening for depression, which might result in improved recognition and early treatment of the condition and thus may reduce the number of suicides. Other adolescent risky behaviors that seem to cluster in the same geographic areas as suicidal behavior included cigarette, alcohol, and illicit drug use (see Appendices 13-15).

This study is a secondary analysis of a survey designed to monitor the prevalence of substance use among students, but which included information of several potential risk factors for suicidal behavior. Strengths of this study include that it is a representative sample of all students between 7th and 12th grade in public schools in Puerto Rico, and that the participation rate was high (75.8%). Few studies on this topic have been performed on representative samples. However, this study is limited by its cross-sectional design as temporal sequence cannot be established, and findings may be subject to recall bias. Recall bias could result in an over- or under-estimation of the prevalence of suicidal behavior among students, and of the relationships between different factors and suicidal behavior. The 16.6% absenteeism may have led to selection bias, and an under-reporting of the prevalence of suicidal behavior. School absenteeism has been associated with school performance, and performance has been associated with suicidal behavior.[3, 15, 29] So, our current study may have under-estimated the prevalence of suicidal behavior because absentees were not included. Under-reporting is likely more serious among students in high school since their absentee rate was almost twice as high as among middle school students (20.4% vs. 12.7%). In addition, the results do not reflect the experiences of adolescents who have dropped out of school and suicidal behavior is likely to be higher among dropouts than among adolescents still in school. In 2000, it was estimated that 14% of adolescents 16-19 years in old Puerto Rico were high school dropouts.[30] In addition, this study only evaluated students in public schools, which represent 93.2% of all students in the island. Not including private school students, many of whom go to religious schools, introduces another potential selection bias since these students might differ in their risk profile.

In conclusion, suicidal behavior (suicidal ideation and attempted suicide) is an important problem among adolescents. Results of this study demonstrate that suicide behavior is

common among Puerto Rican adolescents, and that the prevalence of suicide ideation and attempt varies by gender and socioeconomic factors as well as by spatial context. These results have important implications for existing and future suicide prevention programs in Puerto Rico and among Puerto Rican populations in the USA. Effective strategies for the prevention of suicidal behavior among adolescents should target the high risk groups and geographic areas identified in this study. Information from this study can also be used for comparison to other Hispanic populations, and as baseline data that can be used for comparison in future studies.

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Table 3.1. Distribution of Socio-Demographic Characteristics among Public School Adolescent Students Surveyed, Puerto Rico, Academic Years 2002-03 and 2003-04

Socio-Demographic Characteristics	*Unweighted Frequency (n)*	*Weighted Frequency (N)*	*Weighted Proportion (%)*
Gender			
Female	28,292	126,183	52.4
Male	25,509	114,644	47.6
Age			
11 years or less	720	3,162	1.3
12 years	6,815	33,050	13.4
13 years	9,425	47,321	19.2
14 years	9,018	44,973	18.2
15 years	9,901	43,960	17.8
16 years	10,377	41,196	16.7
17 years	7,389	28,014	11.4
18 years	1,242	4,321	1.8
19 years or more	179	681	0.3
School Level and Grade			
Middle School	27,656	137,103	55.4
Seventh (7^{th})	9,104	43,794	17.7
Eighth (8^{th})	10,035	51,122	20.7
Ninth (9^{th})	8,517	42,186	17.1
High School	27,571	110,231	44.6
Tenth (10^{th})	9,644	40,928	16.5
Eleventh (11^{th})	10,722	41,221	16.7
Twelfth (12^{th})	7,205	28,082	11.4
Country of Birth			
Puerto Rico	48,820	218,778	88.9
United States	5,533	23,166	9.4
Dominican Republic	294	2,843	1.2
Other	305	1,323	0.5
Father's Educational Level			
Less than high school	9,476	38,854	16.1
High school graduate	18,998	81,476	33.8
Some studies after high school	25,361	120,710	50.1
Mother's Educational Level			
Less than high school	7,478	31,021	12.8
High school graduate	17,721	74,591	30.8
Some studies after high school	28,946	136,486	56.4
Living with Both Parents			
No	27,411	127,094	51.6
Yes	27,534	119,061	48.4
Health Region			
Aguadilla	3,530	14,887	6.0
Arecibo	8,153	34,032	13.8
Bayamón	8,500	39,413	15.9
Caguas	8,784	41,248	16.7
Fajardo	3,690	8,369	3.4
Mayagüez	6,595	19,728	8.0
Metropolitan	4,487	40,330	16.3
Ponce	11,488	49,327	19.9

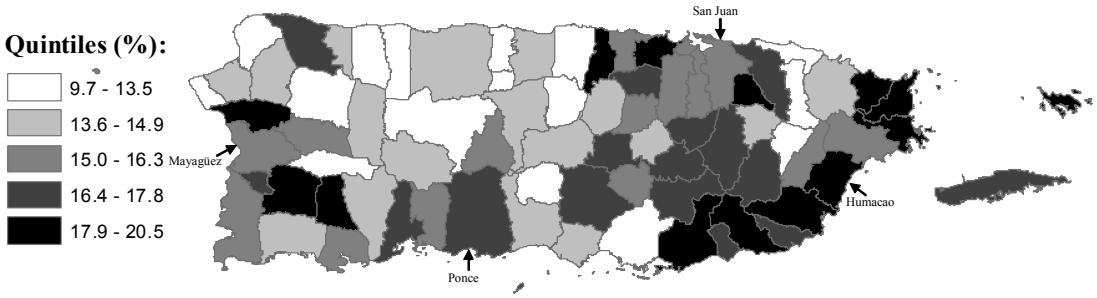
Table 3.2. Prevalence Estimates of Suicidal Behavior among Public School Adolescent Students, Puerto Rico, Academic Years 2002-03 and 2003-04

Suicidal Behavior	*Unweighted Frequency (n)*	*Weighted Frequency (N)*	*Weighted Prevalence (95% CI)*
Ever attempting suicide	7,126	30,988	12.8 (12.5-13.2)
One attempt	*4,273*	*18,773*	*7.8 (7.5-8.1)*
Two or three attempts	*2,167*	*9,312*	*3.9 (3.6-4.1)*
Four or more attempts	*686*	*2,903*	*1.2 (1.1-1.3)*
Ever seriously considered attempting suicide (ideation)	8,657	37,834	15.7 (15.3-16.1)
More than a year ago	*5,349*	*23,317*	*9.7 (9.3-10.0)*
During the last year	*3,308*	*14,518*	*6.0 (5.8-6.3)*

Table 3.3. Prevalence Estimates of Suicide Attempts and Suicidal Ideation among Public School Adolescent Students and Odds Ratios by Socio-Demographic Characteristics, Puerto Rico, Academic Years 2002-03 and 2003-04

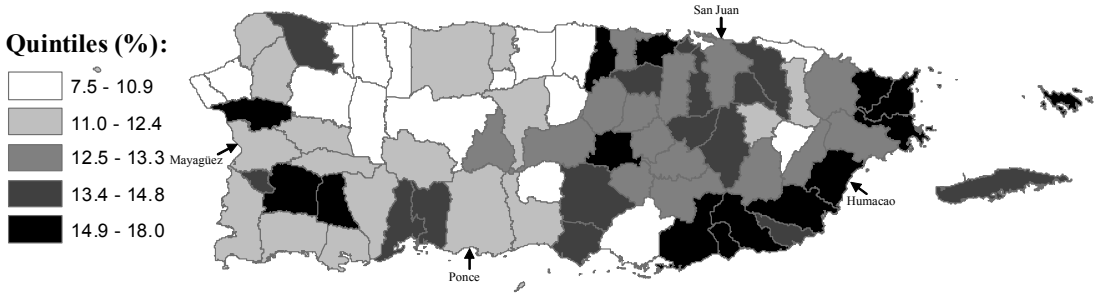
Socio-Demographic Characteristics	*Suicide Attempts*				*Suicidal Ideation*			
	Weighted Frequency	*Weighted Prevalence (95% CI)*	*Crude Odds Ratio (95% CI)*	*Adjusted Odds Ratio (95% CI)*	*Weighted Frequency*	*Weighted Prevalence (95% CI)*	*Crude Odds Ratio (95% CI)*	*Adjusted Odds Ratio (95% CI)*
Gender								
Female	21,718	17.4 (16.8-18.0)	2.56 (2.35-2.78)	2.54 (2.34-2.75)	26,486	21.3 (20.7-21.9)	2.57 (2.40-2.76)	2.58 (2.41-2.77)
Male	8,452	7.6 (7.2-8.1)	Reference	Reference	10,520	9.5 (9.0-10.0)	Reference	Reference
Grade								
Seventh (7th)	3,366	8.0 (7.3-8.7)	Reference	Reference	3,541	8.4 (7.8-9.1)	Reference	Reference
Eighth (8th)	5,128	10.4 (9.6-11.1)	1.33 (1.17-1.51)	1.34 (1.17-1.53)	5,717	11.6 (10.7-12.4)	1.42 (1.26-1.61)	1.41 (1.24-1.60)
Ninth (9th)	5,580	13.6 (12.6-14.6)	1.81 (1.60-2.04)	1.81 (1.59-2.07)	6,811	16.6 (15.7-17.5)	2.16 (1.93-2.42)	2.12 (1.88-2.39)
Tenth (10th)	5,905	14.7 (13.9-15.5)	1.98 (1.77-2.21)	2.07 (1.84-2.32)	7,260	18.1 (17.2-18.9)	2.40 (2.16-2.66)	2.47 (2.20-2.76)
Eleventh (11th)	6,305	15.5 (14.6-16.4)	2.11 (1.88-2.36)	2.14 (1.90-2.41)	8,080	19.9 (18.9-20.8)	2.69 (2.43-2.99)	2.72 (2.44-3.03)
Twelfth (12th)	4,704	16.9 (15.6-18.3)	2.34 (2.06-2.67)	2.41 (2.11-2.76)	6,426	23.2 (21.7-24.7)	2.28 (2.91-3.69)	3.35 (2.96-3.78)
Country of Birth								
Puerto Rico	26,677	12.5 (12.1-12.9)	Reference	Reference	32,551	15.3 (14.8-15.7)	Reference	Reference
Other	4,159	15.6 (14.6-16.6)	1.29 (1.19-1.40)	1.23 (1.13-1.35)	5,127	19.2 (18.1-20.3)	1.32 (1.23-1.43)	1.28 (1.17-1.39)
Father's Educational Level								
Less than high school	5,529	14.5 (13.6-15.4)	1.19 (1.10-1.29)	1.05 (0.96-1.15)	6,272	16.5 (15.6-17.4)	1.08 (0.99-1.16)	0.96 (0.88-1.05)
High school graduate	24,708	12.4 (12.0-12.8)	Reference	Reference	30,733	15.5 (15.0-16.0)	Reference	Reference
Mother's Educational Level								
Less than high school	4,873	16.1 (15.0-17.2)	1.36 (1.24-1.50)	1.30 (1.16-1.45)	5,476	18.1 (16.9-19.3)	1.22 (1.12-1.34)	1.20 (1.07-1.35)
High school graduate	25,534	12.3 (11.9-12.7)	Reference	Reference	31,686	15.3 (14.8-15.7)	Reference	Reference
Living with Both Parents								
No	18,704	15.1 (14.5-15.8)	1.54 (1.44-1.65)	1.49 (1.38-1.61)	22,350	18.1 (17.4-18.8)	1.47 (1.37-1.58)	1.45 (1.34-1.56)
Yes	12,125	10.4 (9.9-10.8)	Reference	Reference	15,293	13.1 (12.6-13.7)	Reference	Reference
Health Region								
Aguadilla	1,629	11.1 (10.1-12.2)	1.06 (0.91-1.24)	1.07 (0.92-1.25)	2,121	14.5 (13.3-15.7)	1.12 (0.98-1.28)	1.14 (1.01-1.28)
Arecibo	3,539	10.6 (9.8-11.4)	Reference	Reference	4,386	13.2 (12.3-14.0)	Reference	Reference
Bayamón	5,295	13.8 (12.9-14.7)	1.35 (1.22-1.50)	1.35 (1.22-1.51)	6,270	16.4 (15.4-17.4)	1.29 (1.17-1.43)	1.29 (1.18-1.40)
Caguas	5,489	13.6 (12.7-14.5)	1.33 (1.19-1.48)	1.32 (1.17-1.48)	6,868	17.0 (16.0-18.0)	1.35 (1.22-1.49)	1.33 (1.21-1.47)
Fajardo	1,268	15.5 (14.2-16.8)	1.55 (1.37-1.75)	1.53 (1.31-1.80)	1,423	17.4 (16.0-18.8)	1.39 (1.28-1.52)	1.35 (1.23-1.49)
Mayagüez	2,469	12.7 (11.7-13.8)	1.23 (1.12-1.36)	1.24 (1.13-1.37)	3,109	16.1 (14.8-17.3)	1.26 (1.56-1.38)	1.25 (1.15-1.36)
Metropolitan	5,048	12.9 (11.6-14.2)	1.25 (1.10-1.42)	1.18 (1.05-1.32)	5,948	15.2 (13.8-16.7)	1.19 (1.06-1.33)	1.09 (0.99-1.20)
Ponce	6,251	13.0 (12.2-13.8)	1.26 (1.14-1.40)	1.25 (1.13-1.39)	7,708	16.1 (15.2-16.9)	1.27 (1.15-1.39)	1.25 (1.15-1.37)

Figure 3.1. Prevalence Estimates of Suicidal Ideation among Public School Adolescent Students by Municipality, Puerto Rico, Academic Years 2002-03 and 2003-04



n=53,912

Figure 3.2. Prevalence Estimates of Suicide Attempts among Public School Adolescent Students by Municipality, Puerto Rico, Academic Years 2002-03 and 2003-04



n=53,960

Appendix 1. Prevalence Estimates of Suicide Attempts among Public School Adolescent Students by Municipality, Puerto Rico, Academic Years 2002-03 and 2003-04

Health Region and Municipality	*Unweighted Frequency (n)*	*Weighted Frequency (N)*	*Weighted Prevalence (95% CI)*
Aguadilla Region	**390**	**1,629**	**11.1 (10.1-12.2)**
Aguada	78	334	10.3 (8.1-12.6)
Aguadilla	76	329	11.0 (8.7-13.4)
Isabela	95	452	14.5 (11.8-17.2)
Moca	76	301	11.0 (8.7-13.3)
San Sebastián	65	214	8.4 (6.3-10.5)
Arecibo Region	**870**	**3,539**	**10.6 (9.8-11.4)**
Arecibo	73	752	11.5 (9.0-14.0)
Barceloneta	87	189	11.6 (9.3-14.0)
Camuy	59	205	10.3 (7.8-12.9)
Ciales	94	230	12.4 (10.0-14.8)
Florida	70	103	10.4 (8.1-12.7)
Hatillo	54	191	7.5 (5.5-9.5)
Lares	66	317	10.3 (7.9-12.7)
Manatí	69	258	10.4 (7.7-13.2)
Morovis	71	300	10.6 (8.1-13.0)
Quebradillas	64	240	10.9 (8.3-13.4)
Utuado	74	309	10.3 (8.0-12.5)
Vega Baja	89	445	10.5 (8.4-12.6)
Bayamón Region	**1,189**	**5,295**	**13.8 (12.9-14.7)**
Barranquitas	130	495	15.7 (13.2-18.2)
Bayamón	99	1,455	12.5 (10.2-14.8)
Cataño	119	232	14.8 (12.2-17.5)
Comerío	88	221	13.1 (10.4-15.7)
Corozal	89	419	12.5 (10.1-15.0)
Dorado	77	254	12.8 (10.1-15.5)
Naranjito	112	335	13.2 (10.9-15.5)
Orocovis	110	216	12.7 (10.2-15.2)
Toa Alta	117	482	13.8 (11.5-16.1)
Toa Baja	132	747	17.0 (14.3-19.7)
Vega Alta	116	438	15.8 (13.2-18.5)
Caguas Region	**1,168**	**5,489**	**13.6 (12.7-14.5)**
Aguas Buenas	79	278	13.8 (10.9-16.7)
Aibonito	99	352	13.2 (10.8-15.6)
Caguas	75	1,123	13.5 (10.6-16.4)
Cayey	101	487	13.1 (10.7-15.6)
Cidra	94	400	13.0 (10.5-15.5)
Gurabo	93	245	12.1 (9.8-14.5)
Humacao	86	699	15.9 (12.7-19.1)
Juncos	62	276	10.0 (7.6-12.3)
Las Piedras	111	294	13.1 (10.8-15.4)
Maunabo	76	155	14.3 (10.4-18.2)
Naguabo	93	222	13.3 (10.8-15.8)
San Lorenzo	100	420	13.1 (10.7-15.5)
Yabucoa	99	538	16.3 (13.3-19.4)

Appendix 1. Prevalence Estimates of Suicide Attempts among Public School Adolescent Students by Municipality, Puerto Rico, Academic Years 2002-03 and 2003-04 (Cont.)

Health Region and Municipality	*Unweighted Frequency (n)*	*Weighted Frequency (N)*	*Weighted Prevalence (95% CI)*
Fajardo Region	**586**	**1,268**	**15.5 (14.2-16.8)**
Ceiba	121	161	17.5 (14.6-20.3)
Culebra	29	21	18.0 (12.0-24.0)
Fajardo	104	419	17.0 (14.0-20.0)
Luquillo	129	190	16.4 (13.7-19.1)
Río Grande	115	357	13.3 (11.0-15.5)
Vieques	88	119	14.8 (11.7-17.8)
Mayagüez Region	**867**	**2,469**	**12.7 (11.7-13.8)**
Añasco	111	282	14.9 (12.2-17.7)
Cabo Rojo	92	311	11.9 (9.6-14.2)
Hormigueros	106	146	14.1 (11.5-16.8)
Lajas	91	197	11.6 (9.3-13.9)
Las Marias	75	103	11.3 (8.7-13.8)
Maricao	65	84	12.4 (9.5-15.3)
Mayagüez	52	538	11.0 (7.7-14.2)
Rincón	71	108	10.1 (7.9-12.4)
Sabana Grande	115	305	15.6 (13.0-18.3)
San Germán	89	395	14.9 (12.0-17.7)
Metropolitan Region	**555**	**5,048**	**12.9 (11.6-14.2)**
Canóvanas	89	424	11.7 (9.4-14.0)
Carolina	95	1,269	14.0 (11.4-16.6)
Guaynabo	102	484	14.1 (11.5-16.8)
Loiza	71	180	9.4 (7.2-11.5)
San Juan	92	2,316	12.5 (10.1-14.9)
Trujillo Alto	106	375	14.2 (11.7-16.8)
Ponce Region	**1,501**	**6,251**	**13.0 (12.2-13.8)**
Adjuntas	77	201	11.7 (9.2-14.3)
Arroyo	116	272	15.4 (12.8-18.0)
Coamo	119	447	13.8 (11.5-16.1)
Guánica	85	179	12.1 (9.6-14.6)
Guayama	106	727	17.9 (14.5-21.3)
Guayanilla	112	267	14.1 (11.6-16.6)
Jayuya	104	273	13.3 (10.9-15.8)
Juana Diaz	108	504	12.3 (10.1-14.5)
Patillas	108	307	15.3 (12.6-18.0)
Peñuelas	117	337	13.5 (11.2-15.8)
Ponce	105	1,451	12.1 (9.9-14.2)
Salinas	75	231	10.3 (8.1-12.5)
Santa Isabel	115	203	13.9 (11.5-16.4)
Villalba	79	281	10.2 (8.0-12.4)
Yauco	75	571	12.2 (9.6-14.9)

Appendix 2. Prevalence Estimates of Suicidal Ideation among Public School Adolescent Students by Municipality, Puerto Rico, Academic Years 2002-03 and 2003-04

Health Region and Municipality	*Unweighted Frequency (n)*	*Weighted Frequency (N)*	*Weighted Prevalence (95% CI)*
Aguadilla Region	**514**	**2,121**	**14.5 (13.3-15.7)**
Aguada	112	470	14.6 (12.0-17.1)
Aguadilla	91	393	13.1 (10.6-15.7)
Isabela	117	554	17.8 (14.9-20.8)
Moca	97	383	14.0 (11.5-16.6)
San Sebastián	97	320	12.6 (10.1-15.1)
Arecibo Region	**1,072**	**4,386**	**13.2 (12.3-14.0)**
Arecibo	91	933	14.3 (11.6-17.0)
Barceloneta	101	219	13.5 (11.0-16.0)
Camuy	72	252	12.7 (9.9-15.5)
Ciales	108	258	13.9 (11.4-16.4)
Florida	81	121	12.3 (9.7-14.8)
Hatillo	72	247	9.7 (7.6-11.9)
Lares	86	417	13.6 (10.9-16.2)
Manatí	91	353	14.3 (11.1-17.4)
Morovis	87	359	12.7 (10.0-15.3)
Quebradillas	82	302	13.7 (10.9-16.4)
Utuado	92	380	12.6 (10.2-15.1)
Vega Baja	109	545	12.9 (10.6-15.2)
Bayamón Region	**1,407**	**6,270**	**16.4 (15.4-17.4)**
Barranquitas	144	548	17.3 (14.7-19.8)
Bayamón	121	1,777	15.2 (12.7-17.7)
Cataño	130	246	15.6 (13.0-18.3)
Comerío	105	249	14.7 (12.0-17.4)
Corozal	103	485	14.5 (11.9-17.1)
Dorado	95	310	15.7 (12.8-18.6)
Naranjito	141	412	16.3 (13.8-18.8)
Orocovis	130	253	14.9 (12.2-17.5)
Toa Alta	140	575	16.4 (13.9-18.9)
Toa Baja	160	898	20.5 (17.6-23.3)
Vega Alta	138	519	18.8 (15.9-21.6)
Caguas Region	**1,458**	**6,868**	**17.0 (16.0-18.0)**
Aguas Buenas	94	328	16.4 (13.3-19.4)
Aibonito	118	413	15.5 (12.9-18.1)
Caguas	101	1,464	17.6 (14.4-20.8)
Cayey	139	654	17.7 (15.0-20.3)
Cidra	126	537	17.5 (14.7-20.3)
Gurabo	117	300	14.9 (12.4-17.4)
Humacao	102	844	19.2 (15.8-22.7)
Juncos	76	338	12.2 (9.6-14.8)
Las Piedras	138	365	16.3 (13.8-18.8)
Maunabo	96	188	17.3 (13.2-21.4)
Naguabo	104	250	15.1 (12.4-17.7)
San Lorenzo	129	543	17.0 (14.3-19.6)
Yabucoa	118	643	19.5 (16.3-22.8)

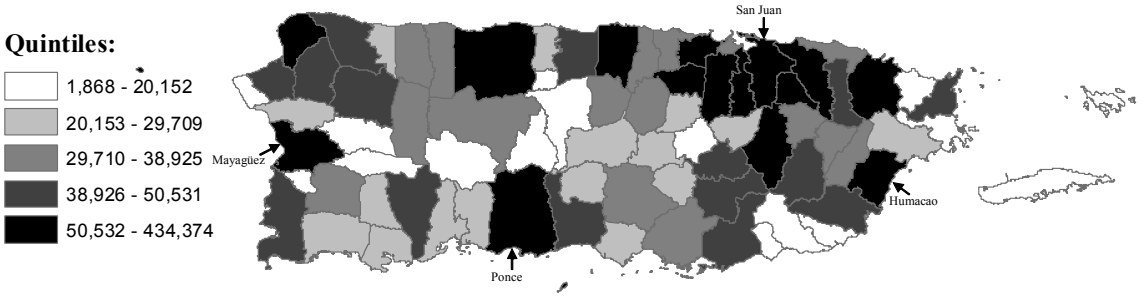
Appendix 2. Prevalence Estimates of Suicidal Ideation among Public School Adolescent Students by Municipality, Puerto Rico, Academic Years 2002-03 and 2003-04 (Cont.)

Health Region and Municipality	*Unweighted Frequency (n)*	*Weighted Frequency (N)*	*Weighted Prevalence (95% CI)*
Fajardo Region	**660**	**1,423**	**17.4 (16.0-18.8)**
Ceiba	133	177	19.1 (16.1-22.0)
Culebra	31	23	19.1 (13.0-25.3)
Fajardo	120	489	19.8 (16.7-23.0)
Luquillo	146	209	18.0 (15.3-20.8)
Río Grande	126	388	14.4 (12.0-16.8)
Vieques	104	138	17.0 (13.8-20.2)
Mayagüez Region	**1,075**	**3,109**	**16.1 (14.8-17.3)**
Añasco	140	338	17.9 (15.1-20.8)
Cabo Rojo	123	416	15.9 (13.4-18.5)
Hormigueros	139	184	17.8 (14.9-20.7)
Lajas	115	248	14.7 (12.1-17.2)
Las Marias	100	137	15.0 (12.1-17.9)
Maricao	71	89	13.2 (10.3-16.2)
Mayagüez	66	751	15.4 (11.4-19.3)
Rincón	81	123	11.5 (9.2-13.9)
Sabana Grande	132	349	18.0 (15.2-20.7)
San Germán	108	475	17.9 (14.9-21.0)
Metropolitan Region	**643**	**5,948**	**15.2 (13.8-16.7)**
Canóvanas	98	463	12.8 (10.5-15.2)
Carolina	115	1,537	17.1 (14.2-19.9)
Guaynabo	112	517	15.1 (12.5-17.8)
Loiza	75	186	9.7 (7.6-11.9)
San Juan	110	2,772	15.0 (12.4-17.6)
Trujillo Alto	133	474	18.0 (15.2-20.8)
Ponce Region	**1,828**	**7,708**	**16.1 (15.2-16.9)**
Adjuntas	92	234	13.6 (11.0-16.3)
Arroyo	129	301	17.0 (14.3-19.7)
Coamo	153	573	17.6 (15.1-20.2)
Guánica	109	226	15.3 (12.6-18.0)
Guayama	125	826	20.4 (16.9-23.9)
Guayanilla	141	337	17.8 (15.0-20.5)
Jayuya	124	327	15.9 (13.3-18.5)
Juana Diaz	128	591	14.4 (12.1-16.8)
Patillas	139	394	19.6 (16.7-22.5)
Peñuelas	137	386	15.5 (13.1-17.9)
Ponce	143	1,961	16.4 (13.9-18.8)
Salinas	92	282	12.5 (10.2-14.9)
Santa Isabel	121	211	14.4 (12.0-16.9)
Villalba	105	365	13.2 (10.8-15.6)
Yauco	90	694	14.9 (12.1-17.8)

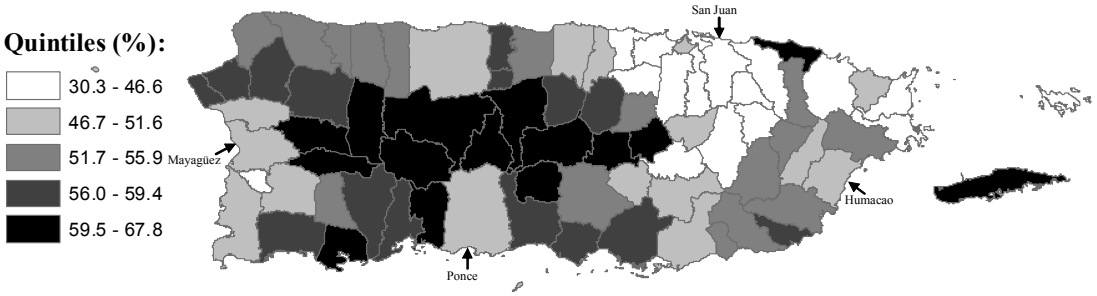
Appendix 3. Municipalities of the Commonwealth of Puerto Rico

Source: Joe Delgado (http://www.linktopr.com/map_pr_towns.gif).

