THE CONTRIBUTION OF SCHOOL-LEVEL FACTORS TO CONTRACEPTIVE USE AMONG ADOLESCENTS IN NEW YORK CITY PUBLIC HIGH SCHOOLS

By

DEBORAH L. KAPLAN

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Nicholas Freudenberg, DrPH

Date

Chair of Examining Committee

Nicholas Freudenberg, DrPH

Date

Executive Officer

Diana Romero, PhD, MA

Luisa Borrell, DDS, PhD

John Santelli, MD, MPH

Supervisory Committee

THE CITY UNIVERSITY OF NEW YORK

Abstract

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by

Deborah L. Kaplan

Advisor: Professor Diana Romero

Every year approximately 17,000 adolescents ages 15-19 become pregnant in New York City. Most of these pregnancies are unintended and only a small percent of adolescents use effective contraception, with wide disparities by race/ethnicity and poverty level. While many studies have identified factors associated with contraceptive use, most research has focused on individual level factors, with little attention to the contribution of the school environment to sexual risk behavior and contraceptive use.

This study investigates the effect of school-level factors on contraceptive use among adolescents in NYC public high schools before and after controlling for individual-level factors, and whether this effect varies with race/ethnicity. Using a cross-sectional design, the NYC Youth Risk Behavior Survey (YRBS) individual-level datasets for 2007, 2009 and 2011 were linked to a school-level dataset. Variables were selected based on empirical findings on factors associated with sexual behaviors, including contraceptive use, by adolescents. The analytic sample included all YRBS respondents aged 14 or older who reported having sexual intercourse in the past three months and had complete responses to the YRBS questions on contraceptive use at last sex (N=8,054).

The chi square test of significance was used to evaluate significant associations between independent variables and contraceptive use in bivariate analyses; variables with a p value < 0.1 were included in the multivariable analyses. Binary and multinomial logistic regression analyses were conducted to estimate the strength of the associations of school-level factors with contraceptive use among sexually active adolescents.

Findings included that use of any contraception and/or hormonal contraception at last sexual intercourse was associated with attending schools with a higher six-year graduation rate, higher percent of students strongly agreeing they were safe in their classrooms, higher percent of teachers at the school for over two years, and having a School-Based Health Center (SBHC) in the building.

No known study has examined the contribution of school-level effects to contraceptive use in a dataset linking YRBS and school-level datasets. Implications of research findings are that schools providing a supportive, engaging and safe environment can protect students from sexual risk behaviors and increase contraceptive use among sexually active adolescents.

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Bedell. You have all been by my side – literally or virtually – as I've plodded through the doctoral program. Mary – thank you for your glowing reference for my application to the doctoral program, for challenging me to think clearer and bigger, for your high standards for the written word, for giving me the opportunity to be an Assistant Commissioner, for your commitment to social justice which inspires me to always let that be my guide, and for appreciating my tenaciousness (even if it is sometimes annoying). Lorna – thank you for always making time to talk and help me problem solve about work and academic challenges, for your enthusiasm for the DrPH program and my participation in it, and for being a role model for how to figure out and continuously prioritize the need for work-life balance. Jane – we have been "partners in crime" at the NYC Health Department (DOHMH) for about ten years. I can't begin to say how important our collegial relationship and friendship has been and continues to be for me. Thank you for your generosity in acknowledging and appreciating others accomplishments, including mine. Thank you for being willing - without complaint or keeping any kind of "tab" - to take up the slack in our mutual work so that I could prioritize completing my dissertation this past year. I am so proud of the work we have accomplished together to promote and increase the availability of sex education and sexual and reproductive health services for NYC teens.

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DEDICATIONS

To Erik, Emma and Zoë for the amazing and loving husband and daughters that you are. You make me so very happy and proud, and I love you with all my heart.

In memory of Doug Kirby, who died on December 22, 2012.
He will always be a guiding light in my work and the work of many others dedicated to improving the lives of young people.

And in loving memory of my parents, Blanche and Jack Kaplan, who instilled in me the values of service and integrity, and pointed me in the direction of fighting for social justice.