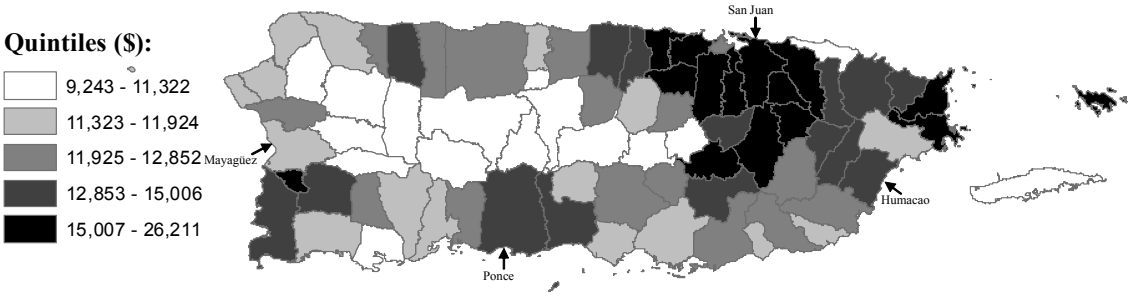
Appendix 4. Total Population by Municipality, 2000 Puerto Rico Population Census



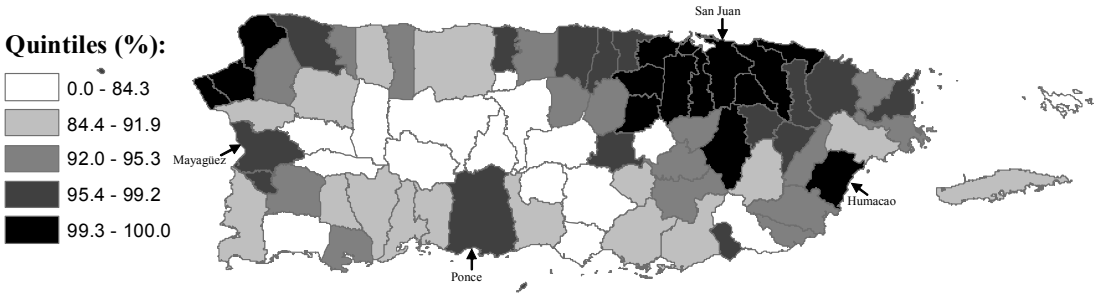
Appendix 5. Percentage of Population with Income Under Poverty Level, 2000 Puerto Rico Population Census



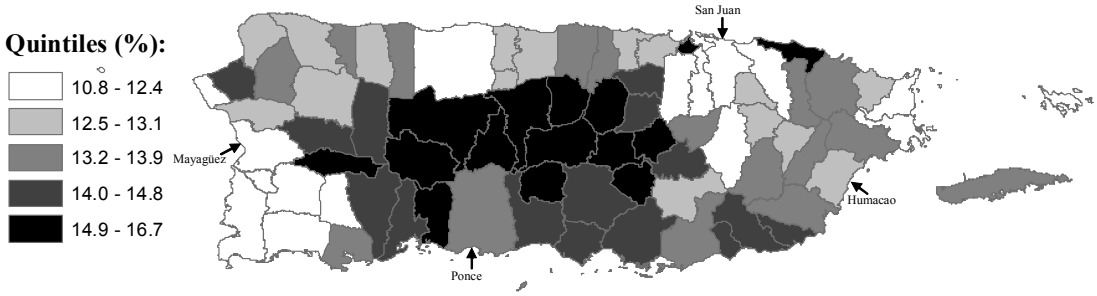
Appendix 6. Median Household Annual Income, 2000 Puerto Rico Population Census



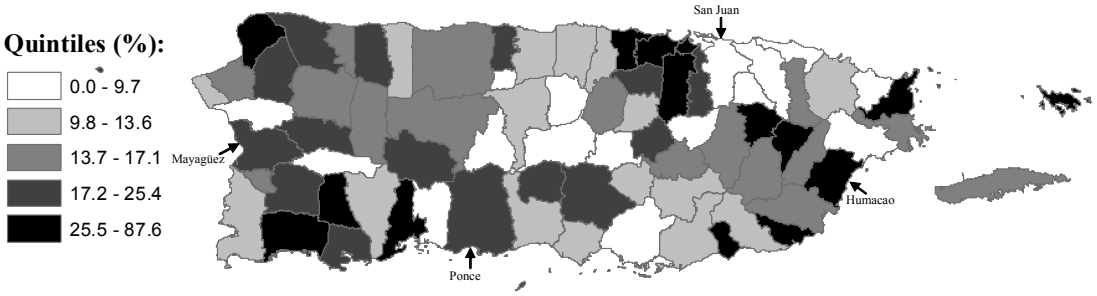
Appendix 7. Percentage of Municipality Population Classified as Urban, 2000 Puerto Rico Population Census



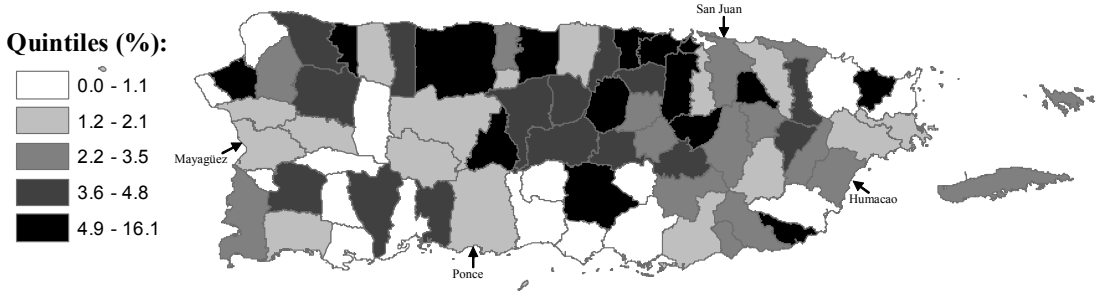
Appendix 8. Percentage of Municipality Population 10 to 17 Years Old, 2000 Puerto Rico Population Census



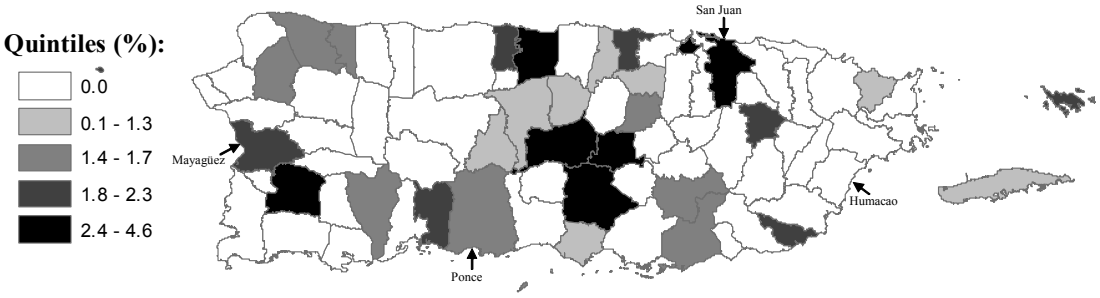
Appendix 9. Percentage of Adolescents Aged 12-18 who Reported Having an Exercise Regime, 2003 Puerto Rico Continuous Health Survey



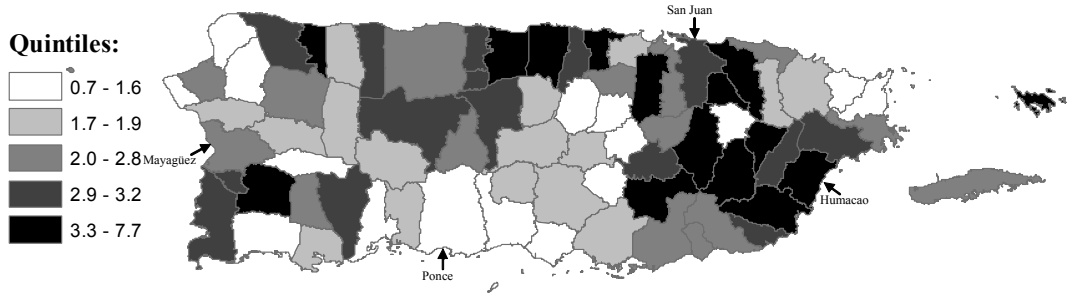
Appendix 10. Percentage of Adolescents Aged 12-18 going to the Doctor due to Mental or Behavioral Disorders in the, 2003 Puerto Rico Continuous Health Survey



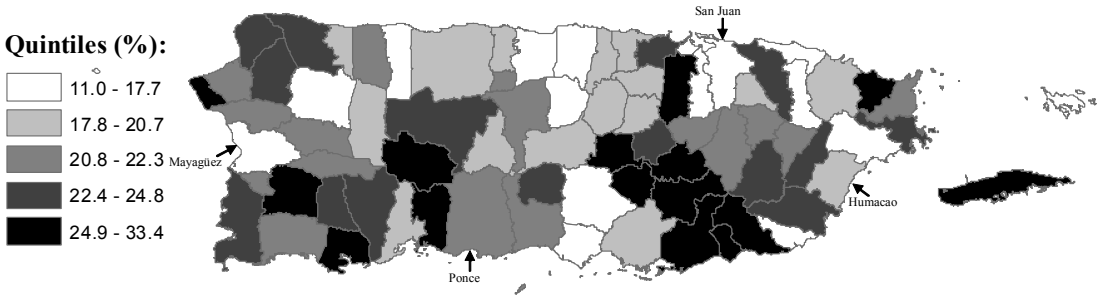
Appendix 11. Percentage of Adolescents Aged 12-18 with Depressive Episodes, 2003 Puerto Rico Continuous Health Survey



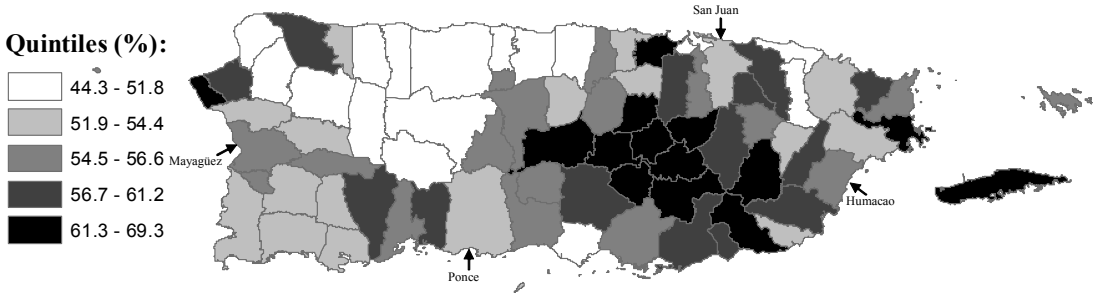
Appendix 12. Mean Annual Number of Visits to the Doctor by Adolescents Aged 12-18, 2003 Puerto Rico Continuous Health Survey



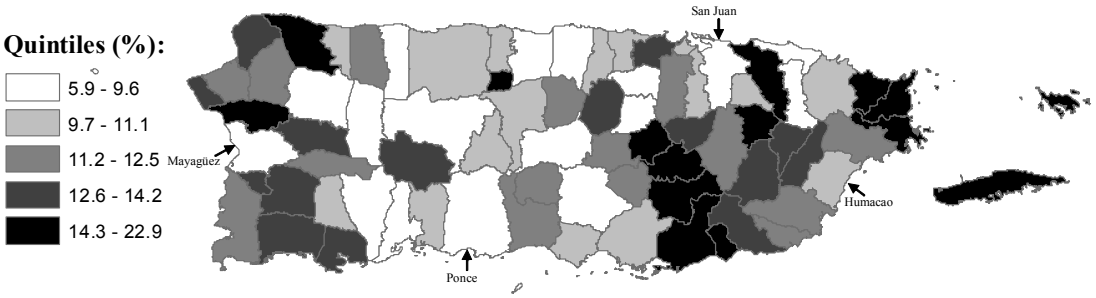
Appendix 13. Lifetime Prevalence of Cigarette Use among 7th to 12th Grade Students, *Consulta Juvenil VI* Survey, 2002-04



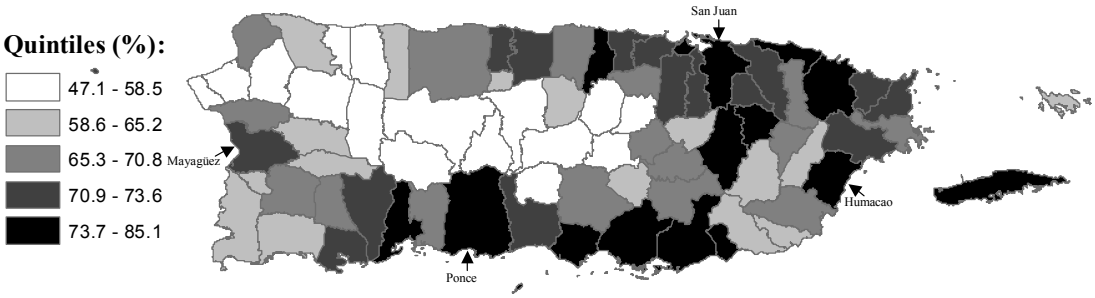
Appendix 14. Lifetime Prevalence of Alcohol Use among 7th to 12th Grade Students, *Consulta Juvenil VI* Survey, 2002-04



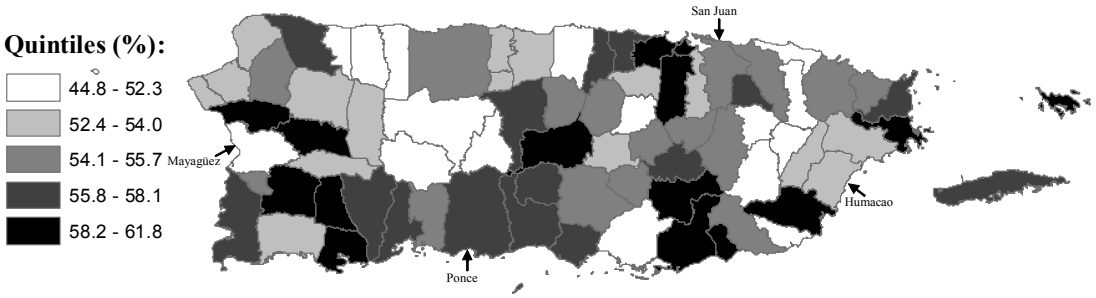
Appendix 15. Lifetime Prevalence of Illicit Drug Use among 7th to 12th Grade Students, *Consulta Juvenil VI* Survey, 2002-04



Appendix 16. Percentage of 7th to 12th Grade Students that Describe their Community as Less than Excellent (Community Disorganization), *Consulta Juvenil VI* Survey, 2002-04



Appendix 17. Percentage of 7th to 12th Grade Students that Reported at Least One Depressive Symptom, *Consulta Juvenil VI* Survey, 2002-04



REFERENCES

1. Bloch DS. Adolescent suicide as a public health threat. *J Child Adolesc Psychiatr Nurs*. 1999;12(1):26-38.

2. Cantor C, Neulinger K. The epidemiology of suicide and attempted suicide among young Australians. *Aust N Z J Psychiatry*. 2000;34(3):370-387.

3. Joffe RT, Offord DR. Epidemiology. In: MacLean G, ed. *Suicide in Children and Adolescents.* Lewiston, NY: Hogrefe & Huber Publishers; 1990:1-14.

4. Aaron R, Joseph A, Abraham S, et al. Suicides in young people in rural southern India. *Lancet*. 2004;363(9415):1117-1118.

5. Kim WJ, Singh T. Trends and dynamics of youth suicides in developing countries. *Lancet.* 2004;363:1090-1091.

6. Phillips MR, Yang G. Suicide and attempted suicide-China, 1990-2002. *MMWR Morb Mortal Wkly Rep.* 2004;53(22):481-484.

7. Scribante L, Blumenthal R, Saayman G, Roos JL. A retrospective review of 1018 suicide cases from the capital city of South Africa for the period 1997-2000. *Am J Forensic Med Pathol*. 2004;25(1):52-55.

8. Puerto Rico Department of Health. *Informe anual de estadísticas vitales 2001 [2001 Annual Vital Statistics Report]*. San Juan, Puerto Rico: ASPESIS, Division of Statistics; 2003.

9. Krug EG, Dahlberg LL, Mercy JA, eds. *World Report on Violence and Health.* Geneva, World Health Organization; 2002.

10. Borowsky IW, Ireland M, Resnick MD. Adolescent suicide attempts: risks and protectors. *Pediatrics*. 2001;107(3):485-493.

11. Kann L, Kinchen SA, Williams BI, et al. Youth risk behavior surveillance - United States, 1999. *MMWR Morb Mortal Wkly Rep*. 2000; 49(SS-5):1-96.

12. King RA, Schwab-Stone M, Flisher AJ, et al. Psychosocial and risk behavior correlates of youth suicide attempts and suicidal ideation. *J Am Acad Child Adolesc Psychiatry.* 2001; 40(7):837-846.

13. National Center for Health Statistics. *Health, United States, 2004 With Chartbook on Trends in the Health of Americans*. Hyattsville, Md; 2004.

14. Hassan-Ríos E. *Estudio epidemiológico sobre sicopatología y su relación con la ideación e intento suicida en niños y adolescentes de 9 a 17 años del área metropolitana de San Juan, Puerto Rico, para el 1990 [Epidemiologic Study about Psychopathology and its Relationship with Suicide Ideation and Attempt in Children and Adolescents 9 to 17 Years Old from the San Juan Metropolitan Area, Puerto Rico, for 1990]* [master's thesis]. San Juan, Puerto Rico: University of Puerto Rico; 1993.

15. Sánchez-Lacay JA, Parrilla-Cruz CE, Pagán-Castro AL. Intentos suicidas en adolescentes [Suicide attempts in adolescents]. *Bol Asoc Med P R*. 1985;77(7):273-277.

16. Bensley LS, Van Eenwyk J, Spieker SJ, Schoder J. Self-reported abuse history and adolescent problem behaviors. I. Antisocial and suicidal behaviors. *J Adolesc Health*. 1999;24(3):163-172.

17. Brent DA. Risk factors for adolescent suicide and suicidal behavior: mental and substance abuse disorders, family environmental factors, and life stress. *Suicide Life Threat Behav.* 1995;25(suppl):52-63.

18. Canetto SS. Meanings of gender and suicidal behavior during adolescence. *Suicide Life Threat Behav*. 1997;27(4):339-351.

19. Gonzalez-Manrique MA, Rodríguez-Llauger A. Epidemiological trends of suicide in Puerto Rico: 1931 to 1985. *P R Health Sci J*. 1988;7(3):245-250.

20. Makikyro TH, Hakko HH, Timonen MJ, et al. Smoking and suicidality among adolescent psychiatric patients. *J Adolesc Health*. 2004;34(3):250-253.

21. Woods ER, Lin YG, Middleman A, Beckford P, Chase L, DuRant RH. The associations of suicide attempts in adolescents. *Pediatrics*. 1997; 99(6):791-796.

22. U.S. Department of Health and Human Services. Chapter 18-Mental health and mental disorders. In: *Healthy People 2010, Volume II, Objectives for Improving Health (Part B: Focus Areas 15-28)*. 2nd ed. Washington, DC: U.S. Government Printing Office; 2000: 18.1-18.32.

23. González-Cancel LJ, Ramos-Lozano AV, Rivera-Vargas J, Torres-González AE. *Suicidio en adolescentes: factores de la dinámica familiar asociados a las ideas e intentos suicidas de los adolescentes participantes del Programa de Servicios de Salud a Adolescentes y del Proyecto de Prevención del Suicidio en Adolescentes, Hospital Regional de Caguas, a mayo de 1998 [Suicide in Adolescents: Family Dynamic Factors Associated with Suicidal Ideation and Suicide Attempts among Adolescents Participating in the Health Services to Adolescents Project and the Adolescent Suicide Prevention Project, Caguas Regional Hospital, May 1998]* [master's thesis]. San Juan, Puerto Rico: University of Puerto Rico; 1998.

24. Moscoso MR, Colón HM, Parrilla I, Reyes-Pulliza JC, Robles RR. *EncuestaJuvenil.Municipal: Uso de substancias entre adolescentes escolares del nivel secundario estimados para cada municipio, sistema público, años escolares 2002-2004 [Municipal.YouthSurvey: Substance Use Estimates among Adolescent Students from the Secondary School Level for each Municipality, Public System, School Years 2002-04]*. Puerto Rico: Oficina de Control de Drogas; 2004.

25. Grunbaum JA, Kann A, Kinchen S, et al. Youth risk behavior surveillance - United States, 2003. *MMWR Morb Mortal Wkly Rep*. 2004; 53(SS-2):1-96.

26. MacLean G. Clinical perspectives. In: MacLean G, ed. *Suicide in Children and Adolescents.* Lewiston, NY: Hogrefe & Huber Publishers; 1990:15-39.

27. Beers MH, Berkow R, eds. Section 15-Psychiatric disorders. Chapter 190-Suicidal behavior. In: *The Merck Manual of Diagnosis and Therapy.* 17th ed. Whitehouse Station, NJ: Merck Research Laboratories; 1999:1544-1549.

28. Sandin B, Chorot P, Santed MA, Valiente RM, Joiner TE Jr. Negative life events and adolescent suicidal behavior: a critical analysis from the stress process perspective. *J Adolesc*. 1998;21(4):415-426.

29. Barthel CA. *Sociodemographic Variables as Predictors in Adolescent Suicide Attempts in Outpatient Psychiatric Settings* [master's thesis]. Ann Arbor, Mich: The University of Michigan; 1989.

30. Mather M. *Children in Puerto Rico: Results from the 2000 Census.* A KIDS COUNT/PRB Report on Census 2000. Baltimore, Md: The Annie E. Casey Foundation and the Population Reference Bureau; 2003.

CHAPTER IV

INDIVIDUAL AND FAMILY CHARACTERISTICS ASSOCIATED WITH SUICIDAL BEHAVIOR AMONG ADOLESCENT STUDENTS IN PUERTO RICO, ACADEMIC YEARS 2002-03 AND 2003-04

ABSTRACT

Background: Suicidal ideation and attempts are difficult to predict. Several risk and protective factors among adolescents have been identified yet few studies have explored suicidal behavior among Puerto Ricans. The objective of this study was to assess the association between suicidal ideation and suicide attempts with individual characteristics and behaviors of the adolescent, and characteristics of the adolescents' family and their family relationships. ***Methods:*** This study is a secondary analysis of the "Consulta Juvenil VI" survey, a Puerto Rican-wide bi-annual cross-sectional survey among children and adolescents. The sample (n=55,227) was selected using a multi-stage stratified cluster sampling design, and is representative of all 7^{th}-12^{th} grade public school students in Puerto Rico. Multiple logistic regression analyses were performed to assess the strength of the association between each suicidal behavior and individual and family variables. ***Results:*** The individual characteristic most strongly associated with suicidal behavior of students was the presence of depressive symptoms, particularly among females. Sensation seeking behaviors were also important predictors, particularly among males. The most important family characteristic was the presence of family conflict. Among females, students who reported family conflict were three times more likely to report depressive symptoms than those who did not report family conflict. ***Conclusions:*** Individual and family characteristics are important predictors for suicidal ideation and suicide attempts among adolescents. Results of this study have profound implications for current and future suicide prevention programs in the island, pointing to the need for

increased focus in addressing depression in adolescents, particularly when expressed as part of family conflict.

INTRODUCTION

Suicidal behavior among adolescents has been increasingly identified as an important clinical and public health problem.[1-4] In Puerto Rico, suicide is the 8th leading cause of death in the 10-14 year old age group and the 6th leading cause of death in the 15-19 year old group.[5] However, few countries have reliable information on non-fatal suicidal behaviors such as suicidal ideation and suicide attempts.[6] In the USA, it is estimated that between 3-9% of adolescent students attempt suicide each year, and that 16.9% have recent (last year) suicidal ideation.[7-10] In Puerto Rico, we have estimated that 12.8% of adolescent students have attempted suicide at least once in their lives, and 6.0% had ideation in the last year (see Chapter III). Given these prevalences, it is crucial to examine potential predictors of these non-fatal suicidal behaviors since these behaviors are, themselves, important predictors for suicide.

Suicidal ideation and attempts are difficult to predict, but several risk and protective factors among adolescents have been identified.[6-9, 11-33] Most of the previously identified risk factors in the USA and other populations are individual characteristics and behaviors inherent to the adolescent (such as a history of substance use). Characteristics of the adolescents' family and family relationships have also been associated with suicidal behavior, although fewer studies have examined family-related factors. Furthermore, few studies have looked simultaneously at characteristics from these two domains (individual and family) in order to understand the independent risks of factors that comprise each domain. Only three studies examined suicidal behavior among Puerto Ricans.

Depression, substance use, antisocial behaviors, and poor health have been identified as risk factors for suicidal behavior.[3, 7, 12-13, 17-18, 20, 22-24, 31] Depression, one of the most important risk factors for suicide, may be precipitated by social factors (such as disputes with parents) or by poor physical health.[3, 12-13, 17, 20, 22, 24, 31] Alcohol intensifies depressive

mood swings and reduces self-control, so it can predispose to suicidal acts. Previous sexual activity, antisocial behavior (carrying guns, selling illegal drugs, stealing or trying to steal a motor vehicle, being arrested, or taking a gun to school), and other behavioral problems (abuse, fights) have also been identified as predictors of suicidal behavior among adolescents.[9, 16, 26-27, 31] In addition, a history of violence perpetration (having a physical fight, injuring someone, history of carrying weapons to school) has been found to predict attempted suicide among adolescent students.[7, 9, 28, 31] Religious identity (praying frequently, viewing self as religious, affiliation with a religion) has been reported to protect against attempted suicide.[7]

The role of family factors in suicidal behavior is not clear. Family factors appear to play a role in suicidal behavior by increasing the vulnerability of the adolescent.[3] A poor family environment (one where dysfunction, discord or tension is present) and a lack of parental monitoring and family support have been associated with suicidal ideation and suicide attempts.[3, 7, 9, 13, 17, 19-20, 22-23, 27, 32-34] On the USA, factors that reduce the risk of suicidal behavior include perceived parent and family connectedness.[7]

Few studies have explored risk and protective factors for suicidal behavior among Hispanics, especially among Puerto Ricans. This lack of information is of particular concern in the United States since it is expected that by 2020 Hispanics will be the biggest racial/ethnic minority population on the USA, representing 17% of the population.[35] Currently, Puerto Ricans represent approximately 9% of the Hispanic population in the USA. Hispanic populations are culturally different from both other USA populations and among themselves; health beliefs and behaviors, social and psychological resources, and health care utilization patterns differ. Puerto Rican populations living in the USA might experience different influences due to re-location and acculturation than those still living in the island. Baseline data is needed to understand how their experiences living in a different cultural setting impact upon them.

The extent to which we understand the relationships between different factors that increase or reduce the risk for suicidal behavior (particularly when examining

simultaneously both individual and family factors), and their influence on the adolescent's behavior and lifestyle, will allow us to better identify adolescents who are at risk. Strategies for the prevention of suicidal behavior among adolescents should target these risk factors in order to be more effective.[1] A prior analysis of the data from the "Consulta Juvenil VI" study (see Chapter 3) demonstrated a higher risk of both suicidal behaviors among females, among those not living with both parents, among students not born on the island, and among those with mothers not high school graduates. The present report builds upon these results and considers individual characteristics and behaviors of the adolescents as well as characteristics of the adolescents' family relationships.

METHODS

This cross-sectional study is a secondary analysis of data from the "Consulta Juvenil" survey, an island-wide bi-annual cross-sectional survey designed to monitor the prevalence of substance use among students in Puerto Rico. The survey was funded by the *Mental Health and Drug Addiction Administration* (ASSMCA, by its acronym in Spanish) and the *Puerto Rico Office of Drug Control,* and commissioned to the *Universidad Central del Caribe* (UCC) School of Medicine for its design and conduction. Data used in this analysis was collected in the sixth wave of the survey over two academic years: 2002-03 and 2003-04.

Sampling Design

The "Consulta Juvenil VI" survey includes a representative sample of students from public secondary schools (grades 7^{th} to 12^{th}). The sample was selected using a multi-stage stratified cluster sampling design with the primary sampling units being the public schools.[36] Public schools were first stratified based on municipality. Within each of the 78 municipalities, schools were further stratified by school level (middle or high school), creating a total of 156 strata. The next sampling stage involved the selection of sections (homerooms) within the school. The number of schools per strata and sections per school depended on the number of schools within that stratum. All students within the selected

homeroom sections were included in the sample. A total of 348 schools (208 middle and 140 high schools), and 3,184 sections were selected.

Four (4) schools refused to participate (98.9% school participation rate). In the participating schools, 73,245 students were enrolled in the sections selected for the survey. A total of 27,837 middle and 27,667 high school students completed a self-administered pre-coded questionnaire (n=55,504; participation rate=75.8%). A total of 16.6% were absent on the day of the survey, and 7.6% of the students present did not participate (4.6% of the students refused and 3.0% of the parents did not sign the consent form). Following application of the survey, an additional 277 questionnaires were invalidated because they were incomplete or illegible. The final sample was 55,227 students, representing 22.3% of the 247,334 students between 7th and 12th grade in public schools in Puerto Rico.

Data Collection Procedures

The pre-coded self-administered questionnaire used in the survey included questions about suicidal behavior as well as demographic characteristics of the students, their school experiences, patterns and attitudes towards substance use, substance use among parents, siblings and friends, family environment, relationship with parents, religion, violence, sexual history, and participation in prevention programs. Questions regarding risk and protective factors were translated and adapted from the *Student Survey of Risk and Protective Factors and Prevalence of Alcohol, Tobacco & Other Drug Use*, designed by Hawkins, Catalano and colleagues (1992), ensuring semantic equivalence of the questions and cultural adaptation.[37-38] Most of the scales used in this study were adapted from this instrument. The questionnaire was pre-tested in two (2) schools using four sections of students.

A written informed consent letter was sent to the parents and collected before administering the questionnaire. Students without authorization of their parents or who did not want to participate in the survey remained in the classroom, but did not complete the questionnaire. Teachers were asked to remain outside the classroom during the

survey administration. Completion of the questionnaire took approximately 30 minutes. All research procedures and forms were approved by the *Universidad Central del Caribe* School of Medicine's Institutional Review Board.

Study Variables

Suicidal ideation and suicide attempts were measured, respectively, by the following questions: "*Have you seriously considered attempting suicide?"* and *"How many times have you attempted suicide?"*. Both variables were dichotomized (ever/never).

This paper examined individual characteristics and behaviors inherent to the individual adolescent, and characteristics of the adolescents' family and their family relationships. Individual characteristics included: depression (4-item scale), ever use of cigarette (yes/no), alcohol (yes/no), or illicit drugs (yes/no), perceived risks of drug use (7-item scale), favorable attitudes towards substance use (7-item scale), antisocial behavior (4-item scale), favorable attitudes towards antisocial behavior (5-item scale), sensation seeking (3 items), self-perceived health (excellent, good, fair, poor), sexual activity ever (yes/no), and religiosity (2-item scale). The specific items included in each scale, following Hawkins and Catalano theoretical model, are presented in Appendix 1.[37]

Family characteristics included: family history of substance use (9 items), poor family oversight (8-item scale), family conflict (3 items), favorable parental attitudes toward substance use and antisocial behavior (3-item scales), parental attachment (4 items), opportunities for pro-social involvement (3 items), and rewards for pro-social involvement (4 items). The specific items included in each scale are presented in Appendix 2. Multicollinearity between variables was assessed using the variance inflation factor and condition index diagnostics.

Statistical Analyses

Data was data-entered using the SPSS (*Statistical Package for the Social Sciences*) program for Windows, version 11. The fidelity of data entry was verified by re-entering

a 10% randomly selected sample of the questionnaires. Exploratory analysis of the data was performed to identify missing and inconsistent data.

The data was analyzed using SPSS (*Statistical Package for the Social Sciences*) for Windows (version 11.0.1), and SAS (*SAS Institute Inc*.) for Windows (version 9.1.3). In SAS, the SURVEYFREQ procedure, which takes into account the complex sample design, was used to estimate the prevalences and corresponding confidence limits. The SURVEYLOGISTIC procedure was used to estimate the odds ratios and their corresponding 95% confidence intervals. This sample is representative of all students between 7^{th} and 12^{th} grade in public schools in Puerto Rico, and results are weighted to represent approximately 247,334 students. All analyses were performed on weighted data.

Simple logistic regressions were performed to evaluate the presence of an association between each suicidal behavior (ideation and attempt) with each independent variable; their odds ratios and 95% confidence limits were calculated. Multiple logistic regression models were used to assess the effect of variables in each specific domain (individual or family) on suicidal ideation and on suicide attempt, controlling first for relevant socio-demographic characteristics (see Chapter 3), then for individual variables, and finally for family variables (following the ecological model). Socio-demographic characteristics forced into all multiple regression models were: gender (male/female), grade (seventh to twelfth), country of birth (Puerto Rico, other), mother's educational level (less than high school, high school or more), and whether they lived with both parents (yes/no). A stepwise regression approach was used with a backward selection method to build the final multiple regression models. The variables within each domain included in the final regression models were those that were significantly associated ($p<0.05$) in the bivariate analyses.

Tests of interaction were performed by entering into the models selected interaction terms between gender, depression, and other risk factors. These interaction terms were defined according to results from previous studies on the subject. Since several interaction terms

related to gender were significant (Wald test), the final multiple regression analyses were performed separately for each gender. Overall model significance was assessed using the Likelihood Ratio Test comparing the final model (full model) with the model with only the socio-demographic variables included (reduced model). The predictive power of the model was assessed using the Max-rescaled R-square statistic, also called Nagelkerke R^2, a pseudo R^2 statistic which is a measure of R^2 corrected so that the maximum of value one can be achieved. This R^2, which is based on likelihood statistics, describes how well the independent variables in the model predict the dependent variable by comparing the fitted model with the null model.

RESULTS

Sample Characteristics

Slightly over half of the 55,227 students in the sample (55.4%) were in middle school (7^{th} to 9^{th} grade), female (52.4%), between 13 and 15 years old (55.2%), reported that their mother (56.4%) or father (50.1%) had some post-secondary education, and that they did not live with both parents (51.6%). Many of the students (88.9%) were born in Puerto Rico.

As reported previously (see Chapter 3), approximately 15.7% of the students in the sample reported that they had ever seriously considered attempting suicide (suicidal ideation), and 12.8% of the students reported at least one suicide attempt in their lives. Suicidal ideation and suicide attempts were strongly associated. Almost all (92.8%) the students who attempted suicide had seriously thought about it, and three quarters (75.5%) of the adolescent students who reported seriously thinking about suicide (ideation) also reported having attempted suicide at least once. Students with suicidal ideation had 279 times higher odds of attempting suicide than those without ideation.

Tables 4.1 and 4.2 present the distribution of the individual and family variables, respectively, in the whole sample and by gender, since suicidal behavior has consistently

been shown to differ among males and females and several interaction terms related to gender were significant in this study. Over half of the students reported favorable attitudes towards antisocial behaviors (62.3%), that they had engaged in sensation seeking behaviors (61.5%), ever used alcohol (56.1%), or had at least one depressive symptom (55.5%). Between 20-35% reported not perceiving all drugs as dangerous (36.7%), or favorable attitudes towards substance use (24.9%), or that they had ever engaged in sexual activity (25.1%), or in at least one antisocial behavior (21.2%), or had ever used cigarettes (21.1%), or not being very religious (20.9%). Slightly over one in ten students reported fair or poor health (11.9%) and ever use of illicit drugs (11.3%).

A significantly higher proportion of females reported at least one depressive symptom as compared to males (60.9% vs. 48.5%), and fair or poor self-perceived health (13.6% vs. 10.1%). More males reported lifetime use of cigarettes (23.2% vs. 19.1%) and illicit drugs (13.5% vs. 9.2%), at least one antisocial behavior (28.8% vs. 14.4%), engaging in sexual activity (31.1% vs. 19.7%), and not being very religious (24.3% vs. 17.9%). A higher proportion of males also thought that not all drugs were very dangerous (41.5% vs. 32.5%), and that they were in favor of using at least one substance (26.7% vs. 23.3%). Alcohol use and engaging in sensation seeking behaviors were not significantly different between males and females.

Almost half of the students reported less family oversight (48.0%), or substance use by family members (48.0%), and about a third reported some parental attitudes favorable to antisocial behavior (30.4%) and towards substance use (29.9%). Although 44.5% of students reported some family conflict, only 10.7% reported a considerable amount of family conflict. In addition, 10.7% reported no rewards from parents for pro-social involvement, 8.8% were not attached at all to parents, and 6.9% had no opportunities for pro-social involvement with parents.

A significantly higher proportion of females reported a considerable amount of family conflict when compared to males (13.6% vs. 7.5%), and some substance use by family members (51.0% vs. 44.7%). More males reported less family oversight (52.7% vs.

43.7%), some parental attitudes favorable to antisocial behavior (31.6% vs. 29.2%), not being attached at all to parents (9.3% vs. 8.3%), and having no opportunities for pro-social involvement with parents (7.6% vs. 6.2%). Parental attitudes favorable towards substance use and rewards from parents for pro-social involvement were not statistically different between males and females.

Tables 4.3 to 4.6 present the prevalence of suicidal ideation and suicide attempts by the individual and family characteristics evaluated in the study. Measures of association include crude and adjusted odds ratios. Crude odds ratios overestimated the strength of the association between the individual and family characteristics with suicidal behaviors, therefore we focus on the adjusted associations. In addition, the associations for suicidal ideation and suicide attempts were very similar, so we focus our discussion on the data for attempts.

Depressive Symptoms

The presence of depressive symptoms was the individual characteristic most strongly associated with suicidal behavior among adolescent students in this study (see Tables 4.3 and 4.4). Approximately 20.5% (95% CI=19.9-21.2) of the students who reported at least one of the four symptoms of depression also reported suicide attempts, and 25.3% (95% CI=24.5-26.0) reported ideation. The risk of having engaged in suicidal behavior increased with the number of depression symptoms reported, almost doubling with each additional symptom. Prevalence was highest among students who reported the four symptoms of depression measured in the survey. Almost half (40.6%) of these individuals reported suicide attempts.

Suicidal behavior did not cluster around any one particular depressive symptom: prevalence of attempts ranged from 23.3% among those who felt depressed or sad most of the time the previous year to 31.7% among those who thought they were failures. Feeling a failure was the symptom with the highest prevalence of ideation and attempts for both females and males, followed by sometimes feeling that life is not worth it, sometimes feeling that they are good for nothing, and feeling sad and depressed most of

the time last year. For both suicidal behaviors, prevalence for each symptom was almost twice as high in females when compared to males.

After adjusting for socio-demographic characteristics, students with at least one depressive symptom had 6.61 (95% CI=5.98-7.31) times greater odds of reporting having attempted suicide, and 7.26 (95% CI=6.56-8.03) times greater odds of reporting ever having seriously considered attempting suicide, as compared to those reporting no depressive symptoms. When gender-specific multivariable logistic regression analysis was used, the association between depression and suicidal behavior was stronger for females, although depression remained the strongest predictor of suicidal behavior in males. That is, females with four depression symptoms had 9.04 higher odds of reporting suicide attempts than those with no depressive symptoms, whereas the odds for males was 7.08 times higher.

Substance Use

Prevalences of suicidal behaviors were higher among students who reported substance use, particularly use of illicit drugs. Approximately 31.0% of the adolescents who had ever tried illicit drugs reported suicide attempts. In addition, attempts were reported by 27.6% of those who had ever used cigarettes and 18.7% of those who had ever used alcohol.

After adjustment for socio-demographic characteristics, substance use increased the odds of both suicidal behaviors among students about four fold. However, after adjustment for other individual and family variables, particularly depressive symptoms, the risk associated with substance use, though still present, was substantially reduced. Alcohol use seemed to have a stronger association with both suicidal behaviors than cigarette or illicit drug use in both genders, and its association with suicidal behavior seemed to be stronger for females. Among females, those who had ever used alcohol had a 64% higher odds of suicide attempts than those who had never used alcohol; males had 55% higher odds of attempts. In addition, alcohol use seemed to have a stronger association with suicidal behaviors in both genders than did the presence of antisocial behaviors.

Risk of suicidal ideation associated with cigarette use was similar for males and females. However, risk of suicide attempts was higher among females. Among females, those who reported cigarette use had a 63% higher odds of attempts; there was a 27% higher odds among males. Females who reported illicit drug use had a 32% higher odds of suicide attempts than those who had never tried them. Males had 40% higher risk of attempts, but illicit drug use was not associated with suicidal ideation after adjusting for socio-demographic, family, and other individual variables. Cigarette and illicit drug use had a weaker association with suicidal behaviors in both genders than the presence of antisocial behaviors. Notably, neither perceived risks of drug use nor favorable attitudes towards substance use were significantly associated to either suicidal behavior after adjusting for other covariates in the multiple logistic regression models.

Other Individual Characteristics

Students who reported antisocial behaviors (suspended from school, arrested, carried a gun, intentionally attacked somebody) also had a high prevalence of both suicidal behaviors, particularly if they reported two or more antisocial behaviors. Prevalence of suicide attempts among those with two or more antisocial behaviors was 30.8%. Prevalence of both suicidal ideation and attempts increased with the reported frequency of sensation seeking behaviors with 32.8% of those frequently doing risky behaviors reporting suicide attempts. Also, students with previous sexual activity had a higher prevalence of attempts (23.0%) than those who had never had sex.

Prevalence of attempts was higher among students with fair or poor self-perceived health (25.5%) as compared with students with good or excellent health. Prevalence of both suicidal behaviors was also higher among those students who reported not being very religious.

Antisocial behavior, sensation seeking behaviors, and sexual activity increased the odds of both suicidal ideation and suicide attempts more than two fold for both genders, after adjusting for socio-demographic characteristics. After controlling for other individual and family variables, particularly depressive symptoms, the risk associated with these

variables was substantially reduced. The association between suicidal behavior and sensation seeking behaviors was stronger among males than females and remained high, even after adjustment. Males who reported frequently performing risky actions had 2.42 times greater odds of reporting suicide attempts than those who did not do any risky actions. The association between suicidal behavior and antisocial behavior seemed to be stronger among females. Females who reported two to four antisocial behaviors had a 76% higher odds of suicide attempts than those with no antisocial behaviors; males had a 63% higher odds of attempts.

The association between suicidal behavior and sexual activity was also stronger among females. Females who had ever had sexual activity had a 52% higher odds of attempts. Sexual activity was not significantly associated with suicidal ideation among males, but those who had had sex had a 32% higher odds of suicide attempts.

Students with fair or poor self-perceived health were at a higher risk of both suicidal behaviors. Males who reported fair or poor health had a 99% higher odds of suicide attempts than those with good or excellent health; females had 53% higher odds of attempts. Religiosity (going to religious services and importance of religion in life) was only weakly protective against suicidal behaviors and only among males.

Family Conflict

Family conflict was the family characteristic most strongly associated with both suicidal behaviors (see Tables 4.5 and 4.6). Approximately 32.7% of the students who reported a considerable amount of conflict also reporting suicide attempts.

Adolescents who reported any family conflict had 3.06 (95% CI=2.86-3.27) times higher odds of reporting having attempted suicide at least once, after adjusting for socio-demographic characteristics. The odds of suicidal behavior among students increased with the level of family conflict reported. Reporting a lot of family conflict was associated with a 5-6 fold increase in odds of suicidal behavior compared to those who reported no conflict, but after adjusting for other individual and family variables the risk

associated with conflict, though still present, was considerably reduced. The association between family conflict and suicidal behavior was stronger among males. Males who reported a lot of conflict had a two-fold increase in the odds of suicide attempts compared with students reporting no family conflict. Females who reported a lot of family conflict had 1.72 times higher odds of attempts.

Family Members Substance Use

Substance use among parents or siblings is strongly associated with substance use among students: 67.6% of the students who reported cigarette use, 60.4% of those who have consumed alcohol, and 70.3% of those who reported illicit drug use also reported that at least one family member used substances. Students who reported the use of two or more substances by their parents or siblings had a higher prevalence of suicidal ideation (26.5%) and suicide attempts (22.1%) than those who reported no substance use by family members (10.3% and 8.4%, respectively). Also, prevalence of both suicidal behaviors was highest among those who reported that their parents considered all or almost all substances to be not bad at all (attempts=20.6%).

After controlling for socio-demographic characteristics, substance use by family members was associated with a 1.8-2.6 fold increase in the odds of both suicidal behaviors among adolescents compared to those who reported no family substance use; students with parents who considered all or almost all substances not bad at all had a two fold increase in the odds of both behaviors compared to those with parents who considered that all substances were very bad. After adjusting for other individual and family variables, parents' and siblings' substance use was significantly associated with suicidal ideation among females and males, but only associated with suicide attempts among females.

Pro-Social Involvement

Students who had no opportunity for pro-social involvement with parents (being allowed to give opinions in family decisions, able to go to parents for help, and invited by parents to do things that he/she likes) had higher prevalence of suicide attempts (24.0%).

Similarly, students who did not receive rewards for their pro-social involvement (positive feedback from parents, spending time with them) reported a higher prevalence of attempts (29.5%). Having opportunities for pro-social involvement was associated with lower risk of suicidal ideation and attempts in both genders, although more strongly so for males. Receiving rewards for pro-social involvement was also associated with a lower risk of attempts in both genders, but with lower risk of ideation only among females.

Other Family Characteristics

Students who reported that their parents considered all or almost all antisocial behaviors to be not bad at all had a higher prevalence of suicide attempts (20.3%). Prevalence of attempts (20.4%) was also higher among students who reported poor family oversight (parental management of household rules and awareness of student's behavior). Approximately 24.0% of students who reported not being attached at all to their parents also reported suicide attempts.

After adjusting for socio-demographic characteristics, parental attitudes favorable towards antisocial behavior was associated with a 2-3 fold increase in odds of both suicidal behaviors compared to those students who reported that parents considered all antisocial behaviors to be very bad. Family oversight was associated with a 3-4 fold increase in odds. However, after adjusting for other individual and family variables, parental attitudes favorable towards antisocial behavior was not associated with suicidal behavior, and family oversight was only weakly associated to suicide attempts among males. Parental attachment (closeness and communication with parents) was associated with both suicidal behaviors only for males.

Interaction between Depression and Family Conflict among Adolescent Females

In the final multivariable logistic regression model for females, the interaction term between the presence of depression symptoms and family conflict was significant, after adjusting for socio-demographic, family, and individual characteristics and behaviors. Table 4.7 presents the adjusted odds ratios for both suicidal behaviors for different levels

of depression and family conflict. The odds of suicidal ideation and attempts among female students significantly increased with the number of depressive symptoms reported and with level of family conflict after controlling for socio-demographic, family, and individual characteristics. The odds of suicide attempts among students with four depressive symptoms is approximately 20% higher when family conflict is also present (OR=16.30 vs. 13.13).

Overall model significance of all final regression models was excellent ($p<0.0001$ for each). The variables in the final models significantly predicted the risk for suicidal ideation among females (LR=35281.59, df=40) and among males (LR=17804.07, df=29). They also significantly predicted the risk for suicide attempts among girls (LR=28847.81, df=40) and boys (LR=15649.97, df=35). Final regression models for females compared favorably to a null model (Max-rescaled R-Square for ideation= 0.75; for attempts=0.66) as did the final models among males (Max-rescaled R-Square for ideation= 0.53; for attempts=0.46).

DISCUSSION

This is the first study in Puerto Rico to examine factors associated with suicidal behavior in an island-wide representative sample of adolescent students. The individual characteristic most strongly associated with reporting suicidal ideation and suicide attempts among these adolescent students was the presence of depressive symptoms, particularly for females. Sensation seeking behaviors were also important predictors of reporting suicidal behaviors, particularly among males. The family characteristic most strongly associated with suicidal behavior was family conflict. Results of this study have profound implications for current and future suicide prevention programs in the island, pointing to the need for increased focus in addressing depression in adolescents particularly in the context of family conflict.

The most compelling finding in this study regarded the importance of depression, a disabling psychiatric disorder identifiable in all age groups. Depression was strongly

associated with reporting both suicidal ideation and suicide attempts, particularly among females, even after controlling for socio-demographic, family, and other individual characteristics. This result is consistent with previous findings.[3, 13, 20, 22, 24, 26, 31] Most studies also report that suicide attempts among adolescents are more common in females.[3, 7-9, 16, 19, 24, 27, 31, 39] Gender differences in depression prevalence and in the risk of suicidal behavior among persons reporting depression may help explain the gender differences found in suicidal behavior. These gender differences also suggest that there might be a biological explanation, such as hormonal differences between sexes, which might make girls more susceptible to mood disorders and their effects. Alternatively, the higher susceptibility might be due to a complex relationship between biological and social characteristics, including coping styles which might differ by gender. However, more research is needed in these areas.

Depression in adolescents is characterized by a severe or persistent state of sadness or irritability that interferes with functioning or causes considerable distress, and diagnosis is based on identifying these signs and symptoms. Several short questionnaires are available for screening, but are not routinely used among adolescents. These questionnaires could be used more frequently by primary health care providers for the routine screening of depression, since most people with depression are seen by non-psychiatrist physicians.[31] Routine screening for depression might result in improved recognition and early treatment of the condition, which might reduce the number of suicidal teens. Screening questionnaires might even be used in schools by teachers and school nurses to identify students at high risk for suicidal behavior since the questions used to assess depression may not be considered as intrusive by students, as questions about substance use and antisocial behaviors. Mental health promotion programs could be incorporated into the schools' curriculums as a prevention activity. However, incorporating school-based prevention programs as part of a curriculum might be difficult to achieve until their feasibility and sustainability are evaluated.

Household family conflict was another strong predictor of suicidal behavior. Having arguments in the house, insults, and yelling between family members is stressful to

adolescents, and there is some evidence that suicidal behavior is associated with stressful life events among children and adolescents.[3, 9, 17, 19, 26-27] It has been suggested that it may not be the amount of stress experienced by the adolescent that predicts suicide intent, but rather the manner in which stress is handled (coping ability) which makes the difference.[13] This suggests two strategies for prevention efforts: working directly with adolescents to improve their coping skills, and developing strategies to identify families at risk and working directly with them.

Among females, depression in the presence of family conflict appears to create a particularly risky context. In fact, further analysis suggested that female students who reported family conflict had three times higher odds of reporting depressive symptoms than those who did not report family conflict. This finding emphasizes the value of a non-confrontational home environment (one with no arguments, insults or yelling between family members) for the emotional well being of adolescent females. This interaction between depression and family conflict was not observed among males, even though males with family conflict were also more likely to report depression. As previously mentioned, females and males might have different coping abilities which might make females more susceptible to depression, and thus to suicidal behavior. These differences might explain why family conflict and depression interact in females but not in males. These findings underscore the joint importance of considering both individual and family characteristics when studying suicidality.

Substance use and abuse has been associated with suicidal behavior among adolescents in other studies.[7, 9, 17-18, 21, 24, 26, 31] This study also identified cigarette, alcohol and illicit drug use as predictors of suicidal behavior. However, after adjusting for individual and family characteristics, the increase in risk associated with substance use was modest. It has been hypothesized that substance abuse can lead to disruption of social relationships, which in turn can produce social isolation and hopelessness, a risk factor for suicidal behavior.[18, 26] Prevalence of substance use has increased among adolescents, and among students in Puerto Rico, which might be cause for concern.[36, 40-41] Substance use has also been associated with depression. However, further work on the causal relationship between

depression, adoption of substance use, and suicidal behavior is needed. Existing prevention efforts directed at substance use could be modified to target depressive adolescents, which might make these efforts more acceptable to this age population.

Other predictors for suicidal behavior consisted primarily of behaviors, including antisocial and sensation seeking behaviors, although the risk associated with these behaviors was only moderate. Attitudes and perceived risks were not independent predictors of risk. This finding suggests that prevention efforts may most appropriately be targeted at behaviors, an advantage since behaviors are easier to notice than attitudes and may facilitate our identification of those adolescents at risk for suicide.

This study revealed that suicidal ideation was strongly correlated with suicide attempts, and that the patterns of risk for attempts were similar to the patterns for ideation. For policymaking, the same proposed prevention measures and programs could potentially impact both suicidal behaviors. We estimate that over half (n=134,402) of the 247,334 students between 7th and 12th grade in Puerto Rico have at least one depressive symptom. Immediate measures to deal with possibly depressive, and potentially suicidal, teens need to be implemented. In addition, future research should evaluate the risk of suicidal behavior due to other risk factors, such as peer, school, and community characteristics, taking into account the individual and family characteristics found to be predictors in this study.

This study is a secondary analysis of a survey designed to monitor the prevalence of substance use among students. Strengths of this study include that it is a representative sample of all students between 7th and 12th grade in public schools in Puerto Rico, and that the participation rate was high (75.8%). Public school students represent 93.2% of all students in the island. Few studies on this topic have been performed on representative samples. However, a limitation of this study is its cross-sectional design. Temporal sequence cannot be established, and findings may be subject to recall bias. Recall bias could result in an over- or under-estimation of the prevalence of suicidal behavior among students, and of the relationships between different factors and suicidal

behavior. The 16.6% absenteeism may have lead to selection bias, and an under-reporting of the prevalence of suicidal behavior. School absenteeism has been associated with school performance, and performance has been associated with suicidal behavior.[3, 13, 27] So, our current study may have under-estimated the prevalence of suicidal behavior because absentees were not included. Under-reporting is likely more serious among students in high school since their absentee rate was almost twice as high as among middle school students (20.4% vs. 12.7%). In addition, the results will not reflect the experiences of adolescents who have dropped out of school and suicidal behavior is likely to be higher among dropouts than among adolescents still in school. In 2000, it was estimated that 14% of adolescents 16-19 years in old Puerto Rico were high school dropouts.[42] In addition, this study only evaluated students in public schools, which represent 93.2% of all students in the island. Not including private school students, many of whom go to religious schools, introduces another potential selection bias since these students might differ in their risk profile.

Suicidal behavior is an important problem among Puerto Rican adolescents and this study begins to fill the gap in information about high-risk groups in the Puerto Rican population. Individual and family characteristics are important predictors for suicidal ideation and suicide attempts among adolescent students in Puerto Rico. Effective prevention strategies in this age group should target high-risk groups. Suicidal behavior appears to be influenced by a number of family factors which vary among populations. In Puerto Rico, adolescent females appear to be at a higher risk of suicidal ideation and suicide attempts if they have symptoms for depression, have ever used cigarettes, alcohol or illicit drugs, have exhibited antisocial or sensation seeking behaviors, have ever had sexual activity, are in fair or poor health, if family members use substances, if they have family conflicts at home, and if they have no opportunities or rewards for pro-social involvement from parents. Risk factors for suicidal behavior among males were similar to those for females, except that neither illicit drug use nor sexual activity was associated with suicidal ideation among them, and not being very religious was associated with both ideation and attempts.

Some prevention activities could include creating screening programs to identify adolescents at high risk, implementing health promotion campaigns focusing in this public health problem, or even developing and implementing an island-wide prevention plan, among others. Some of these activities could include interventions during the elementary school grades, since interventions with teachers, parents, and children provided throughout elementary grades have been shown to have enduring positive effects on academic development, and in reducing violent and other risk behaviors among urban children.[43] Since family characteristics were important predictors of suicidal behavior, prevention efforts should target the family unit, that is, family members (particularly parents) should be an integral part of the intervention. Parents and other family members could be educated to recognize early warning signs of a potentially suicidal adolescent, including the identification of depressive symptoms.

Results from this study underscore the importance of understanding and targeting depression and family conflict in adolescents. Future research should focus on developing a better understanding of risks and protective factors for depression to better customize prevention and intervention efforts.

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Table 4.1. Weighted Frequency and Percentage of Individual Characteristics and Behaviors by Gender among Public School Adolescent Students, Puerto Rico, Academic Years 2002-03 and 2003-04

Individual Characteristics and Behaviors	*Females N (%)*	*Males N (%)*	*Total N (%)*
Depression Scale			
No symptoms	48,998 (39.1)	58,082 (51.5)	107,080 (45.0)
One symptom	27,079 (21.6)	22,536 (20.0)	49,615 (20.8)
Two symptoms	18,807 (15.0)	13,851 (12.3)	32,658 (13.7)
Three symptoms	15,440 (12.3)	8,962 (7.9)	24,402 (10.2)
Four symptoms	15,053 (12.0)	9,391 (8.3)	24,444 (10.3)
Cigarette Use			
Never	102,064 (80.9)	87,966 (76.8)	190,030 (78.9)
Ever	24,083 (19.1)	26,644 (23.2)	50,727 (21.1)
Alcohol Use			
Never	55,986 (44.4)	49,802 (43.5)	105,788 (43.9)
Ever	70,172 (55.6)	64,808 (56.5)	134,980 (56.1)
Illicit Drug Use			
Never	112,954 (90.8)	97,934 (86.5)	210,888 (88.7)
Ever	11,509 (9.2)	15,277 (13.5)	26,786 (11.3)
Perceived Risks of Drug Use Scale			
All drugs very dangerous	82,470 (67.5)	61,580 (58.5)	144,050 (63.3)
Not all drugs very dangerous	39,743 (32.5)	43,654 (41.5)	83,397 (36.7)
Favorable Attitudes Toward Substance Use Scale			
Not in favor of using substances	96,131 (76.7)	82,776 (73.3)	178,907 (75.1)
In favor of using at least one substance	29,233 (23.3)	30,192 (26.7)	59,425 (24.9)
Antisocial Behaviors Scale			
None	107,042 (85.6)	79,897 (71.2)	186,939 (78.8)
One behavior	14,134 (11.3)	22,024 (19.6)	36,158 (15.2)
Two to four behaviors	3,880 (3.1)	10,300 (9.2)	14,180 (6.0)
Favorable Attitudes Toward Antisocial Behavior Scale			
All behaviors viewed negatively	46,213 (37.0)	43,351 (38.6)	89,564 (37.7)
At least one not viewed negatively	78,823 (63.0)	68,876 (61.4)	147,699 (62.3)
Sensation Seeking Scale			
No risky actions	47,913 (38.1)	44,243 (39.0)	92,156 (38.5)
Risky actions rarely	33,615 (26.7)	22,875 (20.1)	56,490 (23.6)
Risky actions once in a while	19,600 (15.6)	17,784 (15.7)	37,384 (15.6)
Risky actions sometimes	12,269 (9.8)	13,944 (12.3)	26,213 (11.0)
Risky actions often	6,694 (5.3)	7,543 (6.6)	14,237 (6.0)
Risky actions frequently	5,614 (4.5)	7,140 (6.3)	12,754 (5.3)
Health			
Excellent	60,448 (48.2)	63,167 (55.4)	123,615 (51.6)
Good	47,944 (38.2)	39,318 (34.5)	87,262 (36.4)
Fair/Poor	17,090 (13.6)	11,451 (10.1)	28,541 (11.9)
Sexual Activity			
Ever	24,714 (19.7)	35,052 (31.1)	59,766 (25.1)
Never	100,638 (80.3)	77,519 (68.9)	178,157 (74.9)
Religiosity Scale			
Not very religious	22,377 (17.9)	27,127 (24.3)	49,504 (20.9)
Somewhat religious	53,746 (43.1)	46,411 (41.6)	100,157 (42.4)
Very religious	48,697 (39.0)	38,086 (34.1)	86,783 (36.7)

Table 4.2. Weighted Frequency and Percentage of Family Characteristics by Gender among Public School Adolescent Students, Puerto Rico, Academic Years 2002-03 and 2003-04