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CHAPTER 1 – INTRODUCTION

Almost 90% of teen pregnancies are unintended. Only a small percent of adolescents use effective contraception, with wide disparities in these measures by race/ethnicity and poverty level.(1) There are numerous studies identifying factors associated with contraceptive use, including programs that increase contraceptive use. However, most of the research has focused on individual level factors and interventions, with limited research on the contribution of the school environment to sexual risk behavior and contraceptive use.

This study investigates the effect of school-level factors on contraceptive use among adolescents in NYC public high schools, including variation by race and ethnicity, before and after controlling for individual-level factors. No known study has examined the contribution of school-level effects to contraceptive use in a dataset linking Youth Risk Behavior Survey (YRBS) and school-level datasets. Implications of research findings are that schools providing a supportive, engaging and safe environment may protect students from sexual risk behaviors and increase contraceptive use among sexually active adolescents.

Using a cross-sectional design, the NYC YRBS individual level datasets for 2007, 2009 and 2011 were linked to school-level datasets from corresponding school years though a school identifier. The individual-level constructs included in the analyses were demographics, health-related factors, connectedness/safety, and sexual behaviors. School-level constructs were demographics, academics, connectedness/prosocial activities, safety/ambient hazards, and whether or not a school had a School-Based Health Center (SBHC). Bivariate analyses and chi square test of significance were conducted to determine associations. Binary and multinomial

logistic regression analyses were conducted to estimate the strength of the associations of school-level factors with contraceptive use among sexually active adolescents.

Chapter 2 (Background) is divided into three sections. Section 1 defines the problem and why it is important to public health, including teen pregnancy and birth trend data in the US and NYC, and individual, neighborhood and school-level factors associated with contraceptive use by teens. This section also discusses the theoretical framework guiding this research. Section 2 reviews empirical findings on school-based interventions to increase teen contraceptive and condom use and improve other sexual health outcomes. This includes a summary of the evidence on what works to increase contraceptive use among sexually active adolescents, and the New York City specific high school environment in which this study took place and helped inform selection of school-level factors to include in the study. Section 3 discusses intersections between individual and contextual factors and school-based interventions and the significance of examining the contribution of school-level effects to contraceptive use.

Chapter 3 (Methods) describes the individual and school-level data sources and measurement of variables, the process for linking and merging these two datasets, and the analytic plan; and Chapter 4 (Results) presents research findings organized by school-level constructs that were identified in the literature to be associated with teen sexual behaviors, and were then operationalized – demographics, academics, connectedness/prosocial activities, safety/ambient hazards, and having a SBHC.

Study findings showed that use of any contraception and/or hormonal contraception at last sexual intercourse was associated with attending schools with a higher six-year graduation

rate, higher percent of students strongly agreeing they were safe in their classrooms, higher percent of teachers at the school for over two years, and having a School-Based Health Center (SBHC) in the building.

Chapter 5 (Discussion) interprets the study findings in light of the research questions and hypotheses that the school environment would have an effect on contraceptive use by sexually active adolescents, and that this effect would vary by race/ethnicity. Implications of research findings are that providing a supportive, engaging and safe environment in schools will be associated with a reduction in sexual risk behaviors and an increase in contraceptive use among sexually active adolescents. Specific recommendations are made for policy change and future research.

CHAPTER 2 – BACKGROUND

- Overview
- Section 1 - The Problem, Why it is Important to Public Health and Theoretical Framework
- Section 2 – High School Interventions and NYC Public High School Context
- Section 3 – Intersections and Significance

OVERVIEW

This chapter is divided into three sections: (1) The Problem, Why it is Important to Public Health and Theoretical Framework; (2) High School Interventions and NYC Public High School Context; and (3) Intersections and Significance. In Section 1, data on teen pregnancy and contraceptive use nationally and in NYC make the case for why this is a key public health concern, describing overall rates and trends, as well as differences by race/ethnicity and socioeconomic status. This is followed by a summary of individual, neighborhood and school-level factors associated with teen contraceptive use and other sexual behaviors or outcomes, factors that informed the selection of variables that were included in the dissertation study. A review of interventions to address the outcome of interest, with a particular focus on school-based interventions, are described to show both what the focus has been on efforts to increase contraceptive use among sexually active adolescents and the gap between what is known about contextual factors associated with this behavior and limited interventions to influence these contextual factors. Section 1 concludes with a description of the theoretical framework that guided this research.

Section 2 summarizes empirical findings on school-based interventions to increase contraceptive use and other protective sexual behaviors, and presents the NYC public high school context, essential background information to understand the selection of school-level factors included in the study, the interpretation of the study findings, and the recommendations based on the findings. This is especially important given the structural changes in NYC public high schools over the past ten years, and how these are likely to have influenced teens' experience of high school and behaviors associated with the school environment. The NYC School-Based Reproductive Health Center is described in detail as it was an intervention introduced during the study period that had a specific goal of increasing contraceptive use by sexually active students, and oversampling of schools with School-Based Health Centers (SBHCs) in the YRBS allowed a comparison of students attending schools with and without SBHCs.

Section 3 describes intersections between individual and contextual levels, and between these levels and school-based interventions, and concludes with a description of the significance of the study.

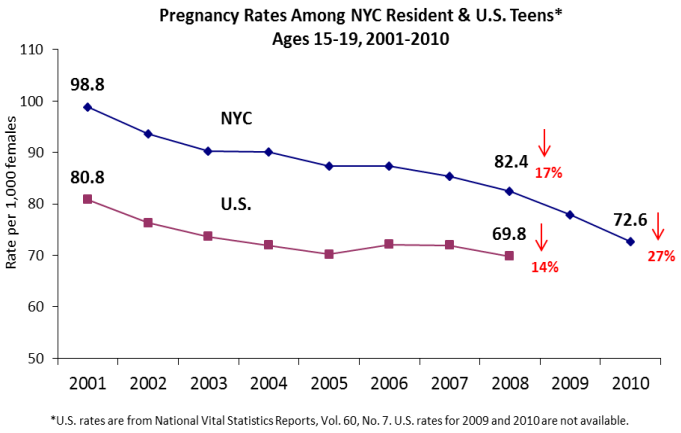
SECTION 1 –The Problem, Why it is Important to Public Health and Theoretical Framework

2.1 Teen Pregnancy and Contraceptive Use

An examination of the changing teen pregnancy rates in the United States and in New York City illustrates the dynamic nature of teen pregnancy, with the influence and interplay of complex behavioral, social, environmental and political factors.(2) Thus, an analysis of teen pregnancy trends requires an examination of context, and the environmental factors that may influence the likelihood of teen pregnancy.

The US teen pregnancy rate has decreased significantly over the past 20 years, with the rate for 15-19 year olds declining by 14%, from 80.8 per 1,000 females in 2001 to 69.8 in 2008, the most recent year for which national data is available.(3) (FIGURE 2.1)

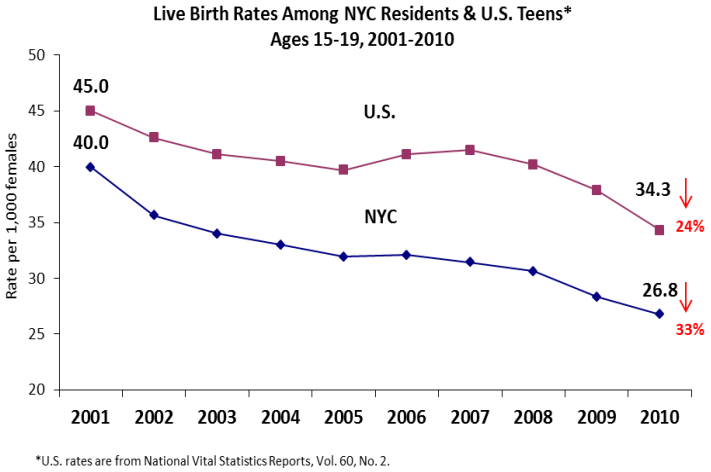
FIGURE 2.1



US teen birth rates are available through 2010 and show an even more dramatic trend, from 45 births per 1,000 females in 2001 to 34.3 in 2010, a 24% decrease.(4) (FIGURE 2.2) It is notable that while the NYC teen pregnancy rate is higher than the US rate, the teen birth rate is lower.