Family Characteristics	*Females* *N (%)*	*Males* *N (%)*	*Total* *N (%)*
Family Members Substance Use Scale			
None	61,851 (49.0)	63,312 (55.3)	125,163 (52.0)
One substance	39,462 (31.3)	33,689 (29.4)	73,151 (30.4)
Two to nine substances	24,857 (19.7)	17,538 (15.3)	42,395 (17.6)
Family Oversight Scale			
Excellent	70,674 (56.3)	53,493 (47.3)	124,167 (52.0)
Good	26,218 (20.9)	22,700 (20.1)	48,918 (20.5)
Fair	19,878 (15.8)	20,455 (18.1)	40,333 (16.9)
Poor	8,809 (7.0)	16,561 (14.6)	25,370 (10.6)
Family Conflict Scale			
None	64,680 (51.5)	67,831 (59.9)	132,511 (55.5)
Almost none	26,971 (21.5)	23,972 (21.2)	50,943 (21.3)
Moderate	16,910 (13.5)	12,861 (11.4)	29,771 (12.5)
Considerable	17,016 (13.6)	8,547 (7.5)	25,563 (10.7)
Parental Attitudes Favorable Toward Substance Use Scale			
All substances very bad	88,537 (70.5)	78,669 (69.5)	167,206 (70.1)
Almost all very bad	14,447 (11.5)	11,751 (10.4)	26,198 (11.0)
Some very bad	11,829 (9.4)	10,422 (9.2)	22,251 (9.3)
All or almost all not bad at all	10,698 (8.5)	12,313 (10.9)	23,011 (9.6)
Parental Attitudes Favorable to Antisocial Behavior Scale			
All behaviors very bad	88,716 (70.8)	77,231 (68.4)	165,947 (69.6)
Some very bad	24,452 (19.5)	20,878 (18.5)	45,330 (19.0)
All or almost all not bad at all	12,168 (9.7)	14,844 (13.1)	27,012 (11.3)
Level of Parental Attachment Scale			
Not attached at all	10,465 (8.3)	10,495 (9.3)	20,960 (8.8)
1	17,164 (13.7)	13,502 (11.9)	30,666 (12.9)
2	43,211 (34.4)	30,619 (27.1)	73,830 (31.0)
3	23,003 (18.3)	15,482 (13.7)	38,485 (16.1)
Very attached	31,594 (25.2)	42,962 (38.0)	74,556 (31.3)
Opportunities for Pro-Social Involvement Scale			
No opportunities with parents	7,815 (6.2)	8,589 (7.6)	16,404 (6.9)
Almost no opportunities	15,517 (12.4)	12,505 (11.1)	28,022 (11.7)
Some opportunities	29,688 (23.7)	29,493 (26.1)	59,181 (24.8)
Many opportunities	72,456 (57.7)	62,571 (55.3)	135,027 (56.6)
Rewards for Pro-Social Involvement Scale			
None or almost no rewards from parents	13,840 (11.0)	11,866 (10.4)	25,706 (10.7)
Almost no rewards	14,837 (11.8)	12,828 (11.3)	27,665 (11.5)
Some rewards	30,777 (24.4)	25,299 (22.2)	56,076 (23.4)
Many rewards	66,494 (52.8)	63,979 (56.1)	130,473 (54.4)

Table 4.3. Prevalence Estimates of Suicide Attempts among Public School Adolescent Students and Odds Ratios by Individual Characteristics and Behaviors, Puerto Rico, Academic Years 2002-03 and 2003-04

Individual Characteristics and Behaviors	*Weighted Frequency*	*Weighted Prevalence (95% CI)*	*Crude Odds Ratio (95% CI)*	**Model 1: SDS** *Adjusted Odds Ratio (95% CI)**	**Model 2: SDS+IND+FAM (Females only)** *Adjusted Odds Ratio (95% CI)†*	**Model 2: SDS+IND+FAM (Males only)** *Adjusted Odds Ratio (95% CI)†*
Depression Scale						
No symptoms	3,625	3.4 (3.1-3.7)	Reference	Reference	Reference	Reference
One symptom	4,797	9.6 (8.9-10.3)	2.98 (2.66-3.34)	2.82 (2.51-3.18)	2.33 (1.93-2.80)	1.85 (1.52-2.25)
Two symptoms	5,876	17.8 (16.7-18.8)	6.07 (5.46-6.76)	5.46 (4.88-6.11)	3.93 (3.29-4.70)	2.72 (2.23-3.33)
Three symptoms	6,465	26.3 (24.8-27.8)	10.02 (8.87-11.31)	8.79 (7.73-10.00)	5.78 (4.73-7.07)	3.58 (2.86-4.48)
Four symptoms	10,054	40.6 (38.9-42.3)	19.18 (16.97-21.68)	17.99 (15.84-20.43)	9.04 (7.37-11.09)	7.08 (5.86-8.57)
Cigarette Use						
Never	16,972	8.9 (8.6-9.2)	Reference	Reference	Reference	Reference
Ever	14,011	27.6 (26.6-28.5)	3.89 (3.66-4.14)	3.91 (3.68-4.17)	1.63 (1.46-1.81)	1.27 (1.04-1.54)
Alcohol Use						
Never	5,737	5.4 (5.0-5.8)	Reference	Reference	Reference	Reference
Ever	25,251	18.7 (18.1-19.3)	4.01 (3.69-4.36)	3.89 (3.57-4.23)	1.64 (1.44-1.87)	1.55 (1.28-1.86)
Illicit Drug Use						
Never	22,418	10.6 (10.2-10.9)	Reference	Reference	Reference	Reference
Ever	8,196	31.0 (29.5-32.5)	3.79 (3.50-4.11)	3.93 (3.58-4.30)	1.32 (1.10-1.58)	1.40 (1.16-1.70)
Perceived Risks of Drug Use Scale						
All drugs very dangerous	16,507	11.4 (11.0-11.9)	Reference	Reference	N.A.	N.A.
Not all drugs very dangerous	13,013	15.5 (14.9-16.2)	1.43 (1.33-1.53)	1.55 (1.44-1.66)		
Favorable Attitudes Toward Substance Use Scale						
Not in favor of using substances	18,646	10.4 (10.0-10.8)	Reference	Reference	N.A.	N.A.
In favor of using at least one substance	12,066	20.3 (19.5-21.1)	2.19 (2.06-2.34)	2.08 (1.95-2.23)		
Antisocial Behaviors Scale						
None	19,298	10.3 (9.9-10.6)	Reference	Reference	Reference	Reference
One behavior	7,070	19.5 (18.2-20.7)	2.11 (1.93-2.31)	2.52 (2.32-2.75)	1.32 (1.17-1.48)	1.27 (1.06-1.52)
Two to four behaviors	4,315	30.8 (29.0-32.5)	3.88 (3.54-4.26)	5.39 (4.87-5.97)	1.76 (1.37-2.27)	1.63 (1.38-1.94)

* Adjusted by socio-demographic (SDS) characteristics (gender, grade, country of birth, mother's educational level, and living with both parents).

† Adjusted by all socio-demographic characteristics and the individual (IND) and family (FAM) variables left in model after backward selection.

N.A. = Not applicable; variables not retained in adjusted model.

Table 4.3. Prevalence Estimates of Suicide Attempts among Public School Adolescent Students and Odds Ratios by Individual Characteristics and Behaviors, Puerto Rico, Academic Years 2002-03 and 2003-04 (*Cont.*)

Individual Characteristics and Behaviors	*Weighted Frequency*	*Weighted Prevalence (95% CI)*	*Crude Odds Ratio (95% CI)*	**Model 1: SDS** *Adjusted Odds Ratio (95% CI)**	**Model 2: SDS+IND+FAM (Females only)** *Adjusted Odds Ratio (95% CI)†*	**Model 2: SDS+IND+FAM (Males only)** *Adjusted Odds Ratio (95% CI)†*
Favorable Attitudes Toward Antisocial Behavior Scale						
All behaviors viewed negatively	7,776	8.7 (8.1-9.2)	Reference	Reference	N.A.	N.A.
At least one not viewed negatively	22,907	15.4 (15.0-15.9)	1.93 (1.79-2.08)	1.79 (1.65-1.95)		
Sensation Seeking Scale						
No risky actions	5,235	5.6 (5.2-6.1)	Reference	Reference	Reference	Reference
Risky actions rarely	5,998	10.5 (9.9-11.1)	1.97 (1.77-2.19)	1.70 (1.52-1.92)	1.05 (0.90-1.22)	1.14 (0.90-1.44)
Risky actions once in a while	6,297	16.8 (15.5-18.0)	3.37 (3.01-3.78)	3.23 (2.86-3.65)	1.33 (1.12-1.58)	1.47 (1.16-1.87)
Risky actions sometimes	5,461	20.8 (19.3-22.2)	4.39 (3.84-5.02)	4.46 (3.85-5.17)	1.57 (1.28-1.92)	1.62 (1.29-2.03)
Risky actions often	3,698	25.7 (23.7-27.8)	5.80 (5.06-6.66)	6.06 (5.21-7.05)	1.57 (1.28-1.91)	1.67 (1.29-2.17)
Risky actions frequently	4,218	32.8 (30.8-34.8)	8.18 (7.20-9.30)	8.92 (7.64-10.41)	1.63 (1.22-2.16)	2.42 (1.88-3.11)
Health						
Excellent	10,985	8.9 (8.5-9.3)	Reference	Reference	Reference	Reference
Good	12,473	14.3 (13.6-14.9)	1.70 (1.58-1.84)	1.58 (1.47-1.71)	1.12 (1.01-1.23)	1.40 (1.22-1.60)
Fair/Poor	7,311	25.5 (24.2-26.7)	3.50 (3.24-3.79)	3.23 (2.95-3.53)	1.53 (1.37-1.71)	1.99 (1.68-2.37)
Sexual Activity						
Ever	13,855	23.0 (22.1-24.0)	2.87 (2.69-3.05)	3.18 (2.97-3.40)	1.52 (1.36-1.70)	1.32 (1.12-1.54)
Never	16,913	9.5 (9.1-9.8)	Reference	Reference	Reference	Reference
Religiosity Scale						
Not very religious	8,564	17.2 (16.3-18.0)	1.76 (1.61-1.92)	1.86 (1.71-2.03)	N.A.	0.82 (0.68-0.99)
Somewhat religious	12,772	12.7 (12.1-13.3)	1.23 (1.14-1.34)	1.21 (1.11-1.31)		0.72 (0.62-0.84)
Very religious	9,201	10.5 (10.0-11.1)	Reference	Reference		Reference

* Adjusted by socio-demographic (SDS) characteristics (gender, grade, country of birth, mother's educational level, and living with both parents).
† Adjusted by all socio-demographic characteristics and the individual (IND) and family (FAM) variables left in model after backward selection.
N.A. = Not applicable; variables not retained in adjusted model.

Table 4.4. Prevalence Estimates of Suicidal Ideation among Public School Adolescent Students and Odds Ratios by Individual Characteristics and Behaviors, Puerto Rico, Academic Years 2002-03 and 2003-04

Individual Characteristics and Behaviors	*Weighted Frequency*	*Weighted Prevalence (95% CI)*	*Crude Odds Ratio (95% CI)*	**Model 1: SDS** *Adjusted Odds Ratio (95% CI)**	**Model 2: SDS+IND+FAM (Females only)** *Adjusted Odds Ratio (95% CI)†*	**Model 2: SDS+IND+FAM (Males only)** *Adjusted Odds Ratio (95% CI)†*
Depression Scale						
No symptoms	4,444	4.1 (3.8-4.4)	Reference	Reference	Reference	Reference
One symptom	5,838	11.7 (10.9-12.5)	3.08 (2.77-3.43)	2.89 (2.57-3.25)	2.26 (1.92-2.65)	1.93 (1.59-2.34)
Two symptoms	7,346	22.2 (21.0-23.4)	6.67 (6.00-7.42)	6.12 (5.44-6.87)	4.27 (3.60-5.07)	3.09 (2.59-3.68)
Three symptoms	8,087	32.9 (31.4-34.5)	11.44 (10.20-12.84)	10.34 (9.11-11.72)	6.33 (5.28-7.59)	4.70 (3.80-5.82)
Four symptoms	12,039	48.8 (47.0-50.6)	22.22 (19.80-24.94)	22.06 (19.43-25.06)	10.90 (9.07-13.10)	8.89 (7.30-10.83)
Cigarette Use						
Never	21,443	11.3 (10.9-11.7)	Reference	Reference	Reference	Reference
Ever	16,384	32.3 (31.3-33.3)	3.76 (3.56-3.97)	3.62 (3.42-3.84)	1.46 (1.30-1.63)	1.44 (1.22-1.70)
Alcohol Use						
Never	6,909	6.5 (6.1-6.9)	Reference	Reference	Reference	Reference
Ever	30,925	22.9 (22.3-23.5)	4.25 (3.97-4.56)	3.89 (3.61-4.18)	1.71 (1.54-1.90)	1.53 (1.31-1.78)
Illicit Drug Use						
Never	28,259	13.4 (12.9-13.8)	Reference	Reference	Reference	N.A.
Ever	9,175	34.7 (33.3-36.2)	3.46 (3.20-3.73)	3.52 (3.24-3.84)	1.26 (1.06-1.50)	
Perceived Risks of Drug Use Scale						
All drugs very dangerous	20,597	14.3 (13.7-14.8)	Reference	Reference	N.A.	N.A.
Not all drugs very dangerous	15,757	18.9 (18.1-19.6)	1.40 (1.31-1.50)	1.52 (1.41-1.63)		
Favorable Attitudes Toward Substance Use Scale						
Not in favor of using substances	22,475	12.5 (12.1-12.9)	Reference	Reference	N.A.	N.A.
In favor of using at least one substance	15,025	25.3 (24.3-26.3)	2.36 (2.22-2.51)	2.17 (2.04-2.31)		
Antisocial Behaviors Scale						
None	24,231	12.9 (12.5-13.3)	Reference	Reference	Reference	Reference
One behavior	8,569	23.6 (22.2-25.0)	2.08 (1.91-2.27)	2.47 (2.28-2.68)	1.28 (1.13-1.44)	1.22 (1.05-1.42)
Two to four behaviors	4,701	33.6 (31.7-35.4)	3.41 (3.09-3.76)	4.65 (4.19-5.16)	1.62 (1.24-2.11)	1.48 (1.26-1.74)

* Adjusted by socio-demographic (SDS) characteristics (gender, grade, country of birth, mother's educational level, and living with both parents).

† Adjusted by all socio-demographic characteristics and the individual (IND) and family (FAM) variables left in model after backward selection.

N.A. = Not applicable; variables not retained in adjusted model.

Table 4.4. Prevalence Estimates of Suicidal Ideation among Public School Adolescent Students and Odds Ratios by Individual Characteristics and Behaviors, Puerto Rico, Academic Years 2002-03 and 2003-04 (*Cont.*)

Individual Characteristics and Behaviors	*Weighted Frequency*	*Weighted Prevalence (95% CI)*	*Crude Odds Ratio (95% CI)*	**Model 1: SDS** *Adjusted Odds Ratio (95% CI)**	**Model 2: SDS+IND+FAM (Females only)** *Adjusted Odds Ratio (95% CI)†*	**Model 2: SDS+IND+FAM (Males only)** *Adjusted Odds Ratio (95% CI)†*
Favorable Attitudes Toward Antisocial Behavior Scale						
All behaviors viewed negatively	8,945	10.0 (9.4-10.5)	Reference	Reference	N.A.	N.A.
At least one not viewed negatively	28,571	19.3 (18.8-19.8)	2.16 (2.02-2.31)	1.99 (1.85-2.13)		
Sensation Seeking Scale						
No risky actions	5,575	6.0 (5.6-6.5)	Reference	Reference	Reference	Reference
Risky actions rarely	7,469	13.1 (12.4-13.9)	2.36 (2.13-2.61)	2.00 (1.80-2.22)	1.24 (1.09-1.42)	1.32 (1.06-1.64)
Risky actions once in a while	8,017	21.3 (20.0-22.7)	4.25 (3.83-4.71)	3.95 (3.53-4.42)	1.68 (1.45-1.96)	1.97 (1.59-2.45)
Risky actions sometimes	7,016	26.7 (25.2-28.3)	5.71 (5.10-6.40)	5.63 (4.96-6.40)	1.99 (1.65-2.39)	2.32 (1.91-2.82)
Risky actions often	4,798	33.3 (31.3-35.4)	7.83 (6.90-8.89)	8.08 (7.05-9.26)	2.15 (1.76-2.62)	2.80 (2.20-3.56)
Risky actions frequently	4,895	38.3 (36.1-40.6)	9.73 (8.52-11.12)	10.62 (9.11-12.38)	2.36 (1.82-3.07)	3.15 (2.46-4.02)
Health						
Excellent	14,004	11.4 (10.9-11.9)	Reference	Reference	Reference	Reference
Good	15,230	17.4 (16.6-18.2)	1.65 (1.53-1.77)	1.53 (1.42-1.66)	1.06 (0.96-1.17)	1.26 (1.08-1.47)
Fair/Poor	8,361	29.2 (27.9-30.6)	3.23 (2.97-3.50)	3.07 (2.80-3.36)	1.48 (1.31-1.67)	1.74 (1.48-2.05)
Sexual Activity						
Ever	16,069	26.8 (25.7-27.9)	2.67 (2.50-2.85)	2.76 (2.57-2.96)	1.39 (1.22-1.58)	N.A.
Never	21,543	12.0 (11.6-12.4)	Reference	Reference	Reference	
Religiosity Scale						
Not very religious	10,061	20.2 (19.2-21.2)	1.66 (1.53-1.79)	1.82 (1.68-1.96)	N.A.	0.88 (0.75-1.05)
Somewhat religious	15,734	15.7 (15.0-16.3)	1.21 (1.12-1.31)	1.20 (1.11-1.30)		0.79 (0.68-0.93)
Very religious	11,577	13.3 (12.7-13.8)	Reference	Reference		Reference

* Adjusted by socio-demographic (SDS) characteristics (gender, grade, country of birth, mother's educational level, and living with both parents).
† Adjusted by all socio-demographic characteristics and the individual (IND) and family (FAM) variables left in model after backward selection.
N.A. = Not applicable; variables not retained in adjusted model.

Table 4.5. Prevalence Estimates of Suicide Attempts among Public School Adolescent Students and Odds Ratios by Family Characteristics, Puerto Rico, Academic Years 2002-03 and 2003-04

Family Characteristics	*Weighted Frequency*	*Weighted Prevalence (95% CI)*	*Crude Odds Ratio (95% CI)*	**Model 1: SDS** *Adjusted Odds Ratio (95% CI)**	**Model 2: SDS+IND+FAM (Females only)** *Adjusted Odds Ratio (95% CI)†*	**Model 2: SDS+IND+FAM (Males only)** *Adjusted Odds Ratio (95% CI)†*
Family Members Substance Use Scale						
None	10,516	8.4 (8.0-8.8)	Reference	Reference	Reference	N.A.
One substance	11,082	15.1 (14.4-15.8)	1.94 (1.81-2.09)	1.79 (1.66-1.93)	1.14 (1.02-1.28)	
Two to nine substances	9,359	22.1 (20.9-23.3)	3.10 (2.81-3.42)	2.61 (2.36-2.89)	0.98 (0.84-1.15)	
Family Oversight Scale						
Excellent	10,418	8.4 (8.0-8.7)	Reference	Reference	N.A.	Reference
Good	7,195	14.6 (13.6-15.6)	1.87 (1.70-2.06)	1.88 (1.70-2.08)		1.29 (1.06-1.56)
Fair	7,989	19.7 (18.6-20.7)	2.68 (2.46-2.92)	2.76 (2.51-3.02)		1.10 (0.91-1.32)
Poor	5,172	20.4 (19.1-21.7)	2.82 (2.55-3.11)	3.51 (3.15-3.91)		1.19 (0.99-1.43)
Family Conflict Scale						
None	9,209	6.9 (6.6-7.3)	Reference	Reference	Reference	Reference
Almost none	6,948	13.5 (12.7-14.4)	2.11 (1.93-2.30)	1.99 (1.83-2.17)	1.22 (1.07-1.38)	1.51 (1.25-1.82)
Moderate	6,220	20.8 (19.4-22.1)	3.53 (3.22-3.88)	3.22 (2.93-3.55)	1.45 (1.26-1.67)	1.59 (1.31-1.93)
Considerable	8,396	32.7 (31.0-34.4)	6.53 (5.95-7.18)	5.37 (4.82-5.97)	1.72 (1.43-2.07)	2.12 (1.74-2.57)
Parental Attitudes Favorable Toward Substance Use Scale						
All substances very bad	17,884	10.6 (10.2-11.0)	Reference	Reference	N.A.	N.A.
Almost all very bad	4,187	15.9 (14.4-17.4)	1.59 (1.41-1.79)	1.39 (1.23-1.58)		
Some very bad	4,022	17.9 (16.7-19.0)	1.83 (1.67-2.01)	1.62 (1.47-1.79)		
All or almost all not bad at all	4,759	20.6 (19.3-22.0)	2.19 (1.99-2.41)	2.11 (1.89-2.36)		
Parental Attitudes Favorable to Antisocial Behavior Scale						
All behaviors very bad	17,756	10.6 (10.2-11.0)	Reference	Reference	N.A.	N.A.
Some very bad	7,562	16.5 (15.5-17.5)	1.67 (1.52-1.82)	1.61 (1.47-1.77)		
All or almost all not bad at all	5,500	20.3 (19.0-21.6)	2.15 (1.97-2.34)	2.22 (2.01-2.46)		

* Adjusted by socio-demographic (SDS) characteristics (gender, grade, country of birth, mother's educational level, and living with both parents).
† Adjusted by all socio-demographic characteristics and the individual (IND) and family (FAM) variables left in model after backward selection.
N.A. = Not applicable; variables not retained in adjusted model.

Table 4.5. Prevalence Estimates of Suicide Attempts among Public School Adolescent Students and Odds Ratios by Family Characteristics, Puerto Rico, Academic Years 2002-03 and 2003-04 (*Cont.*)

Family Characteristics	*Weighted Frequency*	*Weighted Prevalence (95% CI)*	*Crude Odds Ratio (95% CI)*	**Model 1: SDS** *Adjusted Odds Ratio (95% CI)**	**Model 2: SDS+IND+FAM (Females only)** *Adjusted Odds Ratio (95% CI)†*	**Model 2: SDS+IND+FAM (Males only)** *Adjusted Odds Ratio (95% CI)†*
Level of Parental Attachment Scale						
Not attached at all	5,000	24.0 (22.5-25.5)	Reference	Reference	N.A.	Reference
1	6,180	20.0 (18.8-21.3)	0.79 (0.69-0.91)	0.75 (0.66-0.85)		0.87 (0.68-1.10)
2	11,331	15.2 (14.4-16.0)	0.57 (0.52-0.62)	0.54 (0.49-0.59)		1.15 (0.92-1.43)
3	4,100	10.6 (9.8-11.5)	0.38 (0.33-0.43)	0.37 (0.32-0.42)		1.12 (0.86-1.46)
Very attached	4,124	5.5 (5.1-5.9)	0.18 (0.16-0.21)	0.22 (0.19-0.25)		0.84 (0.64-1.11)
Opportunities for Pro-Social Involvement Scale						
No opportunities with parents	4,594	28.2 (26.5-30.0)	Reference	Reference	Reference	Reference
Almost no opportunities	6,540	23.1 (21.8-24.4)	0.76 (0.68-0.86)	0.69 (0.61-0.77)	0.78 (0.64-0.94)	0.85 (0.67-1.07)
Some opportunities	7,900	13.2 (12.5-14.0)	0.39 (0.35-0.43)	0.38 (0.34-0.42)	0.65 (0.55-0.77)	0.70 (0.54-0.90)
Many opportunities	11,673	8.6 (8.2-9.0)	0.24 (0.22-0.27)	0.23 (0.20-0.25)	0.68 (0.56-0.83)	0.59 (0.46-0.75)
Rewards for Pro-Social Involvement Scale						
None or almost no rewards from parents	7,559	29.5 (28.0-31.0)	Reference	Reference	Reference	Reference
Almost no rewards	5,742	20.8 (19.5-22.1)	0.63 (0.57-0.69)	0.63 (0.57-0.69)	0.90 (0.79-1.04)	0.95 (0.70-1.27)
Some rewards	7,894	14.0 (13.2-14.9)	0.39 (0.35-0.43)	0.38 (0.35-0.43)	0.87 (0.76-1.01)	0.81 (0.62-1.05)
Many rewards	9,763	7.4 (7.0-7.8)	0.19 (0.17-0.21)	0.21 (0.19-0.23)	0.75 (0.65-0.87)	0.69 (0.52-0.93)

* Adjusted by socio-demographic (SDS) characteristics (gender, grade, country of birth, mother's educational level, and living with both parents).
† Adjusted by all socio-demographic characteristics and the individual (IND) and family (FAM) variables left in model after backward selection.
N.A. = Not applicable; variables not retained in adjusted model.

Table 4.6. Prevalence Estimates of Suicidal Ideation among Public School Adolescent Students and Odds Ratios by Family Characteristics, Puerto Rico, Academic Years 2002-03 and 2003-04

Family Characteristics	*Weighted Frequency*	*Weighted Prevalence (95% CI)*	*Crude Odds Ratio (95% CI)*	**Model 1: SDS** *Adjusted Odds Ratio (95% CI)**	**Model 2: SDS+IND+FAM (Females only)** *Adjusted Odds Ratio (95% CI)†*	**Model 2: SDS+IND+FAM (Males only)** *Adjusted Odds Ratio (95% CI)†*
Family Members Substance Use Scale						
None	12,882	10.3 (9.8-10.8)	Reference	Reference	Reference	Reference
One substance	13,695	18.7 (17.9-19.4)	2.00 (1.87-2.15)	1.82 (1.69-1.96)	1.14 (1.04-1.26)	1.28 (1.10-1.48)
Two to nine substances	11,219	26.5 (25.2-27.8)	3.15 (2.88-3.44)	2.61 (2.39-2.85)	1.00 (0.87-1.16)	1.20 (1.02-1.42)
Family Oversight Scale						
Excellent	13,120	10.5 (10.1-11.0)	Reference	Reference	N.A.	N.A.
Good	8,759	17.8 (16.8-18.8)	1.84 (1.69-2.00)	1.81 (1.65-1.98)		
Fair	9,890	24.4 (23.3-25.5)	2.74 (2.52-2.97)	2.83 (2.59-3.08)		
Poor	5,873	23.2 (21.8-24.6)	2.57 (2.34-2.82)	3.32 (3.00-3.67)		
Family Conflict Scale						
None	11,260	8.5 (8.1-8.8)	Reference	Reference	Reference	Reference
Almost none	8,387	16.4 (15.4-17.3)	2.11 (1.94-2.30)	1.98 (1.82-2.15)	1.22 (1.09-1.37)	1.35 (1.15-1.59)
Moderate	7,706	25.8 (24.2-27.3)	3.75 (3.42-4.13)	3.40 (3.07-3.76)	1.52 (1.32-1.76)	1.54 (1.29-1.84)
Considerable	10,289	40.3 (38.7-41.9)	7.29 (6.73-7.90)	5.93 (5.44-6.46)	1.88 (1.61-2.20)	2.19 (1.83-2.64)
Parental Attitudes Favorable Toward Substance Use Scale						
All substances very bad	21,747	12.9 (12.5-13.3)	Reference	Reference	N.A.	N.A.
Almost all very bad	5,238	19.9 (18.5-21.3)	1.67 (1.53-1.83)	1.41 (1.28-1.56)		
Some very bad	5,214	23.2 (21.7-24.6)	2.04 (1.85-2.24)	1.76 (1.58-1.95)		
All or almost all not bad at all	5,508	23.9 (22.4-25.4)	2.12 (1.94-2.31)	2.04 (1.85-2.26)		
Parental Attitudes Favorable to Antisocial Behavior Scale						
All behaviors very bad	21,592	12.9 (12.5-13.4)	Reference	Reference	N.A.	N.A.
Some very bad	9,628	21.1 (19.8-22.3)	1.80 (1.65-1.96)	1.73 (1.58-1.90)		
All or almost all not bad at all	6,439	23.8 (22.3-25.3)	2.10 (1.93-2.30)	2.24 (2.02-2.48)		

* Adjusted by socio-demographic (SDS) characteristics (gender, grade, country of birth, mother's educational level, and living with both parents).
† Adjusted by all socio-demographic characteristics and the individual (IND) and family (FAM) variables left in model after backward selection.
N.A. = Not applicable; variables not retained in adjusted model.

Table 4.6. Prevalence Estimates of Suicidal Ideation among Public School Adolescent Students and Odds Ratios by Family Characteristics, Puerto Rico, Academic Years 2002-03 and 2003-04 (*Cont.*)

Family Characteristics	*Weighted Frequency*	*Weighted Prevalence (95% CI)*	*Crude Odds Ratio (95% CI)*	**Model 1: SDS** *Adjusted Odds Ratio (95% CI)**	**Model 2: SDS+IND+FAM (Females only)** *Adjusted Odds Ratio (95% CI)†*	**Model 2: SDS+IND+FAM (Males only)** *Adjusted Odds Ratio (95% CI)†*
Level of Parental Attachment Scale						
Not attached at all	6,276	30.2 (28.6-31.9)	Reference	Reference	N.A.	Reference
1	7,854	25.4 (24.2-26.7)	0.79 (0.71-0.88)	0.73 (0.65-0.82)		0.74 (0.60-0.91)
2	13,749	18.5 (17.6-19.3)	0.52 (0.48-0.57)	0.48 (0.44-0.52)		0.85 (0.68-1.04)
3	4,862	12.6 (11.7-13.5)	0.33 (0.30-0.38)	0.32 (0.28-0.36)		0.74 (0.57-0.95)
Very attached	4,862	6.5 (6.0-7.0)	0.16 (0.14-0.18)	0.19 (0.17-0.21)		0.49 (0.38-0.62)
Opportunities for Pro-Social Involvement Scale						
No opportunities with parents	5,447	33.6 (31.7-35.6)	Reference	Reference	Reference	Reference
Almost no opportunities	7,846	27.8 (26.5-29.1)	0.76 (0.69-0.84)	0.67 (0.60-0.74)	0.75 (0.63-0.88)	0.76 (0.63-0.92)
Some opportunities	9,812	16.4 (15.6-17.3)	0.39 (0.35-0.43)	0.37 (0.34-0.41)	0.67 (0.56-0.80)	0.65 (0.52-0.81)
Many opportunities	14,472	10.7 (10.2-11.1)	0.24 (0.21-0.26)	0.21 (0.19-0.24)	0.66 (0.55-0.80)	0.57 (0.45-0.72)
Rewards for Pro-Social Involvement Scale						
None or almost no rewards from parents	9,082	35.6 (33.8-37.4)	Reference	Reference	Reference	N.A.
Almost no rewards	7,128	25.9 (24.5-27.3)	0.63 (0.58-0.69)	0.62 (0.57-0.68)	0.94 (0.80-1.10)	
Some rewards	9,383	16.7 (15.8-17.5)	0.36 (0.33-0.40)	0.35 (0.32-0.39)	0.76 (0.65-0.88)	
Many rewards	12,207	9.3 (8.9-9.7)	0.19 (0.17-0.20)	0.20 (0.18-0.22)	0.68 (0.59-0.79)	

* Adjusted by socio-demographic (SDS) characteristics (gender, grade, country of birth, mother's educational level, and living with both parents).
† Adjusted by all socio-demographic characteristics and the individual (IND) and family (FAM) variables left in model after backward selection.
N.A. = Not applicable; variables not retained in adjusted model.

Table 4.7. Odds Ratios for Suicide Attempts and Suicidal Ideation among Female Public School Adolescent Students by Depression and Family Conflict, Puerto Rico, Academic Years 2002-03 and 2003-04

Depression	*Family Conflict*	***Suicide Attempts (Females only)*** *Adjusted Odds Ratio (95% CI)**	***Suicidal Ideation (Females only)*** *Adjusted Odds Ratio (95% CI)**
No symptoms	None	Reference	Reference
	Some	2.28 (1.73-2.99)	2.17 (1.72-2.74)
One symptom	None	3.04 (2.30-4.02)	3.05 (2.45-3.79)
	Some	4.22 (3.32-5.37)	3.89 (3.21-4.71)
Two symptoms	None	5.67 (4.36-7.37)	6.01 (4.71-7.68)
	Some	6.85 (5.41-8.66)	7.33 (6.00-8.96)
Three symptoms	None	7.94 (5.99-10.54)	8.20 (6.39-10.54)
	Some	10.48 (7.99-13.76)	11.53 (9.12-14.58)
Four symptoms	None	13.13 (9.81-17.58)	13.25 (10.36-16.95)
	Some	16.30 (12.45-21.33)	20.69 (16.39-26.12)

* Adjusted by all socio-demographic characteristics and the individual (IND) and family (FAM) variables left in model after backward selection

Appendix 1. Individual Risk and Protective Factors Evaluated in the Study

Factors (Answers)	*Question*
Depression Scale (Yes/No) – Cronbach α=0.77	
• Felt Life Not Worth It	Sometimes I feel that life is not worth it.
• Felt Good for Nothing	Sometimes I feel that I'm good for nothing.
• Felt a Failure	I think that I am a failure.
• Felt Depressed Most of the Time	Last year, I felt depressed or sad most of the time even when sometimes I felt good.
Ever Use of Cigarettes	Variable created as a composite of several variables related to ever use of cigarettes
Ever Use of Alcohol	Variable created as a composite of several variables related to ever use of alcohol
Use of Illicit Drugs	Variable created as a composite of several variables related to ever and recent use of inhalants, marijuana, cocaine, heroine, crack, design drugs, other drugs
Perceived Risks of Drug Use Scale (No harm/Slight harm/A lot if harm/Don't know) – Cronbach α=0.95	
• Perceived Harm of Daily Smoking	In your opinion, how much harm or risk is there in smoking one or more packs of cigarettes per day?
• Perceived Harm of Occasional Marijuana Use	In your opinion, how much harm or risk is there in smoking marihuana occasionally?
• Perceived Harm of Regular Pill Use	In your opinion, how much harm or risk is there in using non-prescribed pills to get high regularly?
• Perceived Harm of Occasional Crack Use	In your opinion, how much harm or risk is there in using crack occasionally?
• Perceived Harm of Occasional Cocaine Use	In your opinion, how much harm or risk is there in using cocaine occasionally?
• Perceived Harm of Regular Drinking	In your opinion, how much harm or risk is there in drinking one or two drinks almost daily?
• Perceived Harm of Binge Drinking	In your opinion, how much harm or risk is there in drinking five or more drinks one after the other?
Favorable Attitudes Toward Substance Use Scale (Yes/No) - Cronbach α=0.79	
• Agrees with Peer Cigarette Use	Do you agree with someone your age using cigarettes?
• Agrees with Peer Alcohol Use	Do you agree with someone your age using alcoholic drinks?
• Agrees with Peer Inhalant Use	Do you agree with someone your age using inhalants (glue, thinner, etc.?
• Agrees with Peer Marijuana Use	Do you agree with someone your age using marijuana?
• Agrees with Peer Cocaine Use	Do you agree with someone your age using cocaine?
• Agrees with Peer Heroine Use	Do you agree with someone your age using heroine?
• Agrees with Peer Crack Use	Do you agree with someone your age using crack?
Antisocial Behavior Scale (Never/10 years or younger/11/12/13/14/15/16/17)	
• Age of First Suspension	How old were you when you first got suspended from school?
• Age of First Arrest	How old were you when you first got arrested?
• Age First Carried a Gun	How old were you when you first carried a gun?
• Age of First Attack	How old were you when you first attacked somebody with the intention of seriously harming him/her?

Factors (Answers)	*Question*
Favorable Attitudes Toward Antisocial Behavior Scale (Very bad/Bad/A bit bad/ Not bad at all) - Cronbach α=0.84	
• Opinion on Peers Taking Gun to School	How bad do you think it is for somebody your age to take a gun to school?
• Opinion on Peers Stealing	How bad do you think it is for somebody your age to steal something?
• Opinion on Peers Picking Fights	How bad do you think it is for somebody your age to pick a fight with somebody?
• Opinion on Peers Injuring Intentionally	How bad do you think it is for somebody your age to attack someone with the intention of seriously hurting him/her?
• Opinion on Peers Staying Out of School All Day	How bad do you think it is for somebody your age to stay away from school all day when parents think they are at school?
Sensation Seeking Scale (Never/Few times/Many times)	
• Frequency of Doing What They Wanted	How often have you done something because you wanted to?
• Frequency of Doing Dangerous Dares	How often have you done something dangerous because somebody dared you?
• Frequency of Doing Crazy Things	How often have you done crazy things even if they were a bit dangerous?
Health	How is your health most of the time? (Excellent/Good/Fair/Poor)
Sexual Activity	
• Age of onset	What age were you when you had sexual relations for the first time? (Never had relations/12 years or younger/13/14/15/16/17/18 years or older)
• Number of partners	During your life, with how many persons have you had sexual relations? (Never had relations/1 person/ 2 persons/3-4 persons/5-6 persons/More than 6 persons)
Religiosity Scale - Cronbach α=0.61	
• Church Attendance	How often do you go to religious activities or to religious se (Never/On special occasions/Two or three times a month/Once c times a week)
• Importance of Religion	How important is religion in your life? (Not important/A little important/Quite important/Very important)

Appendix 2. Family Risk and Protective Factors Evaluated in the Study

Factors	*Question*
Family History of Substance Use Scale (Don't have siblings/Never/Several times a year/Several times per month/Only on weekends/Several times per week/Daily) - Cronbach α=0.90	
• Severe Substance Use History	Has anyone in your family ever have a severe alcohol or drug problem? (Yes/No)
• Sibling Cigarette Use	How often do your sibling(s) use cigarettes?
• Sibling Alcohol Use	How often do your sibling(s) use alcoholic beverages?
• Sibling Marijuana Use	How often do your sibling(s) use marijuana?
• Sibling Cocaine Use	How often do your sibling(s) use cocaine?
• Sibling Other Drug Use	How often do your sibling(s) use other drugs?
• Parental Marijuana Use	How often do your parents or guardians use marijuana?
• Parental Cocaine Use	How often do your parents or guardians use cocaine?
• Parental Other Drug Use	How often do your parents or guardians use drug use?
Family Oversight Scale (Yes/No) - Cronbach α=0.81	
• Homework Supervision	Do your parents ask if you have done your homework?
• Supervision of Arrival	Do your parents notice if you don't come home on time?
• Clear Rules	Are the rules in your house clear?
• Parental Notification	Do your parents want you to notify them if you are going to be late?
• Parental Supervision	Does any of your parents know where you are and with whom when you are not home?
• Supervision of Drinking	Would your parents notice if you drank beer, wine or liquor (rum, vodka, whisky, or gin) without their permission?
• Clear Rules about Substance Use	Are there clear rules in your house about alcohol and drug use?
• Handgun Supervision	Would your parents notice if you carried a handgun without their permission?
Family Conflict Scale (Yes/No) - Cronbach α=0.69	
• Strong Family Arguments	Are there strong arguments in your house?
• Frequent Intra-Familiar Arguments	Do your family members insult or yell at each other frequently?
• Repeated Family Arguments	In your house, are arguments always about the same things?
Parental Attitudes Favorable Toward Substance Use Scale (Very bad/Bad/A bit bad/ Not bad at all) - Cronbach α=0.78	
• Parental Attitudes Toward Alcohol Use	To your parents, how bad is it that you regularly drink beer, wine, liquor, rum vodka or gin?
• Parental Attitudes Toward Smoking	To your parents, how bad is it that you smoke cigarettes?
• Parental Attitudes Toward Marijuana Use	To your parents, how bad is it that you smoke marijuana?
Parental Attitudes Favorable To Antisocial Behavior Scale (Very bad/Bad/A bit bad/ Not bad at all) - Cronbach α=0.82	
• Parental Attitudes Toward Stealing	To your parents, how bad is it that you steal something?
• Parental Attitudes Toward Writing on Walls	To your parents, how bad is it that you draw graffiti, write things or draw on buildings or other properties without the owner's permission?
• Parental Attitudes Toward Picking a Fight	To your parents, how bad is it that you pick a fight with someone?

Factors	*Question*
Level of Parental Attachment Scale (Yes/No) - Cronbach α=0.64	
• Closeness with Mother	Are you very close to your mom?
• Sharing with Mother	Do you tell your things to your mom?
• Closeness with Father	Are you very close to your dad?
• Sharing with Father	Do you tell your things to your dad?
Opportunities for Pro-social Involvement Scale (Yes/No) - Cronbach α=0.59	
• Participation in Family Decision-Making	Can you give your opinion regarding family decisions?
• Approachability of Parents for Help with Problems	Could you ask your dad or mom for help is you had a personal problem?
• Parents Invitation to Activities	Do your parents often invite you to do things that you like?
Rewards for Pro-social Involvement Scale - Cronbach α=0.65	
• Parents Notice Child's Behavior	If you are doing things right, do your parents tell you? (Never/ Almost never/Almost always/Always)
• Parental Pride in Child	How often do your parents tell you that they are proud of you for something that you have done? (Never/ Almost never/Almost always/Always)
• Enjoyment of Time with Mother	Do you like spending time with your mom? (Yes/No)
• Enjoyment of Time with Father	Do you like spending time with your dad? (Yes/No)

REFERENCES

1. Bloch DS. Adolescent suicide as a public health threat. *J Child Adolesc Psychiatr Nurs*. 1999;12(1):26-38.

2. Cantor C, Neulinger K. The epidemiology of suicide and attempted suicide among young Australians. *Aust N Z J Psychiatry*. 2000;34(3):370-387.

3. Joffe RT, Offord DR. Epidemiology. In: MacLean G, ed. *Suicide in Children and Adolescents.* Lewiston, NY: Hogrefe & Huber Publishers; 1990:1-14.

4. Yunes J, Zubarew T. Mortalidad por causas violentas en adolescentes y jóvenes: Un desafio para la Región de las Américas [Mortality due to violent causes in adolescents and young people: A challenge for the Americas region]. *Rev. Bras. Epidemiol.* 1999; 2(3):102-171.

5. Puerto Rico Department of Health. *Informe anual de estadísticas vitales 2001 [2001 Annual Vital Statistics Report]*. San Juan, Puerto Rico: ASPESIS, Division of Statistics; 2003.

6. Krug EG, Dahlberg LL, Mercy JA, eds. *World Report on Violence and Health.* Geneva, World Health Organization; 2002.

7. Borowsky IW, Ireland M, Resnick MD. Adolescent suicide attempts: risks and protectors. *Pediatrics*. 2001;107(3):485-493.

8. Kann L, Kinchen SA, Williams BI, et al. Youth risk behavior surveillance - United States, 1999. *MMWR Morb Mortal Wkly Rep*. 2000; 49(SS-5):1-96.

9. King RA, Schwab-Stone M, Flisher AJ, et al. Psychosocial and risk behavior correlates of youth suicide attempts and suicidal ideation. *J Am Acad Child Adolesc Psychiatry.* 2001; 40(7):837-846.

10. National Center for Health Statistics. *Health, United States, 2004 with Chartbook on Trends in the Health of Americans*. Hyattsville, Md; 2004.

11. American Academy of Pediatrics Committee on Adolescence. Suicide and suicide attempts in adolescents. *Pediatrics*. 2000;105(4 pt 1):871-874.

12. Alvira-Robles LL, Diaz-Villafañe W, Torres-Giovannetti J. *Salud mental en adolescentes: percepción de los adolescentes con diagnósticos psiquiátricos que reciben servicios en los hospitales de salud mental públicos y privados en Puerto Rico sobre su funcionamiento familiar, académico y social a agosto de 1995 [Mental Health among Adolescents: Perception of Adolescents with Psychiatric Diagnoses that Receive Services about their Family, Academic and Family Functioning in*

Public and Private Mental Health Hospitals in Puerto Rico, August 1995] [master's thesis]. San Juan, Puerto Rico: University of Puerto Rico; 1995.

13. Barthel CA. *Sociodemographic Variables as Predictors in Adolescent Suicide Attempts in Outpatient Psychiatric Settings* [master's thesis]. Ann Arbor, Mich: The University of Michigan; 1989.

14. Beautrais AL. Risk factors for suicide and attempted suicide among young people. *Aust N Z J Psychiatry*. 2000;34(3):420-436.

15. Beers MH, Berkow R, eds. Section 15-Psychiatric disorders. Chapter 190-Suicidal behavior. In: *The Merck Manual of Diagnosis and Therapy.* 17th ed. Whitehouse Station, NJ: Merck Research Laboratories; 1999:1544-1549.

16. Bensley LS, Van Eenwyk J, Spieker SJ, Schoder J. Self-reported abuse history and adolescent problem behaviors. I. Antisocial and suicidal behaviors. *J Adolesc Health*. 1999;24(3):163-172.

17. Brent DA. Risk factors for adolescent suicide and suicidal behavior: mental and substance abuse disorders, family environmental factors, and life stress. *Suicide Life Threat Behav.* 1995;25(suppl):52-63.

18. Crumley FE. Substance abuse and adolescent suicidal behavior. *JAMA*. 1990;263(22):3051-3056.

19. González-Cancel LJ, Ramos-Lozano AV, Rivera-Vargas J, Torres-González AE. *Suicidio en adolescentes: factores de la dinámica familiar asociados a las ideas e intentos suicidas de los adolescentes participantes del Programa de Servicios de Salud a Adolescentes y del Proyecto de Prevención del Suicidio en Adolescentes, Hospital Regional de Caguas, a mayo de 1998 [Suicide in Adolescents: Family Dynamic Factors Associated with Suicidal Ideation and Suicide Attempts among Adolescents Participating in the Health Services to Adolescents Project and the Adolescent Suicide Prevention Project, Caguas Regional Hospital, May 1998]* [master's thesis]. San Juan, Puerto Rico: University of Puerto Rico; 1998.

20. Hassan-Ríos E. *Estudio epidemiológico sobre sicopatología y su relación con la ideación e intento suicida en niños y adolescentes de 9 a 17 años del área metropolitana de San Juan, Puerto Rico, para el 1990 [Epidemiologic Study about Psychopathology and its Relationship with Suicide Ideation and Attempt in Children and Adolescents 9 to 17 Years Old from the San Juan Metropolitan Area, Puerto Rico, for 1990]* [master's thesis]. San Juan, Puerto Rico: University of Puerto Rico; 1993.

21. Hintikka J, Hintikka U, Koskela K, Kontula O. Common mental disorders, suicidality and use of health care services during late adolescence in Finland. *J Adolesc Health*. 2000;26(1):2-3.

22. Jellinek MS, Snyder JB. Depression and suicide in children and adolescents. *Pediatr Rev*. 1998; 19(8):255-264.

23. MacLean G. Clinical perspectives. In: MacLean G, ed. *Suicide in Children and Adolescents.* Lewiston, NY: Hogrefe & Huber Publishers; 1990:15-39.

24. Makikyro TH, Hakko HH, Timonen MJ, et al. Smoking and suicidality among adolescent psychiatric patients. *J Adolesc Health*. 2004;34(3):250-253.

25. McQuillan CT, Rodríguez J. Suicide, adolescents and Puerto Rico. *Bol Asoc Med P R*. 2000;92(1-3):22-29.

26. Pfeffer CR. Manisfestation of risk factors. In: MacLean G, ed. *Suicide in Children and Adolescents.* Lewiston, NY: Hogrefe & Huber Publishers; 1990:65-88.

27. Sánchez-Lacay JA, Parrilla-Cruz CE, Pagán-Castro AL. Intentos suicidas en adolescentes [Suicide attempts in adolescents]. *Bol Asoc Med P R*. 1985;77(7):273-277.

28. Swahn MH, Lubell KM, Simon TR. Suicide attempts and physical fighting among high school students-United States, 2001. *MMWR Morb Mortal Wkly Rep*. 2004;53(22):474-476.

29. U.S. Department of Health and Human Services. Chapter 18-Mental health and mental disorders. In: *Healthy People 2010, Volume II, Objectives for Improving Health (Part B: Focus Areas 15-28)*. 2nd ed. Washington, DC: U.S. Government Printing Office; 2000: 18.1-18.32.

30. Weiner IB. Suicidal behavior. In: *Psychological Disturbance in Adolescence*. 2nd ed. New York, NY: John Wiley & Sons, Inc.; 1992: 357-384.

31. Woods ER, Lin YG, Middleman A, Beckford P, Chase L, DuRant RH. The associations of suicide attempts in adolescents. *Pediatrics*. 1997; 99(6):791-796.

32. Carris MJ, Sheeber L, Howe S. Family rigidity, adolescent problem-solving deficits, and suicidal ideation: a mediational model. *J Adolesc*. 1998;21(4):459-472.

33. Garber J, Little S, Hilsman R, Weaver KR. Family predictors of suicidal symptoms in young adolescents. *J Adolesc*. 1998;21(4):445-457.

34. Pfeffer CR. Childhood suicidal behavior: a developmental perspective. *Psychiatr Clin North Am*. 1997;20(3):551-562.

35. Ikeda RM, Crosby A, Thomas RG, Annest JL, Berrios-Torres SI. Suicide among Hispanics-United States, 1997-2001. *MMWR Morb Mortal Wkly Rep*. 2004; 53(22):478-481.

36. Moscoso MR, Colón HM, Parrilla I, Reyes-Pulliza JC, Robles RR. *EncuestaJuvenil.Municipal: Uso de substancias entre adolescentes escolares del nivel secundario estimados para cada municipio, sistema público, años escolares 2002-2004 [Municipal.YouthSurvey: Substance Use Estimates among Adolescent Students from the Secondary School Level for each Municipality, Public System, School Years 2002-04]*. Puerto Rico: Oficina de Control de Drogas; 2004.

37. Hawkins JD, Catalano RF, Millar JY. Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: implications for substance abuse prevention. *Psychol Bull.* 1992;112(1):64-105.

38. Arthur MW, Hawkins JD, Pollard JA, Catalano RF, Baglioni AJ Jr. Measuring risk and protective factors for substance use, delinquency, and other adolescent problem behaviors. The Communities That Care Youth Survey. *Eval Rev*. 2002;26(6):575-601.

39. Canetto SS. Meanings of gender and suicidal behavior during adolescence. *Suicide Life Threat Behav*. 1997;27(4):339-351.

40. Moscoso MR, Parrilla I, Robles RR, Colón HM, García M. *El uso de substancias en los escolares adolescentes: Consulta Juvenil IV, 1997-98 [Substance Use among Adolescent Students: Consulta Juvenil IV, 1997-98]*. Puerto Rico: Administración de Servicios de Salud Mental y Contra la Adicción and Universidad Central del Caribe; 1998.

41. Moscoso MR, Colón HM, Parrilla I, Reyes JC. *El uso de substancias en los escolares adolescentes: Consulta Juvenil V, 2000-02 [Substance Use among Adolescent Students: Consulta Juvenil V, 2000-02]*. Bayamón, Puerto Rico: Universidad Central del Caribe; 2003.

42. Mather M. *Children in Puerto Rico: Results from the 2000 Census.* A KIDS COUNT/PRB Report on Census 2000. Baltimore, Md: The Annie E. Casey Foundation and the Population Reference Bureau; 2003.

43. Hawkins JD, Catalano RF, Kosterman R, Abbott R, Hill KG. Preventing adolescent health-risk behaviors by strengthening protection during childhood. *Arch Pediatr Adolesc Med.* 1999;153: 226-234.

CHAPTER V

PEER, SCHOOL AND COMMUNITY CHARACTERISTICS ASSOCIATED WITH SUICIDAL BEHAVIOR AMONG ADOLESCENT STUDENTS IN PUERTO RICO, ACADEMIC YEARS 2002-03 AND 2003-04

ABSTRACT

Background: Suicidal behavior is difficult to predict. Individual and family characteristics have been found to be strongly associated with suicidal ideation and suicide attempts among Puerto Rican adolescents, but the risk due to factors from other social environments has not been adequately evaluated. The objective of this study was to determine the association between suicidal ideation and suicide attempts with characteristics related to adolescents' peer, school, and community environments. ***Methods:*** This study is a secondary analysis of the "Consulta Juvenil VI" survey, a Puerto Rican-wide bi-annual cross-sectional survey among children and adolescents. The sample (n=55,227) was selected using a multi-stage stratified cluster sampling design, and is representative of all 7^{th}-12^{th} grade public school students in Puerto Rico. Multiple logistic regression analyses were performed to assess the strength of the association between each suicidal behavior and peer, school, and community variables, adjusted for socio-demographic, individual, and family characteristics. ***Results:*** The community environment was most strongly associated with suicidal behavior among these students. Level of community disorganization and a perceived availability of handguns were found to be significantly associated with suicidal behavior among both genders. Experiencing transitions and mobility (changing schools and/or studying outside of Puerto Rico) was also an important predictor, particularly among females. Few school factors and no peer characteristics were independently associated with suicidal behaviors. ***Conclusions:*** Characteristics related to the adolescents' community are important predictors for

suicidal ideation and suicide attempts among students. This study provides us with an increased awareness of the importance of community factors in suicidal behavior among Puerto Rican adolescent students.

INTRODUCTION

Suicidal behavior, including both ideation and attempts, has been increasingly identified as an important clinical and public health problem among adolescents.[1-4] Suicide is the 8th leading cause of death in the 10-14 year old age group in Puerto Rico, and the 6th leading cause of death in the 15-19 year old group.[5] It is estimated that between 3-9% of adolescent students in USA attempt suicide every year, and that 16.9% have recent (last year) suicidal ideation.[6-9] In Puerto Rico, we have estimated that 12.8% of adolescent students have attempted suicide at least once in their lives, and 6.0% had ideation in the last year (see Chapter III).

Suicidal behavior is difficult to predict among adolescents, but a variety of risk and protective factors have been identified from different ecological domains, although few studies have explored the influence of variables from more that three domains simultaneously.[6-8, 10-33] Hawkins and Catalano argue that examining factors across multiple ecological domains is needed in order to focus prevention planning to address each community's unique profile. They have evaluated multiple domains in their research on adolescent antisocial behavior (including delinquency, substance abuse, and violence), but this approach has not previously been applied to suicidal behavior.[34-35] Although several studies have considered individual and family characteristics, few have explored the impact of peer, school, and community factors.

As children grow into adolescence, they shift from depending on their parents to developing their own emerging identities, with social acceptance by their peers and social conformity becoming a bridge between the two.[21] This process is accompanied by an undercurrent of sadness (resulting from the separation) which is commonly manifested by tension, but may also precipitate a depressed mood, one of the strongest predictors for

suicidal behavior among adolescents. [3, 11-12, 16, 19, 21, 24, 31] An inability to create or maintain a supportive social network has been found to be a characteristic of people who have committed suicide.[36] Thus, out-of-home and peer relationships have been suggested as factors that might precipitate suicidal behavior.[26] Establishing supportive social interactions might be helpful in preventing suicidal behavior, while interpersonal problems involving teachers, and friends, including boyfriends/girlfriends, particularly among persons with depressive disorders, may be important potentiating factors for suicidal risk.[16, 26] Low instrumental and social competence has also been associated with suicidal behavior among adolescents.[8]

The school is another important social space since adolescents spend more time within school than elsewhere. Poor school performance has been associated with suicidal behavior as has a history of school problems (trouble paying attention and getting homework done) and a higher degree of academic delay.[3, 6, 27, 31] Conversely, academic success as indicated by grade point average among male students and parents' expectations for the student to complete high school and college appear to protect against suicide attempts.[6] Few studies have explored the association between suicidal ideation or attempts and community characteristics. Two studies have suggested that easy household access to guns predicts attempted suicide among adolescent students.[6, 28]

The literature on factors that increase or decrease the risk for suicidal behavior among Hispanics, the fastest growing minority in USA, is particularly scant. This lack of information is of specific concern in the United States since by 2020 Hispanics are projected to be the largest minority population in the USA, representing 17% of the population.[37] Puerto Ricans, which constitute approximately 9% of the USA Hispanic population, have seldomly been studied. It is thus not known whether relationships between suicidal behavior and characteristics of different ecological domains (community, school, and peer) found in previous studies are similar in Hispanic populations.

Prior analyses of the data from the "Consulta Juvenil VI" survey in Puerto Rican adolescents demonstrated a higher risk of suicidal behaviors among females, among those not living with both parents, and among students whose mothers did not finish high school (see Chapter III). It also demonstrated the dominant role of the presence of depressive symptoms and family conflict in defining individual risk. Substance use (cigarettes, alcohol or illicit drugs) of both students and family members, antisocial or sensation seeking behaviors, sexual activity, poor health, opportunities and rewards for pro-social involvement from parents, and being very religious also influenced the risk of suicidal ideation and attempts. This paper expands upon these prior analyses by examining the effect of peer, school, and community factors on the risk for suicidal behavior, after controlling for those socio-demographic, individual, and family characteristics in the "Consulta Juvenil" study.

METHODS

This cross-sectional study is a secondary analysis of data from the "Consulta Juvenil" survey, an island-wide bi-annual cross-sectional survey designed to monitor the prevalence of substance use among students in Puerto Rico. The survey was funded by the *Mental Health and Drug Addiction Administration* (ASSMCA, by its acronym in Spanish) and the *Puerto Rico Office of Drug Control,* and commissioned to the *Universidad Central del Caribe* (UCC) School of Medicine for its design and conduction. Data used in this analysis was collected in the sixth wave of the survey over two academic years: 2002-03 and 2003-04.

Sampling Design

The "Consulta Juvenil VI" survey includes a representative sample of students from public secondary schools (grades 7^{th} to 12^{th}). The sample was selected using a multi-stage stratified cluster sampling design with the primary sampling units being the public schools.[38] Public schools were first stratified based on municipality. Within each of the 78 municipalities, schools were further stratified by school level (middle or high school), creating a total of 156 strata. The next sampling stage involved the selection of sections

(homerooms) within the school. The number of schools per strata and sections per school depended on the number of schools within that stratum. All students within the selected homeroom sections were included in the sample. A total of 348 schools (208 middle and 140 high schools), and 3,184 sections were selected.

Four (4) schools refused to participate (98.9% school participation rate). In the participating schools, 73,245 students were enrolled in the sections selected for the survey. A total of 27,837 middle and 27,667 high school students completed a self-administered pre-coded questionnaire (n=55,504; participation rate=75.8%). A total of 16.6% were absent on the day of the survey, and 7.6% of the students present did not participate (4.6% of the students refused and 3.0% of the parents did not sign the consent form). Following application of the survey, an additional 277 questionnaires were invalidated because they were incomplete or illegible. The final sample was 55,227 students, representing 22.3% of the 247,334 students between 7th and 12th grade in public schools in Puerto Rico.

Data Collection Procedures

The pre-coded self-administered questionnaire used in the survey included questions about suicidal behavior as well as demographic characteristics of the students, their school experiences, patterns and attitudes towards substance use, substance use among parents, siblings and friends, family environment, relationship with parents, religion, violence, sexual history, and participation in prevention programs. Questions regarding risk and protective factors were translated and adapted from the *Student Survey of Risk and Protective Factors and Prevalence of Alcohol, Tobacco & Other Drug Use*, designed by Hawkins, Catalano and colleagues (1992), ensuring semantic equivalence of the questions and cultural adaptation.[34-35] Most of the scales used in this study were adapted from this instrument. The questionnaire was pre-tested in two (2) schools using four sections of students.

A written informed consent letter was sent to the parents, and collected before administering the questionnaire. Students without authorization of their parents or who

did not want to participate in the survey remained in the classroom, but did not complete the questionnaire. Teachers were asked to remain outside the classroom during the survey administration. Completion of the questionnaire took approximately 30 minutes. All research procedures and forms were approved by the *Universidad Central del Caribe* School of Medicine's Institutional Review Board.

Study Variables

Suicidal ideation and suicide attempt were measured, respectively, by the following questions: "*Have you seriously considered attempting suicide?"* and *"How many times have you attempted suicide?"*. Both variables were dichotomized (ever/never).

This paper examined peer, school, and community characteristics. The peer domain was measured using three scales: friends' use of substances (6 items), interaction with antisocial peers (6 items), and rewards for antisocial involvement (5 items). The specific items included in each scale are presented in Appendix 1. Antisocial friends were those that were suspended from school, carried guns, sold illegal drugs, stole or tried to steal a motor vehicle, were arrested, and/or dropped out of school. The school domain was explored using four scales: academic failure (3 items), low commitment to school (6 items), opportunities for pro-social involvement (3 items), and rewards for pro-social involvement (4 items). The specific items included in each scale, following Hawkins and Catalano theoretical model, are presented in Appendix 2.[35] Commitment to school included believing that what they are learning will help them, that assignments were important and valuable, that courses were interesting, that they enjoyed school, and low frequency of skipping or cutting classes.

Characteristics related to the adolescent's community included community disorganization (6-item scale), and laws and norms favorable to substance use (3 items). Adolescents' transitions and mobility and their opportunities for pro-social involvement were measured with 2-item scales. Rewards for pro-social involvement and perceived availability of substances were assessed with 4-item scales. Perceived availability of handguns (very hard, a bit hard, a bit easy, very easy) was also measured. The specific

items included in each of these community domain scales are presented in Appendix 3. Multicollinearity between variables was assessed using the variance inflation factor and condition index diagnostics.

Statistical Analyses

Data was data-entered using the SPSS (*Statistical Package for the Social Sciences*) program for Windows, version 11. The fidelity of data entry was verified by re-entering a 10% randomly selected sample of the questionnaires. Exploratory analysis of the data was performed to identify missing and inconsistent data.

The data was analyzed using SPSS (*Statistical Package for the Social Sciences*) for Windows (version 11.0.1), and SAS (*SAS Institute Inc*.) for Windows (version 9.1.3). In SAS, the SURVEYFREQ procedure, which takes into account the complex sample design, was used to estimate the prevalences and corresponding confidence limits. The SURVEYLOGISTIC procedure was used to estimate the odds ratios and their corresponding 95% confidence intervals. This sample is representative of all students between 7^{th} and 12^{th} grade in public schools in Puerto Rico, and results are weighted to represent approximately 247,334 students. All analyses were performed on weighted data.

Simple logistic regressions were performed to evaluate the presence of an association between each suicidal behavior (ideation and attempt) with each independent variable; their odds ratios and 95% confidence limits were calculated. Multiple logistic regression models were used to assess the effect of variables in each specific domain (peer, school, and community) on suicidal ideation and on suicide attempt, controlling first for socio-demographic, individual, and family characteristics previously identified as associated with suicidal behavior (see Chapter IV), and then for variables within the specific domain (following the ecological model). A stepwise regression approach was used with a backward selection method to build the final multiple regression models. The variables within each domain included in the final multiple regression models were those that were significantly associated ($p<0.05$) in the bivariate analyses.

Socio-demographic characteristics forced into all multiple regression models were: gender (male/female), grade (seventh to twelfth), country of birth (Puerto Rico, other), mother's educational level (less than high school, high school or more), and whether they lived with both parents most of the time (yes/no) (see Chapter 3). Individual variables forced into the models were: depression, ever use of alcohol, cigarette or illicit drugs, antisocial behaviors, sensation seeking behaviors, self-reported health status, and sexual activity (ever/never) (see Chapter 4). Family variables forced were: family history of substance use, family conflict, level of parental attachment, opportunities for pro-social involvement, rewards for pro-social involvement, and, in the suicide attempts models, family oversight (see Chapter 4).

Tests of interaction were performed by entering into the models selected interaction terms between gender, depression, and other risk factors. These interaction terms were defined according to results from previous studies on the subject. Since several interaction terms related to gender were significant (Wald test), the final multiple regression analyses were performed separately for each gender. Overall model significance was assessed using the Likelihood Ratio Test comparing the final model (full model) with the model with only the socio-demographic variables included (reduced model). The predictive power of the model was assessed using the Max-rescaled R-square statistic, also called Nagelkerke R^2, a pseudo R^2 statistic which is a measure of R^2 corrected so that the maximum of value one can be achieved. This R^2, which is based on likelihood statistics, describes how well the independent variables in the model predict the dependent variable by comparing the fitted model with the null model.

RESULTS

Sample Characteristics

Slightly over half of the 55,227 students in the sample (55.4%) were in middle school (7^{th} to 9^{th} grade), female (52.4%), between 13 and 15 years old (55.2%), reported that their mother (56.4%) or father (50.1%) had some post-secondary education, and that they did

not live with both parents (51.6%). Almost all of the students (88.9%) were born in Puerto Rico.

As we have reported previously, approximately 15.7% of the students in the sample reported that they had ever seriously considered attempting suicide (suicidal ideation), and 12.8% of the students reported at least one suicide attempt in their lives. Suicidal ideation and suicide attempts were strongly associated. Almost all (92.8%) the students who attempted suicide had seriously thought about it, and three quarters (75.5%) of the adolescent students who reported seriously thinking about suicide (ideation) also reported having attempted suicide at least once.

Table 5.1 presents the distribution of the peer, school, and community variables examined in the whole sample and by gender, since suicidal behavior has consistently been shown to differ among males and females and several interaction terms related to gender were significant in this study. A significantly higher proportion of females reported that some of their best friends used substances during the last year (64.1% vs. 57.9%) or engaged in antisocial behaviors such as being suspended/dropped from school, carrying guns, selling drugs, stealing/attempting to steal motor vehicles, or being arrested in the last year (46.3% vs. 41.9%), and that those friends would not care for or would admire them if they engaged in antisocial behaviors such as using substances or carrying guns (78.7% vs. 66.8%).

A significantly higher proportion of males reported having repeated a grade (17.9% vs. 10.9%), or having deficient or failing grades (31.5% vs. 20.2%), or lower commitment to school, or fewer opportunities for pro-social involvement (participating in special programs and in decision making, availability of activities), or less rewards for pro-social involvement (positive feedback and praise from teachers, perceived safety in school, communication between teachers and parents).

More males than females described their community as disorganized (perceiving that somebody could harm, hit or injure them in their community, and the presence of graffiti,

crime, drug selling, fights, and/or empty or abandoned buildings in the community), and reported finding it easy to get a handgun if so desired. However, more females than males reported that it would be easy to obtain illegal substances, and that they did not belong to sports teams or other clubs. A similar proportion of females and males had changed schools or studied abroad, had neighbors that think it is very bad for adolescents to drink, smoke or use marijuana, and reported not getting positive feedback from neighbors (having neighbors proud of student, and who congratulate and motivate them).

Tables 5.2 to 5.7 present the prevalence of suicidal ideation and suicide attempts by the peer, school, and community characteristics evaluated in the study. For all variables, the crude odds ratio substantially overestimated the strength of their association with the suicidal behaviors, thus we focus here on the adjusted models. In addition, since association estimates for suicide attempts (Tables 5.2, 5.4, 5.6) and suicidal ideation (Tables 5.3, 5.5, 5.7) were similar, we focus our discussion on the data for attempts, and highlight ideation only when results differ from those for attempts.

Community Characteristics

Among the three domains considered in this analysis (community, peer, school), the strongest correlate of suicidal behavior among adolescent students were characteristics related to the adolescent's community environment (see Tables 5.2 and 5.3). About one fifth (21.1%) of students who reported the highest level of community disorganization reported suicide attempts. Prevalence of both suicidal behaviors was highest among students who reported that it was very easy to get substances (21.7% reported attempts), and among those who reported that it was easy to get a gun (20.4% reported attempts). Prevalence of both behaviors were also highest among those who had studied outside of Puerto Rico and had changed schools at least once, among those who had neighbors who favored substance use among adolescents, among students who do not belong to sports groups or other clubs, and among those who did not get positive feedback from neighbors.

After adjusting for socio-demographic characteristics, students who reported the highest level of community disorganization had a three fold increase in risk of both suicidal behaviors, and students who reported that it was easy to get handguns had 2.4 times higher odds of both behaviors. These associations were further attenuated once individual and family characteristics were taken into account. In the final adjusted models, females and males who reported the highest level of disorganization in their community had a 20% and 45% higher odds of suicide attempts, respectively, than those who reported an excellent community (i.e., one with no disorganization). Females who reported that it was not very hard to get a handgun had 21% higher odds of suicide attempts than those who reported that it was very hard; males had 28% higher odds of attempts.

Having experienced transitions and mobility (changing schools and studying outside of Puerto Rico) was also associated with suicidal ideation and suicide attempts after controlling for socio-demographic, individual, and family characteristics. After further adjustment for peer, school, and other community characteristics, experiencing transitions and mobility was associated with suicidal ideation among males and females, but with suicide attempts only among females. Females had a 13% higher odds of suicide attempts.

After adjusting for socio-demographic characteristics, students who reported that it was very easy to obtain substances (cigarettes, alcohol, and/or illicit drugs) had nearly a four-fold higher odds of suicide attempts than those who found them very hard to get. After adjusting for individual, family, peer, school and community characteristics, the perceived availability of substances was only associated with suicidal ideation among females. Females who reported that it was very easy to get substances had 32% higher odds of suicidal ideation than those who reported that it was very hard.

After adjusting for socio-demographic characteristics, students who had neighbors who favored substance use among adolescents, who did not belong to sports groups or other clubs, and who did not get positive feedback from neighbors had a higher risk of both

suicidal behaviors. However, once individual, family, peer, school, and community characteristics were taken into account, the association between these variables and suicidal behavior was no longer significant.

School Characteristics

Before adjustment, students' commitment to school was the school environment characteristic found to most influence prevalence of suicidal behavior (see Tables 5.4 and 5.5). Approximately 21.0% of students who reported very low commitment to school reported suicide attempts (OR=4.20). Prevalences of both suicidal behaviors were highest among students who repeated a grade, had deficient or failing grades, and had no or almost no opportunities and rewards for pro-social involvement.

Students with very low commitment to school had four and a half times higher odds of reporting attempted suicide after adjusting for socio-demographic characteristics. However, after adjusting for individual and family characteristics, low commitment to school was not associated with either behavior. Having academic failure (having C's,D's or F's last year, and almost never or never having better grades than classmates) was also found to be a risk factor for suicidal behavior after adjusting for socio-demographic characteristics. However, after further adjustment for individual and family characteristics, having good or excellent grades (not failing as before) was associated only with suicidal ideation. After further adjustment for community characteristics, the only school characteristic found to be significantly associated with suicidal ideation among females was having good or excellent grades (no academic failure), and among males, was having ever repeated a grade.

Peer Characteristics

Few peer characteristics were found to be associated with adolescent suicidal behaviors. Use of substances (cigarettes, alcohol, illicit drugs, and/or non-prescription pills) by the students' best friends during the last year was the characteristic related to the adolescents' peer environment most strongly associated with increased prevalence of suicidal behavior (see Tables 5.6 and 5.7). Approximately 17.1 % (95% CI=16.5-17.6) of the students who

reported that at least some of their best friends used substances also reported suicide attempts.

The prevalence of both suicidal behaviors among students increased with the number of best friends that used substances or exhibited antisocial behaviors in the previous year and was highest among students who reported that most or all of their best friends had used substances in the last year with about a fourth (26.3%) reporting suicide attempts. Also, approximately 26.0% of students who reported having most or all of their best friends exhibit antisocial behavior reported suicide attempts.

After adjustment for socio-demographic characteristics, students with friends who used any substances had 2.76 (95% CI=2.51-3.04) higher odds of reporting having attempted suicide at least once. However, after adjusting for individual and family characteristics, friends' substance use was no longer associated with suicide attempts, and only marginally associated with suicidal ideation.

After adjustment for socio-demographic characteristics, students who reported that most of their best friends engaged in antisocial behaviors had a 3-4 fold increase in odds of both suicidal behaviors, while those who reported that their best friends would not care if they engaged in antisocial behaviors had a 25% higher odds of suicide attempts than those who reported that their friends would reject them. Once individual and family characteristics were taken into account, only friends' antisocial behavior was associated with suicidal attempts, while the opinion of their peers became only marginally associated with both suicidal behaviors. After further adjustment for school and community characteristics, none of the peer variables examined in this study were associated with suicidal behavior.

Overall model significance of all final regression models (Table 5.8) was excellent ($p<0.0001$ for each). The variables in the final models significantly predicted the risk for reporting suicidal ideation among females (LR=37834.511, df=50) and among males (LR=19089.20, df=35). They also significantly predicted the risk for reporting suicide

attempts among girls (LR=30701.54, df=46) and boys (LR=16663.43, df=40). Both final regression models for females (Max-rescaled R-Square for ideation= 0.75; for attempts=0.67) and males (Max-rescaled R-Square for ideation= 0.54; for attempts=0.46) compared favorably to a null model.

DISCUSSION

Few studies have explored the association between suicidal behavior and characteristics related to the adolescents' peer, school, and community environment using representative samples. We found that the adolescent's community environment, particularly the level of community disorganization and a perceived availability of handguns, were significantly associated with suicidal behavior among both genders. Experiencing transitions and mobility (changing schools and/or studying outside of Puerto Rico) was also an important predictor, particularly among females.

The most compelling finding in this study was that characteristics related to the adolescents' community were more important predictors of adolescent suicidal behavior than peer and school characteristics, although previous studies have concentrated on adolescent's friends and social environment, and on school characteristics, since during adolescence relationships with peers take precedence over family and teens spend most of their time in schools. However, this study found that peer, and school factors have little impact on suicidal behavior once socio-demographic, individual, family, and community characteristics are taken into account. These results point to the importance of individual, family, and community factors as the most important predictors of suicidal ideation and suicide attempts among adolescents. Future studies of suicidal behavior should be careful to adjust for the confounding effects of these domains in addition to socio-demographic characteristics which are typically considered.

The level of community disorganization was an important predictor of suicidal behavior for both males and females. The definition of a disorganized community in this study may well describe a number of low-income urban communities. Perceived accessibility to handguns was also an important predictor of suicidal behavior. Low-income urban

communities have long been perceived as communities at higher risk for many negative health outcomes, including other types of violent deaths. As such, suicidal behavior might not have received adequate attention due to the presence of these other more visible and public negative health outcomes. Targeting prevention efforts at these at risk urban communities is of utmost importance, as is ensuring that the basic needs of its inhabitants, including their mental health needs, are addressed. These communities might also have a higher prevalence of depression, the most important predictor of suicidal behavior in this sample (see Chapter IV) and in other studies.[3, 12, 19, 21, 24, 26, 31] In fact, 75.4% of the students in this sample who reported at least one symptom of depression also reported some community disorganization.

Experiencing school transitions and mobility was associated with suicidal ideation in adolescent girls and boys, and with suicide attempts in females. Change appears to affect the emotional well being of the students. Changing schools means changing friends, meeting new people, starting over, regaining a social network. Adolescents at risk might be those who do not have the ability to cope with the stresses intrinsic to change. This stressor could also induce depression in this age group.[39-41] Suicide prevention programs could target new students in the schools and help them not only to adjust to their new environment, but to develop their coping abilities.

In unadjusted models, we observed that good grades appeared to have a protective effect against suicidal behavior. However, after adjusting for individual and family factors, good grades changed from a protective to a risk factor. This finding might be an artifact. Alternatively, females with good grades may indeed be at higher risk for suicidal ideation. Females may feel more pressure to maintain good grades, and have difficulty coping with the stress of keeping them. In addition, the association between ideation and reporting that it is easy to get substances might be due to an inability among females to cope with the stress of perceiving that their environment is not safe. Further research is needed to understand the role of coping abilities of the adolescents and suicidal behavior, particularly any gender differences.

As we previously reported (see Chapter 3), the patterns of risk for suicidal ideation and for suicide attempts had many similarities. This is an advantage when setting out to create policy as the same proposed prevention measures and programs could potentially target both suicidal behaviors at once. Since public policy changes take time and are sometimes difficult to implement on a large scale, results of this study can help define an at-risk community profile that can be considered as a priority for the implementation of new policies.

This study is a secondary analysis of a survey designed to monitor the prevalence of substance use among students. Strengths of this study include that it is a representative sample of all students between 7th and 12th grade in public schools in Puerto Rico, and that the participation rate was high (75.8%). Few studies on this topic have been performed on representative samples. However, a limitation of this study is its cross-sectional design. Temporal sequence cannot be established, and findings may be subject to recall bias. Recall bias could result in an over- or under-estimation of the prevalence of suicidal behavior among students, and of the relationships between different factors and suicidal behavior. The 16.6% absenteeism may have lead to selection bias, and an under-reporting of the prevalence of suicidal behavior. School absenteeism has been associated with school performance, and performance has been associated with suicidal behavior.[3, 12, 27] So, our current study may have under-estimated the prevalence of suicidal behavior because absentees were not included. Under-reporting is likely more serious among students in high school since their absentee rate was almost twice as high as among middle school students (20.4% vs. 12.7%). In addition, the results will not reflect the experiences of adolescents who have dropped out of school and suicidal behavior is likely to be higher among dropouts than among adolescents still in school.[42] In 2000, it was estimated that 14% of adolescents 16-19 years in old Puerto Rico were high school dropouts.[43] In addition, this study only evaluated students in public schools, which represent 93.2% of all students in the island. Not including private school students, many of whom go to religious schools, introduces another potential selection bias since these students might differ in their risk profile.

Despite these limitations, this study increases our knowledge regarding the impact of peer, school, and community characteristics on risk for reporting suicide behaviors. Students appear to be at a higher risk of suicidal behavior if they perceive a high degree of disorganization in their communities, if they expect an easier access to weapons, and if they have studied outside of Puerto Rico and/or changed schools. Risk factors for suicidal ideation and suicide attempts among females were similar to those among males, except that having excellent/good grades and expecting easier access to substances were also risk factors for ideation among females, and repeating a grade was associated with suicide attempts among males. More studies are needed to further evaluate the relationship between suicidal behavior and the other characteristics related to the adolescent's community.

This study also suggests potential avenues for developing more effective prevention activities. Such activities could include creating screening programs to identify adolescents at high risk implementing health promotion campaigns focusing on the importance of community in addressing this public health problem. Targeting interventions during the elementary school grades may be appropriate since interventions with teachers, parents, and children provided throughout elementary grades have been shown to have enduring positive effects on academic development, and in reducing violent and other risk behaviors among urban children.[44]

Community-based prevention programs could also be implemented in churches, schools, or in other community settings, incorporate multiple strategies, and concentrate on early detection of suicidal teens, particularly by conducting depression screening and building community organization. These screening programs and other prevention programs should be coordinated with agencies that provide primary care and mental health services to deliver the appropriate follow-up of depressive individuals, which might include health education or direct medical intervention.

Results from this study point to the importance of the community that surrounds the student in the adolescent's behavior. In addition, Hispanic populations are culturally very

different from other populations. Studying Puerto Ricans, a specific Hispanic group, provides a unique opportunity to study the importance of cultural influences on suicidal behavior. Hispanic adolescents might be more vulnerable to suicidal behaviors than adolescents from other populations. Baseline data from the country of origin is important for understanding the effects of environmental characteristics. Future research should explore other community-level characteristics in order to better understand how these factors relate to characteristics previously identified as important risk factors for suicidal behavior among adolescents, and if these relationships are similar in other populations.

ACKNOWLEDGEMENTS

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Table 5.1. Distribution of Weighted Frequency and Percentage of Peer, School and Community Factors by Gender among Public School Adolescent Students, Puerto Rico, Academic Years 2002-03 and 2003-04

Characteristics	*Females N (%)*	*Males N (%)*	*Total N (%)*
PEER FACTORS			
Friends Use of Substances Scale (Last Year)			
None of their best friends use substances	45,289 (36.0)	48,091 (42.3)	93,380 (39.0)
Almost no friends	21,286 (16.9)	16,644 (14.6)	37,930 (15.8)
Few friends	15,765 (12.5)	12,977 (11.4)	28,742 (12.0)
Some friends	12,455 (9.9)	10,583 (9.3)	23,038 (9.6)
Many friends	14,962 (11.9)	11,834 (10.4)	26,796 (11.2)
Most or all friends	16,019 (12.7)	13,582 (11.9)	29,601 (12.4)
Interaction with Antisocial Peers Scale (Last Year)			
None of their best friends antisocial	67,568 (53.7)	66,016 (58.1)	133,584 (55.8)
Almost no friends	20,213 (16.1)	16,576 (14.6)	36,789 (15.4)
Some friends	20,346 (16.2)	15,339 (13.5)	35,685 (14.9)
Most or all friends	17,648 (14.0)	15,781 (13.9)	33,429 (14.0)
Rewards for Antisocial Involvement Scale			
Most best friends would reject student	26,839 (21.3)	37,772 (33.2)	64,611 (27.0)
Most best friends would not care	32,312 (25.7)	29,033 (25.5)	61,345 (25.6)
Most best friends would admire	66,625 (53.0)	46,905 (41.2)	113,530 (47.4)
SCHOOL FACTORS			
Repeated a Grade			
Yes	13,807 (10.9)	20,470 (17.9)	34,277 (14.2)
No	112,376 (89.1)	94,174 (82.1)	206,550 (85.8)
Academic Failure Scale			
Excellent/good grades	70,177 (55.8)	47,758 (41.7)	117,935 (49.1)
Fair grades	30,231 (24.0)	30,649 (26.8)	60,880 (25.3)
Deficient grades	16,565 (13.2)	21,341 (18.7)	37,906 (15.8)
Failure	8,791 (7.0)	14,647 (12.8)	23,438 (9.8)
Commitment to School Scale			
Very high	24,400 (19.3)	16,671 (14.5)	41,071 (17.1)
Somewhat High	26,164 (20.7)	19,161 (16.7)	45,325 (18.8)
High	25,234 (20.0)	20,495 (17.9)	45,729 (19.0)
Somewhat Low	19,383 (15.4)	19,159 (16.7)	38,542 (16.0)
Low	17,641 (14.0)	19,904 (17.4)	37,545 (15.6)
Very low	13,363 (10.6)	19,250 (16.8)	32,613 (13.5)
Opportunities for Pro-Social Involvement Scale			
None or almost none	18,208 (14.5)	21,016 (18.4)	39,224 (16.3)
Few	38,126 (30.3)	36,554 (32.0)	74,680 (31.1)
Sometimes	17,807 (14.1)	15,349 (13.4)	33,156 (13.8)
Often	30,903 (24.6)	25,502 (22.3)	56,405 (23.5)
Always or almost always	20,824 (16.5)	15,814 (13.8)	36,638 (15.3)
Rewards for Pro-Social Involvement Scale			
None or almost none	19,425 (15.4)	21,808 (19.1)	41,233 (17.2)
Few	19,717 (15.7)	19,266 (16.9)	38,983 (16.2)
Sometimes	23,602 (18.7)	22,536 (19.7)	46,138 (19.2)
Often	23,177 (18.4)	20,519 (17.9)	43,696 (18.2)
Very often	19,341 (15.4)	15,748 (13.8)	35,089 (14.6)
Always or almost always	20,672 (16.4)	14,442 (12.6)	35,114 (14.6)

Table 5.1. Distribution of Weighted Frequency and Percentage of Peer, School and Community Factors by Gender among Public School Adolescent Students, Puerto Rico, Academic Years 2002-03 and 2003-04 (Cont.)

Characteristics	*Females N (%)*	*Males N (%)*	*Total N (%)*
COMMUNITY CHARACTERISTICS			
Level of Community Disorganization Scale			
Excellent community	39,492 (31.6)	34,097 (30.5)	73,589 (31.1)
1-2	42,473 (34.0)	37,319 (33.4)	79,792 (33.7)
3-4	29,889 (23.9)	26,356 (23.6)	56,245 (23.8)
5-6	13,014 (10.4)	14,039 (12.6)	27,053 (11.4)
Transitions and Mobility Scale			
None	52,291 (41.4)	47,142 (41.1)	99,433 (41.3)
Studied outside of Puerto Rico or changed schools at least once	59,376 (47.1)	54,943 (47.9)	114,319 (47.5)
Studied outside of Puerto Rico and changed schools at least once	14,517 (11.5)	12,558 (11.0)	27,075 (11.2)
Perceived Availability of Substances Scale			
Very hard to get	42,095 (33.7)	42,328 (37.5)	84,423 (35.5)
Somewhat hard	37,827 (30.3)	29,076 (25.8)	66,903 (28.1)
Somewhat easy	24,158 (19.3)	19,588 (17.4)	43,746 (18.4)
Very easy	20,825 (16.7)	21,809 (19.3)	42,634 (17.9)
Laws and Norms Favorable to Substance Use Scale			
Neighbors consider use very bad	68,244 (54.8)	60,876 (54.7)	129,120 (54.7)
Considered bad	20,319 (16.3)	17,499 (15.7)	37,818 (16.0)
Somewhat bad	19,189 (15.4)	17,134 (15.4)	36,323 (15.4)
Not bad at all	16,826 (13.5)	15,800 (14.2)	32,626 (13.8)
Opportunities for Pro-Social Involvement Scale			
Does not belong to sports group/other clubs	56,462 (45.3)	41,686 (37.3)	98,148 (41.5)
Belongs to sports group and/or other clubs	68,261 (54.7)	69,982 (62.7)	138,243 (58.5)
Rewards for Pro-Social Involvement Scale			
No positive feedback from neighbors	31,121 (24.9)	28,037 (25.0)	59,158 (24.9)
Some positive feedback	23,662 (18.9)	22,366 (19.9)	46,028 (19.4)
A lot of positive feedback	70,452 (56.3)	61,940 (55.1)	132,392 (55.7)
Perceived Availability of Handguns			
Very difficult to get a gun	94,008 (75.8)	75,716 (67.9)	169,724 (72.1)
Less difficult or easy to get a gun	29,969 (24.2)	35,821 (32.1)	65,790 (27.9)

Table 5.2. Prevalence Estimates of Suicide Attempts among Public School Adolescent Students and Odds Ratios by Community Characteristics, Puerto Rico, Academic Years 2002-03 and 2003-04

Community Characteristics	*Weighted Frequency*	*Weighted Prevalence (95% CI)*	*Crude Odds Ratio (95% CI)*	**Model 1: SDS** *Adjusted Odds Ratio (95% CI)**	**Model 2: SDS+IND+FAM+COM** *Adjusted Odds Ratio (95% CI)†*
Level of Community Disorganization Scale					
Excellent community	5,725	7.7 (7.2-8.2)	Reference	Reference	Reference
1-2	9,326	11.6 (11.0-12.2)	1.57 (1.44-1.71)	1.52 (1.39-1.67)	1.03 (0.93-1.14)
3-4	9,764	17.3 (16.4-18.2)	2.50 (2.28-2.74)	2.32 (2.11-2.56)	1.14 (1.03-1.25)
5-6	5,778	21.1 (19.6-22.7)	3.19 (2.82-3.61)	3.10 (2.71-3.54)	1.25 (1.06-1.47)
Transitions and Mobility Scale					
None	10,348	10.4 (9.9-10.9)	Reference	Reference	Reference
Studied outside of Puerto Rico or changed schools at least once	15,783	13.8 (13.2-14.4)	1.38 (1.28-1.49)	1.30 (1.21-1.40)	1.14 (1.05-1.23)
Studied outside of Puerto Rico and changed schools at least once	4,857	17.8 (16.6-19.0)	1.87 (1.69-2.07)	1.63 (1.45-1.83)	1.11 (0.97-1.29)
Perceived Availability of Substances Scale					
Very hard to get	5,285	6.2 (5.8-6.6)	Reference	Reference	N.A.
Somewhat hard	8,416	12.5 (11.8-13.2)	2.15 (1.98-2.34)	1.96 (1.80-2.13)	
Somewhat easy	7,755	17.7 (16.7-18.7)	3.23 (2.95-3.53)	2.97 (2.68-3.29)	
Very easy	9,258	21.7 (20.8-22.6)	4.16 (3.82-4.54)	3.92 (3.56-4.32)	
Laws and Norms Favorable to Substance Use Scale					
Neighbors consider use very bad	13,252	10.2 (9.8-10.7)	Reference	Reference	N.A.
Considered bad	5,039	13.3 (12.4-14.2)	1.35 (1.24-1.47)	1.23 (1.13-1.35)	
Somewhat bad	5,585	15.3 (14.4-16.2)	1.59 (1.46-1.72)	1.46 (1.33-1.60)	
Not bad at all	6,610	20.1 (18.9-21.2)	2.21 (2.03-2.41)	1.99 (1.80-2.20)	
Opportunities for Pro-Social Involvement Scale					
Does not belong to sports group/other clubs	14,037	14.2 (13.6-14.8)	Reference	Reference	N.A.
Belongs to sports group and/or other clubs	16,523	11.9 (11.3-12.4)	0.81 (0.76-0.88)	0.92 (0.85-0.99)	
Rewards for Pro-Social Involvement Scale					
No positive feedback from neighbors	10,066	16.9 (16.2-17.7)	Reference	Reference	Reference
Some positive feedback	6,543	14.2 (13.3-15.0)	0.81 (0.74-0.88)	0.85 (0.78-0.94)	1.07 (0.96-1.19)
A lot of positive feedback	14,151	10.6 (10.1-11.1)	0.58 (0.55-0.62)	0.63 (0.59-0.68)	1.16 (1.04-1.28)
Perceived Availability of Handguns					
Very difficult to get a gun	16,932	9.9 (9.6-10.3)	Reference	Reference	Reference
Less difficult or easy to get a gun	13,473	20.4 (19.7-21.2)	2.33 (2.19-2.47)	2.42 (2.27-2.58)	1.21 (1.12-1.32)

***** Adjusted by socio-demographic (SDS) characteristics (gender, grade, country of birth, mother's educational level, and living with both parents).

† Adjusted by all socio-demographic characteristics and the individual (IND), family (FAM) and the community (COM) variables left in model after backward selection.

N.A. = Not applicable; variables not retained in adjusted model.

Table 5.3. Prevalence Estimates of Suicidal Ideation among Public School Adolescent Students and Odds Ratios by Community Characteristics, Puerto Rico, Academic Years 2002-03 and 2003-04

Community Characteristics	*Weighted Frequency*	*Weighted Prevalence (95% CI)*	*Crude Odds Ratio (95% CI)*	**Model 1: SDS** *Adjusted Odds Ratio (95% CI)**	**Model 2: SDS+IND+FAM+COM** *Adjusted Odds Ratio (95% CI)†*
Level of Community Disorganization Scale					
Excellent community	6,998	9.5 (8.9-10.1)	Reference	Reference	Reference
1-2	11,621	14.5 (13.9-15.1)	1.62 (1.49-1.76)	1.57 (1.45-1.70)	1.05 (0.96-1.16)
3-4	12,055	21.4 (20.3-22.5)	2.60 (2.37-2.87)	2.39 (2.17-2.63)	1.15 (1.03-1.28)
5-6	6,734	24.7 (23.2-26.2)	3.14 (2.80-3.51)	3.06 (2.72-3.45)	1.22 (1.06-1.42)
Transitions and Mobility Scale					
None	12,392	12.5 (11.9-13.0)	Reference	Reference	Reference
Studied outside of Puerto Rico or changed schools at least once	19,701	17.2 (16.6-17.9)	1.46 (1.36-1.57)	1.37 (1.28-1.47)	1.20 (1.10-1.30)
Studied outside of Puerto Rico and changed schools at least once	5,741	21.0 (19.8-22.2)	1.87 (1.71-2.06)	1.61 (1.44-1.81)	1.12 (0.97-1.28)
Perceived Availability of Substances Scale					
Very hard to get	5,768	6.8 (6.4-7.2)	Reference	Reference	Reference
Somewhat hard	10,246	15.3 (14.5-16.1)	2.46 (2.26-2.68)	2.17 (2.00-2.36)	1.15 (1.03-1.27)
Somewhat easy	9,980	22.8 (21.7-23.8)	4.03 (3.71-4.37)	3.52 (3.23-3.85)	1.24 (1.09-1.42)
Very easy	11,549	27.1 (26.1-28.1)	5.07 (4.67-5.50)	4.53 (4.15-4.94)	1.23 (1.07-1.43)
Laws and Norms Favorable to Substance Use Scale					
Neighbors consider use very bad	15,809	12.2 (11.7-12.7)	Reference	Reference	N.A.
Considered bad	6,345	16.7 (15.8-17.7)	1.45 (1.33-1.57)	1.29 (1.18-1.41)	
Somewhat bad	7,037	19.3 (18.2-20.3)	1.72 (1.59-1.86)	1.53 (1.40-1.67)	
Not bad at all	8,102	24.6 (23.4-25.9)	2.35 (2.17-2.55)	2.05 (1.87-2.24)	
Opportunities for Pro-Social Involvement Scale					
Does not belong to sports group/other clubs	17,191	17.4 (16.7-18.1)	Reference	Reference	N.A.
Belongs to sports group and/or other clubs	20,182	14.5 (14.0-15.1)	0.81 (0.75-0.86)	0.93 (0.86-0.99)	
Rewards for Pro-Social Involvement Scale					
No positive feedback from neighbors	12,702	21.4 (20.6-22.2)	Reference	Reference	N.A.
Some positive feedback	7,854	17.0 (16.1-17.9)	0.75 (0.69-0.82)	0.81 (0.74-0.89)	
A lot of positive feedback	17,021	12.8 (12.3-13.3)	0.54 (0.51-0.57)	0.59 (0.56-0.63)	
Perceived Availability of Handguns					
Very difficult to get a gun	20,818	12.2 (11.8-12.7)	Reference	Reference	Reference
Less difficult or easy to get a gun	16,367	24.9 (24.1-25.6)	2.37 (2.25-2.51)	2.40 (2.26-2.55)	1.17 (1.07-1.28)

* Adjusted by socio-demographic (SDS) characteristics (gender, grade, country of birth, mother's educational level, and living with both parents).

† Adjusted by all socio-demographic characteristics and the individual (IND), family (FAM) and the community (COM) variables left in model after backward selection.

N.A. = Not applicable; variables not retained in adjusted model.

Table 5.4. Prevalence Estimates of Suicide Attempts among Public School Adolescent Students and Odds Ratios by School Factors, Puerto Rico, Academic Years 2002-03 and 2003-04

School Factors	*Weighted Frequency*	*Weighted Prevalence (95% CI)*	*Crude Odds Ratio (95% CI)*	**Model 1: SDS** *Adjusted Odds Ratio (95% CI)**	**Model 2: SDS+IND+FAM+SCH** *Adjusted Odds Ratio (95% CI)†*
Repeated a Grade					
Yes	25,198	12.2 (11.8-12.6)	1.45 (1.33-1.57)	1.56 (1.41-1.72)	N.A.
No	5,700	16.7 (15.6-17.8)	Reference	Reference	
Academic Failure Scale					
Excellent/good grades	12,734	10.7 (10.2-11.3)	Reference	Reference	N.A.
Fair grades	8,113	13.3 (12.5-14.1)	1.28 (1.17-1.40)	1.33 (1.21-1.46)	
Deficient grades	5,767	15.2 (14.2-16.3)	1.50 (1.35-1.66)	1.64 (1.47-1.82)	
Failure	4,292	18.3 (17.0-19.7)	1.86 (1.68-2.07)	2.16 (1.93-2.43)	
Commitment to School Scale					
Very high	2,475	6.0 (5.3-6.7)	Reference	Reference	N.A.
Somewhat High	4,276	9.4 (8.6-10.2)	1.63 (1.40-1.90)	1.54 (1.32-1.79)	
High	5,250	11.5 (10.6-12.3)	2.04 (1.77-2.36)	1.96 (1.67-2.31)	
Somewhat Low	5,463	14.2 (13.3-15.1)	2.60 (2.26-2.99)	2.55 (2.20-2.96)	
Low	6,665	17.7 (16.9-18.6)	3.40 (2.94-3.92)	3.39 (2.91-3.95)	
Very low	6,859	21.0 (19.8-22.3)	4.20 (3.60-4.89)	4.49 (3.81-5.30)	
Opportunities for Pro-Social Involvement Scale					
None or almost none	6,441	16.5 (15.5-17.5)	Reference	Reference	N.A.
Few	10,147	13.5 (12.9-14.2)	0.79 (0.72-0.87)	0.77 (0.69-0.84)	
Sometimes	4,291	13.0 (11.9-14.0)	0.75 (0.67-0.84)	0.73 (0.65-0.83)	
Often	6,282	11.1 (10.2-12.0)	0.63 (0.56-0.71)	0.61 (0.54-0.70)	
Always or almost always	3,703	10.1 (9.2-10.9)	0.57 (0.50-0.64)	0.56 (0.49-0.63)	
Rewards for Pro-Social Involvement Scale					
None or almost none	7,743	18.9 (17.9-19.8)	Reference	Reference	N.A.
Few	5,955	15.2 (14.3-16.2)	0.77 (0.71-0.84)	0.76 (0.70-0.83)	
Sometimes	6,031	13.0 (12.4-13.7)	0.65 (0.60-0.70)	0.65 (0.59-0.71)	
Often	4,836	11.0 (10.1-11.9)	0.53 (0.48-0.60)	0.54 (0.48-0.60)	
Very often	3,441	9.8 (9.0-10.7)	0.47 (0.42-0.52)	0.47 (0.42-0.53)	
Always or almost always	2,894	8.2 (7.5-8.9)	0.38 (0.34-0.43)	0.39 (0.35-0.44)	

* Adjusted by socio-demographic (SDS) characteristics (gender, grade, country of birth, mother's educational level, and living with both parents).

† Adjusted by all socio-demographic characteristics and the individual (IND), family (FAM) and the school (SCH) variables left in model after backward selection.

N.A. = Not applicable; variables not retained in adjusted model.

Table 5.5. Prevalence Estimates of Suicidal Ideation among Public School Adolescent Students and Odds Ratios by School Factors, Puerto Rico, Academic Years 2002-03 and 2003-04

School Factors	*Weighted Frequency*	*Weighted Prevalence (95% CI)*	*Crude Odds Ratio (95% CI)*	**Model 1: SDS** *Adjusted Odds Ratio (95% CI)**	**Model 2: SDS+IND+FAM+SCH** *Adjusted Odds Ratio (95% CI)†*
Repeated a Grade					
Yes	5,944	17.4 (16.4-18.5)	1.16 (1.07-1.26)	1.31 (1.19-1.43)	N.A.
No	31,802	15.4 (15.0-15.9)	Reference	Reference	
Academic Failure Scale					
Excellent/good grades	16,998	14.3 (13.8-14.9)	Reference	Reference	Reference
Fair grades	9,658	15.9 (15.0-16.7)	1.13 (1.04-1.22)	1.17 (1.08-1.27)	0.86 (0.79-0.95)
Deficient grades	6,647	17.6 (16.6-18.7)	1.28 (1.16-1.40)	1.40 (1.28-1.54)	0.78 (0.69-0.88)
Failure	4,449	19.0 (17.6-20.4)	1.40 (1.27-1.54)	1.61 (1.46-1.79)	0.65 (0.58-0.74)
Commitment to School Scale					
Very high	2,969	7.2 (6.4-8.0)	Reference	Reference	N.A.
Somewhat High	5,191	11.4 (10.5-12.3)	1.67 (1.45-1.92)	1.52 (1.32-1.74)	
High	6,419	14.1 (13.2-15.0)	2.12 (1.84-2.44)	1.96 (1.69-2.28)	
Somewhat Low	6,828	17.7 (16.7-18.8)	2.79 (2.45-3.17)	2.64 (2.31-3.01)	
Low	8,387	22.4 (21.3-23.4)	3.72 (3.24-4.28)	3.56 (3.08-4.12)	
Very low	8,041	24.7 (23.5-25.9)	4.25 (3.69-4.89)	4.44 (3.84-5.14)	
Opportunities for Pro-Social Involvement Scale					
None or almost none	7,836	20.1 (19.0-21.2)	Reference	Reference	N.A.
Few	12,552	16.8 (16.1-17.4)	0.80 (0.73-0.87)	0.76 (0.70-0.83)	
Sometimes	5,090	15.4 (14.2-16.6)	0.72 (0.65-0.80)	0.70 (0.63-0.78)	
Often	7,920	14.0 (13.0-15.0)	0.65 (0.58-0.72)	0.63 (0.55-0.71)	
Always or almost always	4,313	11.7 (10.8-12.7)	0.53 (0.47-0.59)	0.53 (0.47-0.60)	
Rewards for Pro-Social Involvement Scale					
None or almost none	9,384	22.9 (22.0-23.8)	Reference	Reference	N.A.
Few	7,555	19.3 (18.3-20.3)	0.81 (0.75-0.87)	0.79 (0.73-0.86)	
Sometimes	7,482	16.2 (15.4-16.9)	0.65 (0.61-0.70)	0.65 (0.60-0.71)	
Often	5,919	13.5 (12.6-14.4)	0.53 (0.47-0.58)	0.54 (0.49-0.60)	
Very often	4,124	11.8 (10.8-12.7)	0.45 (0.41-0.50)	0.46 (0.41-0.51)	
Always or almost always	3,283	9.3 (8.6-10.1)	0.35 (0.31-0.38)	0.36 (0.33-0.40)	

* Adjusted by socio-demographic (SDS) characteristics (gender, grade, country of birth, mother's educational level, and living with both parents).
† Adjusted by all socio-demographic characteristics and the individual (IND), family (FAM) and the school (SCH) variables left in model after backward selection.
N.A. = Not applicable; variables not retained in adjusted model.

Table 5.6. Prevalence Estimates of Suicide Attempts among Public School Adolescent Students and Odds Ratios by Peer Factors, Puerto Rico, Academic Years 2002-03 and 2003-04

Peer Factors	*Weighted Frequency*	*Weighted Prevalence (95% CI)*	*Crude Odds Ratio (95% CI)*	**Model 1: SDS** *Adjusted Odds Ratio (95% CI)**	**Model 2: SDS+IND+FAM+PEER** *Adjusted Odds Ratio (95% CI)†*
Friends Use of Substances Scale (Last Year)					
None of their best friends use substances	5,818	6.2 (5.8-6.6)	Reference	Reference	N.A.
Almost no friends	3,862	10.1 (9.3-11.0)	1.70 (1.52-1.90)	1.59 (1.41-1.79)	
Few friends	4,043	14.1 (13.0-15.1)	2.47 (2.18-2.79)	2.26 (1.98-2.58)	
Some friends	3,934	17.0 (15.6-18.3)	3.08 (2.74-3.45)	2.88 (2.52-3.31)	
Many friends	5,420	20.1 (19.0-21.3)	3.80 (3.42-4.21)	3.54 (3.14-3.99)	
Most or all friends	7,795	26.3 (25.0-27.6)	5.37 (4.87-5.93)	5.09 (4.53-5.72)	
Interaction with Antisocial Peers Scale (Last Year)					
None of their best friends antisocial	11,174	8.3 (8.0-8.7)	Reference	Reference	Reference
Almost no friends	4,519	12.2 (11.3-13.2)	1.53 (1.39-1.69)	1.43 (1.29-1.58)	1.06 (0.93-1.20)
Some friends	6,450	18.1 (17.0-19.1)	2.42 (2.24-2.62)	2.21 (2.04-2.40)	1.19 (1.08-1.31)
Most or all friends	8,731	26.0 (24.7-27.3)	3.87 (3.55-4.20)	3.56 (3.24-3.92)	1.22 (1.08-1.38)
Rewards for Antisocial Involvement Scale					
Most best friends would reject student	7,851	12.2 (11.5-12.9)	Reference	Reference	Reference
Most best friends would not care	10,483	17.0 (16.2-17.8)	1.47 (1.37-1.59)	1.25 (1.15-1.36)	0.99 (0.89-1.11)
Most best friends would admire	12,539	11.0 (10.5-11.5)	0.89 (0.82-0.97)	0.80 (0.73-0.88)	1.11 (0.99-1.25)

* Adjusted by socio-demographic (SDS) characteristics (gender, grade, country of birth, mother's educational level, and living with both parents).
† Adjusted by all socio-demographic characteristics and the individual (IND), family (FAM) and the peer (PEER) variables left in model after backward selection.
N.A. = Not applicable; variables not retained in adjusted model.

Table 5.7. Prevalence Estimates of Suicidal Ideation among Public School Adolescent Students and Odds Ratios by Peer Factors, Puerto Rico, Academic Years 2002-03 and 2003-04

Peer Factors	*Weighted Frequency*	*Weighted Prevalence (95% CI)*	*Crude Odds Ratio (95% CI)*	**Model 1: SDS** *Adjusted Odds Ratio (95% CI)**	**Model 2: SDS+IND+FAM+PEER** *Adjusted Odds Ratio (95% CI)†*
Friends Use of Substances Scale (Last Year)					
None of their best friends use substances	6,682	7.2 (6.7-7.6)	Reference	Reference	Reference
Almost no friends	5,058	13.3 (12.4-14.2)	1.99 (1.79-2.20)	1.77 (1.57-1.99)	1.14 (0.99-1.31)
Few friends	4,965	17.3 (16.1-18.4)	2.71 (2.42-3.04)	2.34 (2.06-2.65)	1.19 (1.03-1.37)
Some friends	5,014	21.6 (20.3-23.0)	3.58 (3.23-3.97)	3.10 (2.73-3.52)	1.24 (1.07-1.44)
Many friends	6,926	25.7 (24.6-26.9)	4.49 (4.08-4.95)	3.81 (3.39-4.28)	1.26 (1.10-1.43)
Most or all friends	9,051	30.6 (29.3-31.9)	5.72 (5.19-6.31)	4.96 (4.40-5.58)	1.23 (1.06-1.43)
Interaction with Antisocial Peers Scale (Last Year)					
None of their best friends antisocial	13,816	10.3 (9.9-10.7)	Reference	Reference	N.A.
Almost no friends	5,862	15.9 (14.8-16.9)	1.64 (1.50-1.79)	1.50 (1.37-1.64)	
Some friends	7,941	22.3 (21.1-23.4)	2.49 (2.31-2.69)	2.20 (2.04-2.37)	
Most or all friends	10,076	30.1 (28.7-31.5)	3.74 (3.44-4.07)	3.34 (3.04-3.67)	
Rewards for Antisocial Involvement Scale					
Most best friends would reject student	9,274	14.4 (13.7-15.2)	Reference	Reference	Reference
Most best friends would not care	13,331	21.7 (20.7-22.6)	1.64 (1.51-1.77)	1.35 (1.24-1.46)	1.06 (0.95-1.19)
Most best friends would admire	15,091	13.2 (12.7-13.8)	0.90 (0.84-0.97)	0.82 (0.76-0.88)	1.15 (1.06-1.26)

* Adjusted by socio-demographic (SDS) characteristics (gender, grade, country of birth, mother's educational level, and living with both parents).
† Adjusted by all socio-demographic characteristics and the individual (IND), family (FAM) and the peer (PEER) variables left in model after backward selection.
N.A. = Not applicable; variables not retained in adjusted model.

Table 5.8. Final Model Estimates of Suicide Attempts and Suicidal Ideation among Public School Adolescent Students, Puerto Rico, Academic Years 2002-03 and 2003-04

Characteristics	*Suicide Attempts*		*Suicidal Ideation*	
	Model 1: Females only *Adjusted Odds Ratio (95% CI)**	**Model 2: Males only** *Adjusted Odds Ratio (95% CI)**	**Model 1: Females only** *Adjusted Odds Ratio (95% CI)**	**Model 2: Males only** *Adjusted Odds Ratio (95% CI)**
Community Characteristics				
Level of Community Disorganization Scale				
Excellent community	Reference	Reference	Reference	Reference
1-2	0.95 (0.84-1.07)	1.30 (1.05-1.61)	0.99 (0.88-1.13)	1.21 (1.02-1.44)
3-4	1.10 (0.97-1.24)	1.34 (1.10-1.62)	1.15 (1.02-1.31)	1.21 (1.00-1.47)
5-6	1.20 (0.98-1.46)	1.45 (1.16-1.81)	1.16 (0.94-1.42)	1.36 (1.10-1.67)
Transitions and Mobility Scale				
None	Reference	N.A.	Reference	Reference
Studied outside of Puerto Rico or changed schools at least once	1.13 (1.04-1.24)		1.15 (1.05-1.26)	1.29 (1.13-1.49)
Studied outside of Puerto Rico and changed schools at least once	1.09 (0.91-1.31)		1.00 (0.83-1.20)	1.34 (1.10-1.64)
Perceived Availability of Substances Scale				
Very hard to get	N.A.	N.A.	Reference	N.A.
Somewhat hard			1.17 (1.02-1.34)	
Somewhat easy			1.29 (1.08-1.54)	
Very easy			1.32 (1.07-1.62)	
Perceived Availability of Handguns				
Very difficult to get a gun	Reference	Reference	Reference	Reference
Less difficult or easy to get a gun	1.21 (1.09-1.35)	1.28 (1.12-1.46)	1.16 (1.03-1.30)	1.24 (1.05-1.47)
School Factors				
Repeated a Grade				
Yes	N.A.	1.22 (1.03-1.44)	N.A.	N.A.
No		Reference		
Academic Failure Scale				
Excellent/good grades	N.A.	N.A.	Reference	N.A.
Fair grades	0.84 (0.75-0.94)		0.84 (0.75-0.94)	
Deficient grades	0.78 (0.68-0.89)		0.78 (0.68-0.89)	
Failure	0.56 (0.47-0.67)		0.56 (0.47-0.67)	

* Adjusted by all socio-demographic characteristics and the individual (IND), family (FAM), peer (PEER), school (SCH), and community (COM) variables left in model after backward selection.

N.A. = Not applicable; variables not retained in adjusted model.

Appendix 1. Peer Factors Evaluated in the Study

Factors (Answers)	*Question*
Friends' Use of Substances Scale (None/ Some of them/Most of them/All of them) - Cronbach α=0.86	
• Friends' Cigarette Use	Think about your best friends. In the last year, how many of them have smoked cigarettes?
• Friends' Alcohol Use	Think about your best friends. In the last year, how many of them have tasted beer, wine, rum, vodka, whisky or gin without their parents knowing?
• Friends' Marihuana Use	Think about your best friends. In the last year, how many of them have used marijuana?
• Friends' Illegal Drug Use	Think about your best friends. In the last year, how many of them have used LSD, cocaine, amphetamines, or other illegal drugs?
• Friends' Inhalant Use	Think about your best friends. In the last year, how many of them have used inhalants to get high?
• Friends' Pill Use	Think about your best friends. In the last year, how many of them have used non-prescribed pills to get high?
Interaction with Antisocial Peers Scale (None/ Some of them/Most of them/All of them) - Cronbach α=0.91	
• Friends' Suspended from School	Think about your best friends. In the last year, how many of them have been suspended from school?
• Friends' Carried Gun	Think about your best friends. In the last year, how many of them have carried a gun?
• Friends' Sold Drugs	Think about your best friends. In the last year, how many of them have sold illegal drugs?
• Friends' Stole Motor Vehicles	Think about your best friends. In the last year, how many of them have stolen or tried to steal a motor vehicle such as a car or motorcycle?
• Friends' Arrested	Think about your best friends. In the last year, how many of them have been arrested?
• Friends' Dropped Out	Think about your best friends. In the last year, how many of them have dropped out of school?
Rewards for Antisocial Involvement Scale (They wouldn't care/They would reject me/They would admire me) - Cronbach α=0.93	
• Friends' Opinion of Smoking	Think about your best friends, how would they see you if you smoked cigarettes?
• Friends' Opinion of Alcohol Use	Think about your best friends, how would they see you if you started to drink alcoholic beverages regularly?
• Friends' Opinion of Marijuana Use	Think about your best friends, how would they see you if you smoked marijuana?
• Friends' Opinion of Illegal Drug Use	Think about your best friends, how would they see you if you used other illegal drugs?
• Friends' Opinion of Carrying Guns	Think about your best friends, how would they see you if you carried a gun?

Appendix 2. School Factors Evaluated in the Study

Factors (Answers)	*Question*
Repeated a Grade	Have you ever repeated a grade? (Never/Yes, in elementary school (1-6)/Yes, in middle school (7-9)/Yes, in high school (10-12))
Academic Failure Scale – Cronbach α=0.55	
• Grades	In general, what were your grades last year? (All or almost all A's/A's and B's/All or almost all B's/B's and C's/All or almost all C's/C's and D's/All or almost all D's/D's and F's)
• Better Grades	My grades in school are better than the grades of most of the students in my classroom. (Never/ Almost never/Sometimes/Almost always/Always)
Commitment to School Scale (Never/Almost never/Sometimes/Almost always/Always) - Cronbach α=0.67	
• Expected Usefulness of School-Acquired Knowledge	The things that I'm learning in school will help me in the future.
• Perceived Value of Schoolwork	How often do you feel that the schoolwork you are assigned is important and of value? (Never/Rarely/Sometimes/Often/Almost always)
• Interest in Courses	How interesting are most of your courses? (Very interesting/Quite interesting/Sometimes interesting/Slightly dull/Very dull)
• Enjoyment of School	In the past year, how often did you enjoy school?
• Hatred of School	In the past year, how often did you hate school?
• Skipping or Cutting Classes	In the last 30 days, how many times have you been absent from school because you skipped or "cut"?
Opportunities for Pro-Social Involvement Scale (Never/Almost never/Sometimes/Almost always/Always) - Cronbach α=0.61	
• Participation in Special Projects	My teachers ask me to participate in special classroom projects.
• Participation in Decision Making	Students have a chance to help decide class activities and classroom rules.
• Availability of Activities	In my school, there are many activities where students can participate.
Rewards for Pro-Social Involvement Scale (Never/Almost never/Sometimes/Almost always/Always) Cronbach α=0.69	
• Positive Feedback from Teachers	My teacher(s) notice when I am doing a good job and let me know it.
• Perceived Safety in School	I feel safe at my school.
• Teacher-Parent Communication	The school lets my parents know when I have done something well.
• Praise from Teachers	My teachers praise me when I work hard in school.

Appendix 3. Community Characteristics Evaluated in the Study

Factors (Answers)	*Question*
Level of Community Disorganization Scale (There is not./ There is a little./There is a lot.) -Cronbach α=0.81	
• Perceived Safety	Do you think that somebody can harm, hit or injure you in your neighborhood? (No/Yes)
• Graffiti in Community	In your community, is there graffiti?
• Crime in Community	In your community, is there crime?
• Drug Selling in Community	In your community, is there drug selling?
• Fights in Community	In your community, are there fights?
• Empty or Abandoned Buildings in Community	In your community, are there empty or abandoned buildings?
Transitions and Mobility Scale	
• Changing Schools	How many times have you changed schools since you were in first grade? (Never/1 or 2 times/3 or 4 times/5 or 6 times/7 or more times)
• Studied Abroad	Mark all grades that you have studied abroad. (None/Before elementary school/Elementary[1-6]/Middle [7-9]/High [10-12])
Perceived Availability of Substances Scale (Very hard/A bit hard/A bit easy/Very easy) - Cronbach α=0.88	
• Availability of Alcohol	Even if you don't use them, if you wanted to get them, how easy would it be to get alcoholic beverages (beer, wine, rum or vodka)?
• Availability of Cigarettes	Even if you don't use them, if you wanted to get them, how easy would it be to get cigarettes?
• Availability of Marijuana	Even if you don't use them, if you wanted to get them, how easy would it be to get marijuana?
• Availability of Other Drugs	Even if you don't use them, if you wanted to get them, how easy would it be to get some other drug (cocaine, heroin, LSD or amphetamines)?
Laws and Norms Favorable to Substance Use Scale (Very bad/Bad/A bit bad/Not bad at all)	
• Adults' Opinion of Drinking	For most adults in your neighborhood, how bad is it for someone you age to drink alcohol?
• Adults' Opinion of Smoking	For most adults in your neighborhood, how bad is it for someone you age to smoke cigarettes?
• Adults' Opinion of Marijuana Use	For most adults in your neighborhood, how bad is it for someone you age to use marijuana?
Opportunities for Pro-Social Involvement Scale (No/Yes) - Cronbach α=0.39	
• Participation in Sports Teams	Do you belong or participate in sports teams?
• Participation in Other Clubs	Do you belong or participate in other clubs?
Rewards for Pro-Social Involvement Scale (No/Yes) - Cronbach α=0.88	
• Neighbors Proud of Student	In your neighborhood, are there neighbors that feel proud of you when you do things right?
• Congratulations by Neighbors	In your neighborhood, do some of your neighbors congratulate you when you do things right?
• Motivation by Neighbors	In your neighborhood, do you have neighbors that motivate you to do things right?
Perceived Availability of Handguns	Even if you don't use them, if you wanted to get them, how easy would it be to get a handgun? (Very hard/A bit hard/A bit easy/Very easy)

REFERENCES

1. Bloch DS. Adolescent suicide as a public health threat. *J Child Adolesc Psychiatr Nurs*. 1999;12(1):26-38.

2. Cantor C, Neulinger K. The epidemiology of suicide and attempted suicide among young Australians. *Aust N Z J Psychiatry*. 2000;34(3):370-387.

3. Joffe RT, Offord DR. Epidemiology. In: MacLean G, ed. *Suicide in Children and Adolescents.* Lewiston, NY: Hogrefe & Huber Publishers; 1990:1-14.

4. Yunes J, Zubarew T. Mortalidad por causas violentas en adolescentes y jóvenes: Un desafio para la Región de las Américas [Mortality due to violent causes in adolescents and young people: A challenge for the Americas region]. *Rev. Bras. Epidemiol.* 1999; 2(3):102-171.

5. Puerto Rico Department of Health. *Informe anual de estadísticas vitales 2001 [2001 Annual Vital Statistics Report]*. San Juan, Puerto Rico: ASPESIS, Division of Statistics; 2003.

6. Borowsky IW, Ireland M, Resnick MD. Adolescent suicide attempts: risks and protectors. *Pediatrics*. 2001;107(3):485-493.

7. Kann L, Kinchen SA, Williams BI, et al. Youth risk behavior surveillance - United States, 1999. *MMWR Morb Mortal Wkly Rep*. 2000; 49(SS-5):1-96.

8. King RA, Schwab-Stone M, Flisher AJ, et al. Psychosocial and risk behavior correlates of youth suicide attempts and suicidal ideation. *J Am Acad Child Adolesc Psychiatry.* 2001; 40(7):837-846.

9. National Center for Health Statistics. *Health, United States, 2004 With Chartbook on Trends in the Health of Americans*. Hyattsville, Md; 2004.

10. American Academy of Pediatrics Committee on Adolescence. Suicide and suicide attempts in adolescents. *Pediatrics*. 2000;105(4 pt 1):871-874.

11. Alvira-Robles LL, Diaz-Villafañe W, Torres-Giovannetti J. *Salud mental en adolescentes: percepción de los adolescentes con diagnósticos psiquiátricos que reciben servicios en los hospitales de salud mental públicos y privados en Puerto Rico sobre su funcionamiento familiar, académico y social a agosto de 1995 [Mental Health among Adolescents: Perception of Adolescents with Psychiatric Diagnoses that Receive Services about their Family, Academic and Family Functioning in Public and Private Mental Health Hospitals in Puerto Rico, August 1995]* [master's thesis]. San Juan, Puerto Rico: University of Puerto Rico; 1995.

12. Barthel CA. *Sociodemographic Variables as Predictors in Adolescent Suicide Attempts in Outpatient Psychiatric Settings* [master's thesis]. Ann Arbor, Mich: The University of Michigan; 1989.

13. Beautrais AL. Risk factors for suicide and attempted suicide among young people. *Aust N Z J Psychiatry*. 2000;34(3):420-436.

14. Beers MH, Berkow R, eds. Section 15-Psychiatric disorders. Chapter 190-Suicidal behavior. In: *The Merck Manual of Diagnosis and Therapy.* 17th ed. Whitehouse Station, NJ: Merck Research Laboratories; 1999:1544-1549.

15. Bensley LS, Van Eenwyk J, Spieker SJ, Schoder J. Self-reported abuse history and adolescent problem behaviors. I. Antisocial and suicidal behaviors. *J Adolesc Health*. 1999;24(3):163-172.

16. Brent DA. Risk factors for adolescent suicide and suicidal behavior: mental and substance abuse disorders, family environmental factors, and life stress. *Suicide Life Threat Behav.* 1995;25(suppl):52-63.

17. Crumley FE. Substance abuse and adolescent suicidal behavior. *JAMA*. 1990;263(22):3051-3056.

18. González-Cancel LJ, Ramos-Lozano AV, Rivera-Vargas J, Torres-González AE. *Suicidio en adolescentes: factores de la dinámica familiar asociados a las ideas e intentos suicidas de los adolescentes participantes del Programa de Servicios de Salud a Adolescentes y del Proyecto de Prevención del Suicidio en Adolescentes, Hospital Regional de Caguas, a mayo de 1998 [Suicide in Adolescents: Family Dynamic Factors Associated with Suicidal Ideation and Suicide Attempts among Adolescents Participating in the Health Services to Adolescents Project and the Adolescent Suicide Prevention Project, Caguas Regional Hospital, May 1998]* [master's thesis]. San Juan, Puerto Rico: University of Puerto Rico; 1998.

19. Hassan-Ríos E. *Estudio epidemiológico sobre sicopatología y su relación con la ideación e intento suicida en niños y adolescentes de 9 a 17 años del área metropolitana de San Juan, Puerto Rico, para el 1990 [Epidemiologic Study about Psychopathology and its Relationship with Suicide Ideation and Attempt in Children and Adolescents 9 to 17 Years Old from the San Juan Metropolitan Area, Puerto Rico, for 1990]* [master's thesis]. San Juan, Puerto Rico: University of Puerto Rico; 1993.

20. Hintikka J, Hintikka U, Koskela K, Kontula O. Common mental disorders, suicidality and use of health care services during late adolescence in Finland. *J Adolesc Health*. 2000;26(1):2-3.

21. Jellinek MS, Snyder JB. Depression and suicide in children and adolescents. *Pediatr Rev*. 1998; 19(8):255-264.

22. Krug EG, Dahlberg LL, Mercy JA, eds. *World Report on Violence and Health.* Geneva, World Health Organization; 2002.

23. MacLean G. Clinical perspectives. In: MacLean G, ed. *Suicide in Children and Adolescents.* Lewiston, NY: Hogrefe & Huber Publishers; 1990:15-39.

24. Makikyro TH, Hakko HH, Timonen MJ, et al. Smoking and suicidality among adolescent psychiatric patients. *J Adolesc Health*. 2004;34(3):250-253.

25. McQuillan CT, Rodríguez J. Suicide, adolescents and Puerto Rico. *Bol Asoc Med P R*. 2000;92(1-3):22-29.

26. Pfeffer CR. Manisfestation of risk factors. In: MacLean G, ed. *Suicide in Children and Adolescents.* Lewiston, NY: Hogrefe & Huber Publishers; 1990:65-88.

27. Sánchez-Lacay JA, Parrilla-Cruz CE, Pagán-Castro AL. Intentos suicidas en adolescentes [Suicide attempts in adolescents]. *Bol Asoc Med P R*. 1985;77(7):273-277.

28. Swahn MH, Lubell KM, Simon TR. Suicide attempts and physical fighting among high school students-United States, 2001. *MMWR Morb Mortal Wkly Rep*. 2004;53(22):474-476.

29. U.S. Department of Health and Human Services. Chapter 18-Mental health and mental disorders. In: *Healthy People 2010, Volume II, Objectives for Improving Health (Part B: Focus Areas 15-28)*. 2nd ed. Washington, DC: U.S. Government Printing Office; 2000: 18.1-18.32.

30. Weiner IB. Suicidal behavior. In: *Psychological Disturbance in Adolescence*. 2nd ed. New York, NY: John Wiley & Sons, Inc.; 1992: 357-384.

31. Woods ER, Lin YG, Middleman A, Beckford P, Chase L, DuRant RH. The associations of suicide attempts in adolescents. *Pediatrics*. 1997; 99(6):791-796.

32. Carris MJ, Sheeber L, Howe S. Family rigidity, adolescent problem-solving deficits, and suicidal ideation: a mediational model. *J Adolesc*. 1998;21(4):459-472.

33. Garber J, Little S, Hilsman R, Weaver KR. Family predictors of suicidal symptoms in young adolescents. *J Adolesc*. 1998;21(4):445-457.

34. Hawkins JD, Catalano RF, Millar JY. Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: implications for substance abuse prevention. *Psychol Bull.* 1992;112(1):64-105.

35. Arthur MW, Hawkins JD, Pollard JA, Catalano RF, Baglioni AJ Jr. Measuring risk and protective factors for substance use, delinquency, and other adolescent problem

behaviors. The Communities That Care Youth Survey. *Eval Rev*. 2002;26(6):575-601.

36. Heikkinen M, Aro H, Lönnqvist J. Recent life events, social support and suicide. *Acta Psychiatr Scand*. 1994;377(suppl):65-72.

37. Ikeda RM, Crosby A, Thomas RG, Annest JL, Berrios-Torres SI. Suicide among Hispanics-United States, 1997-2001. *MMWR Morb Mortal Wkly Rep*. 2004; 53(22):478-481.

38. Moscoso MR, Colón HM, Parrilla I, Reyes-Pulliza JC, Robles RR. *EncuestaJuvenil.Municipal: Uso de substancias entre adolescentes escolares del nivel secundario estimados para cada municipio, sistema público, años escolares 2002-2004 [Municipal.YouthSurvey: Substance Use Estimates among Adolescent Students from the Secondary School Level for each Municipality, Public System, School Years 2002-04]*. Puerto Rico: Oficina de Control de Drogas; 2004.

39. Pohl J, Olmstead MC, Wynne-Edwards KE, Harkness K, Menard JL. Repeated exposure to stress across the childhood-adolescent period alters rats' anxiety- and depression-like behaviors in adulthood: The importance of stressor type and gender. *Behav Neurosci*. 2007;121(3):462-474.

40. Nes RB, Roysamb E, Reichborn-Kjennerud T, Harris JR, Tambs K. Symptoms of anxiety and depression in young adults: genetic and environmental influences on stability and change. *Twin Res Hum Genet*. 2007;10(3):450-461.

41. Southwick SM, Vythilingam M, Charney DS. The psychobiology of depression and resilience to stress: implications for prevention and treatment. *Annu Rev Clin Psychol*. 2005;1:255-291.

42. Daniel SS, Walsh AK, Goldston DB, Arnold EM, Reboussin BA, Wood FB. Suicidality, school dropout, and reading problems among adolescents. *J Learn Disabil*. 2006;39(6):507-514.

43. Mather M. *Children in Puerto Rico: Results from the 2000 Census.* A KIDS COUNT/PRB Report on Census 2000. Baltimore, Md: The Annie E. Casey Foundation and the Population Reference Bureau; 2003.

44. Hawkins JD, Catalano RF, Kosterman R, Abbott R, Hill KG. Preventing adolescent health-risk behaviors by strengthening protection during childhood. *Arch Pediatr Adolesc Med.* 1999;153: 226-234.

CHAPTER VI

CONCLUSION

Suicidal behavior among adolescents has been increasingly identified as an important clinical and public health problem.[1-3] Suicidal ideation, suicidal threats, and suicide attempts among children and adolescents are more common than the completed act, but few countries have reliable information on these non-fatal suicidal behaviors.[4-5] Information regarding suicidal behavior among Puerto Ricans is sparse. Most studies on prevalence and risk factors for suicidal ideation and suicide attempts among adolescents have focused on students in the USA. Few have focused on Hispanic populations, and almost none have been conducted in Puerto Ricans. This research is the first study in Puerto Rico to present prevalence estimates of suicidal behavior and to evaluate risk and protective factors for suicidal ideation and suicide attempts, using a dataset developed under the context of the Hawkins and Catalano conceptual model of adolescent health and behavior problems, in an island-wide representative sample of adolescent students.[6] It is also the first study to explore spatial patterns of suicidal behavior in Puerto Rico.

PREVALENCE AND SPATIAL DISTRIBUTION OF NON-FATAL SUICIDAL BEHAVIORS

Prevalence of suicidal behavior among Puerto Rican adolescent students in this study was higher than that reported for students in the USA. Approximately 15.7% of the Puerto Rican students reported suicidal ideation, and 12.8% reported at least one suicide attempt. A compelling finding in this study was that the prevalence of both suicidal behaviors clustered spatially, with the highest prevalence observed in the southeastern and eastern municipalities of the island. The presence of depressive symptoms and several

adolescent risky behaviors, such as cigarette, alcohol, and illicit drug use, also seemed to cluster in the same geographic areas as suicidal behavior. Municipality-level characteristics obtained from the 2000 U.S. Census Bureau, the Puerto Rico Continuous Health Survey, and from the current study were evaluated to try to explain this spatial clustering. Only the percentage of students in the municipality who reported at least one symptom of depression was associated with the prevalence of both suicidal ideation and suicide attempts. Suicide attempts were also associated with the annual average number of visits to the doctor, and suicidal ideation was associated with the percentage of students who had ever used alcohol. However, care should be taken when interpreting these geographical associations since the unit of observation was aggregate data for the municipalities. Inferences on individual risks cannot be made since it would constitute an ecological fallacy. Results from this analysis point to the need to examine these relationships using an analytical study design. Effective strategies for the prevention of suicidal behavior among adolescents should target high-risk groups in the geographic areas identified. These results also suggest the need for increased screening for depression and suicidal behaviors in the primary care setting.

SOCIO-DEMOGRAPHIC CHARACTERISTICS

Prevalences of suicidal behaviors were significantly higher among females and high school students, among those who did not live with both parents, among those not born in the island, and among those whose mother had less than a high school education. Being female was the socio-demographic characteristic most strongly associated with suicidal behavior, which is consistent with previous studies.[2, 3, 5, 7-16] Adolescent females had over two and a half times higher risk of suicidal ideation and suicide attempts than male students. Not living with both parents was also an important predictor of both suicidal ideation and attempt. Father's educational level was not associated with these behaviors. These results are consistent with previous published studies.[3, 5, 11, 17-18] These high risk groups could be targeted for prevention activities. Information from this study provides an important source of future comparison to other Hispanic populations, and provides baseline data for future studies among Puerto Rican adolescents.

INDIVIDUAL AND FAMILY CHARACTERISTICS

Using Hawkins and Catalano's conceptual model of adolescent health and behavior problems as a reference, we fount that individual and family characteristics were more important predictors for suicidal ideation and suicide attempts among adolescents than peer/social, school, or community characteristics.[6] The individual characteristic most strongly associated with suicidal behavior among students was the presence of depressive symptoms, particularly among females. Students with at least one depressive symptom had seven fold increase in the odds of reporting ever having seriously considered attempting suicide, and more than a six fold higher odds of reporting having attempted suicide at least once as compared to these reporting no depressive symptoms after adjusting for socio-demographic characteristics. Engaging in sensation seeking behaviors, such as doing something because he/she wanted to, doing something dangerous because somebody dared him/her, and doing crazy things even if they were a bit dangerous, were also important predictors, particularly among males.

Family conflict was the characteristic related to the adolescents' family most strongly associated with both suicidal behaviors among students, being associated with a three-fold increase in risk of both behaviors. After adjusting for socio-demographic, individual, and family characteristics, a significant interaction term between the presence of depressive symptoms and family conflict was identified among females. Female students who reported family conflict had three times higher odds of reporting depressive symptoms than those who did not report family conflict. This finding highlights the value of a non-confrontational home environment (one with no arguments, insults or yelling between family members) for the emotional well being of adolescent girls. These findings underscore the joint importance of considering both individual and family characteristics when studying suicidality. Future research should focus on developing a better understanding of risks and protective factors for depression to better customize suicide prevention efforts.

PEER, SCHOOL, AND COMMUNITY CHARACTERISTICS

After adjusting for socio-demographic, individual, and family characteristics, characteristics related to the adolescent's community environment were more important determinants of suicidal behavior among these students than peer/social or school characteristics. The level of community disorganization and a perceived availability of handguns were found to be significantly associated with suicidal ideation and suicide attempts among both genders. Females who reported the highest level of disorganization in their community or who reported that it was easy to get handguns had a 16-21% higher odds of suicidal ideation and attempts while males had a 24-45% higher odds of both suicidal behaviors.

Experiencing transitions and mobility (changing schools and/or studying outside of Puerto Rico) was also an important predictor, particularly among females. Few school factors and no peer/social characteristics remained in the final model after adjustment. These findings provide us with an increased awareness of the importance of community factors in suicidal behavior among Puerto Rican adolescent students.

LIMITATIONS

This study is a secondary analysis of a survey designed to monitor the prevalence of substance use among students, but which included information of several potential risk factors for suicidal behavior. Strengths of this study include that it is a representative sample of all students between 7^{th} and 12^{th} grade in public schools in Puerto Rico, and that the participation rate was high (75.8%). Few studies on this topic have been performed on representative samples.

As this study is cross-sectional in design, temporal sequence cannot be established, and findings may be subject to recall bias. Recall bias could result in an over- or under-estimation of the prevalence of suicidal behavior among students, and of the relationships between different factors and suicidal behavior. The 16.6% absenteeism may have lead to selection bias, and an under-reporting of the prevalence of suicidal behavior. School

absenteeism has been associated with school performance, and performance has been associated with suicidal behavior.[3, 9, 19] Thus, the current study may have under-estimated the prevalence of suicidal behavior because absentees were not included.

Under-reporting is likely more serious among students in high school since their absentee rate was almost twice as high as among middle school students (20.4% vs. 12.7%). The results will not reflect the experiences of adolescents who have dropped out of school and suicidal behavior is likely to be higher among dropouts than among adolescents still in school.[18, 20] In 2000, it was estimated that 14% of adolescents 16-19 years in old Puerto Rico were high school dropouts.[21] In addition, this study only evaluated students in public schools, which represent 93.2% of all students in the island. Not including private school students, who are mainly in religious schools, introduces another potential selection bias since these students' risk profile might differ. Despite these limitations, this is the first island-wide representative sample describing the prevalence of non-fatal suicidal behaviors in Puerto Rican adolescents on the island and, as such, provides important baseline data upon which to base prevention policies and programs.

IMPLICATIONS FOR PUBLIC HEALTH PRACTICE

It is estimated that 37,834 of the students between 7^{th}-12^{th} grade in Puerto Rico have had suicidal ideation and 30,988 have attempted suicide, which represents a considerable number of teens at risk of suicide. The number of adolescents at risk is even greater if we consider that an estimated 131,119 students reported at least one depressive symptom, 48,846 of whom reported three or four symptoms. Most of these adolescents are probably not served by the mental health system. Primary health care services personnel need to be made aware of these frequencies and to understand which characteristics are the strongest correlates of suicidal behavior. They are the most important health care providers to enlist in the identification of mental disorders and suicidality, particularly during late adolescence, as most people visit physicians at least once a year. Several strategies to educate these health professionals about prevalences and warning signs, and about the importance of screening for depression, might include sending short fact sheets

(both by e-mail and by regular mail), incorporating this information into required continuing education courses, and giving conferences about the topic as part of existing curriculums of health professionals in training.

This study revealed that suicidal ideation was strongly correlated with suicide attempts, and that the patterns of risk for attempts were similar to the patterns for ideation. This has implications for policymaking and for the development of prevention programs since the same proposed prevention measures and programs could potentially impact both suicidal behaviors at the same time. The development of new policies with the adoption of new approaches to deal with a problem takes time, and possibly additional resources or a heavier demand in existing resources. This urgently calls for the development and implementation of an island-wide prevention plan to provide guidance.

Results of this study have profound implications for current and future suicide prevention programs in the island. They highlight the need for an increased focus on addressing depression in adolescents, particularly when expressed in the context of family conflict. Depression and suicidal behavior need to be regarded as any physical illness, i.e., as conditions that need to be identified and promptly dealt with in order to avoid negative consequences. Primary health care providers, particularly those in the municipalities at higher risk of suicide, should implement routine screening for depression, which might result in improved recognition and early treatment of the condition thus reducing the number of suicidal teens. Screening questionnaires might even be used in schools by teachers and school nurses to identify students at high risk for suicidal behavior since the questions used to assess depression may not be considered as intrusive by students, as questions about substance use and antisocial behaviors. Other prevention programs could be targeted at the family level. Parents and other family members could be educated to recognize early warning signs of a potentially suicidal adolescent, including the identification of depressive symptoms. Screening at the family and school levels might be more efficient in recognizing depressive teens, and could be more effective in diminishing suicidal behavior, than screening by health care providers, since adolescents seldomly seek medical care. As with any screening program, a proper referral system is

needed so that teens identified as depressive get the professional help they need. This implies that appropriate health services that can target depression are available.

Mental health promotion programs could be incorporated into the schools' curriculums as primary prevention activities. Molock et al. (2007) argue that successful prevention programs should have an educational component to increase awareness of the prevalence, risk, and protective factors associated with suicidal behavior.[22] Suicide prevention programs could be targeted at teens at high risk of suicidal behavior, such as those who exhibit substance use, antisocial, and/or sensation seeking behaviors. Adolescents at risk might also be those who do not have the ability to cope with the stresses intrinsic to change, which could also induce depression in this age group, and coping strategies could be incorporated into school curriculums.[23-25] Suicide prevention programs at the school level could target new students and help them not only to adjust to their new environment, but to develop their coping skills. Other prevention activities could include interventions during the elementary school grades, since interventions with teachers, parents, and children provided throughout elementary grades have been shown to have enduring positive effects on academic development, and in reducing violent and other risk behaviors among urban children.[26]

Since family characteristics were important predictors of suicidal behavior, prevention efforts should target the family unit. Parents and other family members could be educated to recognize early warning signs of a potentially suicidal adolescent, including the identification of depressive symptoms. Teens in families where there is a high degree of conflict, that is, where there are arguments in the house, insults, and yelling between family members, are at a higher risk of suicidal behavior. Prevention programs could be developed to identify families at risk and to develop strategies for working directly with them. These families could be offered counseling services, and be taught strategies to better deal with problems and with each other.

Community-based prevention programs could also be developed. They should include more than one strategy and should be linked to available mental health resources.[27] These

activities could be implemented in churches, schools, or in other community settings, and incorporate multiple strategies. Some prevention programs could concentrate on early detection of suicidal teens, particularly by conducting depression screening. These screening programs and other prevention programs should be coordinated with agencies that provide primary care and mental health services to deliver the appropriate follow-up of depressive individuals, which might include health education or direct medical intervention. This study provided us with an increased awareness of the importance of community factors in suicidal behavior among Puerto Rican adolescent students. The results underscore the importance of targeting prevention efforts to communities with a high level of community disorganization (communities perceived by students as those where harm could come to them, and that have graffiti, crime, drug selling, fights, and/or empty or abandoned buildings), including the need to ensure that the basic needs of its inhabitants, including their mental health needs, are addressed.

FUTURE RESEARCH DIRECTIONS

Future research should focus on evaluating different interventions designed to prevent and/or reduce the occurrence of suicidal behavior among adolescents. These efforts should target depression in teens, and incorporate interventions at the family level. A better understanding of risks and protective factors for depression is also needed. In addition, the relationship between depression and suicidal behavior needs to be evaluated to determine if there is a cause-effect relationship, or if depression is an indicator of suicidal behavior.

Further research can also focus on developing a better understanding of risk and protective factors for suicidal behavior and their inter-relationships to better customize suicide prevention efforts. That is, further analyses should include other variables that have been found to be related to suicidal behavior among adolescents, which may have direct or indirect effects, and that we were unable to evaluate in our study such as: coping skills and problem solving abilities, hopelessness, family history of suicidal behavior and other psychopathologies, homosexuality, other types of violence, abuse, and physical and

mental illnesses, stressful life events, exposure to suicide, hopelessness, romantic breakups, chronic illness, and weight dissatisfaction, among others.

Longitudinal studies can also be performed to better understand the processes and mechanisms that result in suicidal behavior. In addition, studies can be performed to develop models to examine causal links between variables using path analysis, that is, that incorporate variables into pathways that link the risk and protective factors with suicidal behavior. These models can be done separately for both suicidal behaviors and for both sexes.

Other studies on suicidal behavior can concentrate in elucidating different levels of risk and if their correlates vary by level of risk. For example, further studies can evaluate different levels of severity of depression and their relationship with degree and frequency of suicidal behavior.

CONCLUSION

This dissertation is the first study in Puerto Rico to examine suicidal behavior in an island-wide representative sample of adolescent students. It presented prevalence estimates and explored risk and protective factors for suicidal ideation and suicide attempts. It is also the first study to explore spatial patterns of suicidal behavior. Results from this study begin to address the dearth of information about suicidal behavior in Hispanics, specifically among Puerto Ricans. The statistics provided in this study can now be used for comparison to other populations, and can be used as baseline data to study the trends of suicidal behavior in the island.

Suicidal behavior is a complex behavior with many risk and protective factors. Our results agree with previous studies in identifying depression as the most important predictor of suicidal ideation and suicide attempts. It also provided us with important insights on the relationship between correlates of suicidal behavior and the importance of individual, family, and community characteristics. The use of more comprehensive

models which integrate different domains of variables allows us to gain a better understanding of this public health problem, which should facilitate the identification of adolescents at risk for suicidal behavior. Results can also guide future interventions and other prevention efforts designed as a public health response to this problem.

Dr. David Satcher, during his term as USA Surgeon General, expressed that suicidal behavior was a public health problem that had not been adequately dealt with and should be addressed through a systematic public health approach, in the same way other public health problems are approached.[28] That is, we need to first identify and understand their causes and risk factors, and then take measures to remove them. This study provides substantial insight about several determinants and correlates of suicidal behavior. We now need to create and evaluate different interventions to prevent and/or reduce the occurrence of suicidal ideation and attempts, particularly in the adolescent population. These prevention strategies then need to be evaluated, assessing which strategies work with which subgroups in the population, and finally to be implemented in the population at large.[27-28] In Dr. Satcher's words: "we cannot change the past, but together we can shape a different future". Hopefully, our study will provide at least a file, if not a chisel.

REFERENCES

1. Bloch DS. Adolescent suicide as a public health threat. *J Child Adolesc Psychiatr Nurs*. 1999;12(1):26-38.

2. Cantor C, Neulinger K. The epidemiology of suicide and attempted suicide among young Australians. *Aust N Z J Psychiatry*. 2000;34(3):370-387.

3. Joffe RT, Offord DR. Epidemiology. In: MacLean G, ed. *Suicide in Children and Adolescents.* Lewiston, NY: Hogrefe & Huber Publishers; 1990:1-14World Heath Organization, 2003.

4. Krug EG, Dahlberg LL, Mercy JA, eds. *World Report on Violence and Health.* Geneva, World Health Organization; 2002.

5. Borowsky IW, Ireland M, Resnick MD. Adolescent suicide attempts: risks and protectors. *Pediatrics*. 2001;107(3):485-493.

6. Arthur MW, Hawkins JD, Pollard JA, Catalano RF, Baglioni AJ Jr. Measuring risk and protective factors for substance use, delinquency, and other adolescent problem behaviors. The Communities That Care Youth Survey. *Eval Rev*. 2002;26(6):575-601.

7. Kann L, Kinchen SA, Williams BI, et al. Youth risk behavior surveillance - United States, 1999. *MMWR Morb Mortal Wkly Rep*. 2000; 49(SS-5):1-96.

8. King RA, Schwab-Stone M, Flisher AJ, et al. Psychosocial and risk behavior correlates of youth suicide attempts and suicidal ideation. *J Am Acad Child Adolesc Psychiatry.* 2001; 40(7):837-846.

9. Sánchez-Lacay JA, Parrilla-Cruz CE, Pagán-Castro AL. Intentos suicidas en adolescentes [Suicide attempts in adolescents]. *Bol Asoc Med P R*. 1985;77(7):273-277.

10. Bensley LS, Van Eenwyk J, Spieker SJ, Schoder J. Self-reported abuse history and adolescent problem behaviors. I. Antisocial and suicidal behaviors. *J Adolesc Health*. 1999;24(3):163-172.

11. Brent DA. Risk factors for adolescent suicide and suicidal behavior: mental and substance abuse disorders, family environmental factors, and life stress. *Suicide Life Threat Behav.* 1995;25(suppl):52-63.

12. Canetto SS. Meanings of gender and suicidal behavior during adolescence. *Suicide Life Threat Behav*. 1997;27(4):339-351.

13. Gonzalez-Manrique MA, Rodríguez-Llauger A. Epidemiological trends of suicide in Puerto Rico: 1931 to 1985. *P R Health Sci J*. 1988;7(3):245-250.

14. Makikyro TH, Hakko HH, Timonen MJ, et al. Smoking and suicidality among adolescent psychiatric patients. *J Adolesc Health*. 2004;34(3):250-253.

15. Woods ER, Lin YG, Middleman A, Beckford P, Chase L, DuRant RH. The associations of suicide attempts in adolescents. *Pediatrics*. 1997; 99(6):791-796.

16. U.S. Department of Health and Human Services. Chapter 18-Mental health and mental disorders. In: *Healthy People 2010, Volume II, Objectives for Improving Health (Part B: Focus Areas 15-28)*. 2nd ed. Washington, DC: U.S. Government Printing Office; 2000: 18.1-18.32.

17. Hassan-Ríos E. *Estudio epidemiológico sobre sicopatología y su relación con la ideación e intento suicida en niños y adolescentes de 9 a 17 años del área metropolitana de San Juan, Puerto Rico, para el 1990 [Epidemiologic Study about Psychopathology and its Relationship with Suicide Ideation and Attempt in Children and Adolescents 9 to 17 Years Old from the San Juan Metropolitan Area, Puerto Rico, for 1990]* [master's thesis]. San Juan, Puerto Rico: University of Puerto Rico; 1993.

18. Daniel SS, Walsh AK, Goldston DB, Arnold EM, Reboussin BA, Wood FB. Suicidality, school dropout, and reading problems among adolescents. J Learn Disabil. 2006;39(6):507-514.

19. Barthel CA. *Sociodemographic Variables as Predictors in Adolescent Suicide Attempts in Outpatient Psychiatric Settings* [master's thesis]. Ann Arbor, Mich: The University of Michigan; 1989.

20. Daniel SS, Walsh AK, Goldston DB, Arnold EM, Reboussin BA, Wood FB. Suicidality, school dropout, and reading problems among adolescents. *J Learn Disabil.* 2006;39(6):507-514.

21. Mather M. *Children in Puerto Rico: Results from the 2000 Census.* A KIDS COUNT/PRB Report on Census 2000. Baltimore, Md: The Annie E. Casey Foundation and the Population Reference Bureau; 2003.

22. Molock SD, Barksdale C, Matlin S, Puri R, Cammack N, Spann M. Qualitative study of suicidality and help-seeking behaviors in African American adolescents. *Am J Community Psychol.* 2007;40(1-2):52-63.

23. Pohl J, Olmstead MC, Wynne-Edwards KE, Harkness K, Menard JL. Repeated exposure to stress across the childhood-adolescent period alters rats' anxiety- and depression-like behaviors in adulthood: The importance of stressor type and gender. Behav Neurosci. 2007;121(3):462-474.

24. Nes RB, Roysamb E, Reichborn-Kjennerud T, Harris JR, Tambs K. Symptoms of anxiety and depression in young adults: genetic and environmental influences on stability and change. Twin Res Hum Genet. 2007;10(3):450-461.

25. Southwick SM, Vythilingam M, Charney DS. The psychobiology of depression and resilience to stress: implications for prevention and treatment. Annu Rev Clin Psychol. 2005;1:255-291.

26. Hawkins JD, Catalano RF, Kosterman R, Abbott R, Hill KG. Preventing adolescent health-risk behaviors by strengthening protection during childhood. *Arch Pediatr Adolesc Med.* 1999;153: 226-234.

27. Potter LB, Powell KE, Kachur SP. Suicide prevention from a public health perspective. *Suicide Life Threat Behav.* 1995;25(1):82-91.

28. Satcher D. Bringing the public health approach to the problem of suicide. *Suicide Life Threat Behav*. 1998;28(4):325-327.