This is because a much higher percent of teen pregnancies end in induced abortion in NYC when compared to the US, in part due to easier access to abortion in NYC.

FIGURE 2.2



A study using data from the National Survey for Family Growth (NSFG), a nationally representative household survey, identified two proximate reasons for reduction in teen pregnancy: delayed initiation of sexual intercourse and increased contraceptive use, with increased contraceptive use responsible for 86% of the reduction in teen pregnancy from 1995-2002.(5) More distal factors that likely influenced teen pregnancy and birth rates, in particular an increase in these rates in 2006 and 2007, include the change in US policy regarding sex education, with promotion and extensive funding of abstinence only education.(6)

The advent of HIV in the 1980s, and increasing awareness of HIV/AIDS by young people beginning in the 1990s, is also likely to have affected teen pregnancy rates, with sexually active teens increasingly using condoms to prevent HIV infection.(7) That said, rates of sexually transmitted infections (STI), in particular chlamydia, remain high among teens, with one in four teens ages 14-19 having at least one STI.(8, 9) This is a critical reason why teen sexual risk

behavior has public health import - lack or inconsistent use of condoms increases the likelihood of STIs,(10) which, if untreated, can result in poor reproductive health outcomes including infertility.

State-level factors that influence teen pregnancy and teen sexual behaviors include the poverty rate and investment in education, as well as laws on abortion, sex education, and minors' access to sexual and reproductive health services, including contraception.(6) The most recent decreases in US teen birth rates from 2008-2010 remain unexplained, although NYC data, described below, help explain a similar decline in NYC.

NYC Pregnancy Rates – Trends and Disparities - In 2010, the NYC teen pregnancy rate among NYC residents ages 15-19 year olds was 72.6 per 1,000 females in this age group. (FIGURE 2.1) While the NYC rate was higher than the US rate, there was a greater percent decline from 2001-2008 (US rates for 2009 and 2010 are not available) in NYC, with the rate falling by 16.5%, as compared to a 13.6% reduction for the US.(3)

The teen pregnancy rate among NYC residents ages 15-19 year declined 26.5% from 2001-2010; the rate among school-age teens ages 15-17 declined even more, 31.6% (Table 2.1). The percent change varied by race/ethnicity in NYC, from a 46% change for Asian-Pacific Islander (API) teens to a 24% drop for non-Hispanic black teens. There was no change in the black-white or the Hispanic-white gap from 2001-2010. (Table 2.1)

TABLE 2.1 - Pregnancy Rates* Among NYC Residents, Ages 15-19, 2001-2010**

Age	2001	2010	% change	Non-Hisp Black 2001/2010 % Δ	Hispanic 2001/2010 % Δ	API 2001/2010 % Δ	Non-Hisp White 2001/2010 % Δ	Black-White Gap % Difference 2001/2010	Hisp-White Gap % Difference 2001/2010
15-17	63.0	43.1	- 31.6%	--	--	--	--	--	--
15-19	98.8	72.6	- 26.5%	145.5/110.7 -24%	130/93.1 -28%	29.9/16.0 -46%	27.3/19.6 -28%	73.0/72.0	76.6/76.7

*rates per 1,000 females of specified age group

**NYC rates are from the NYC Department of Health and Mental Hygiene (DOHMH) Office of Vital Statistics, prepared by the Bureau of Maternal, Infant and Reproductive Health.

Based on data from the NYC Youth Risk Behavior Survey, a representative sample of public high school students, two proximal factors are likely to have contributed to the decline in teen pregnancy rates. From 2001 to 2011, there was a 30% decline in the percent of female students who ever had sex, from 45.6% to 32.1%, and from 2009-2011 the percent of sexually active students who used hormonal birth control (including emergency contraception) the last time they had sex increased significantly from 17.3% to 26.9%.(11)

There are substantial disparities in teen pregnancy by race/ethnicity in NYC, with no change in the percent differences in these rates from 2001-2010 when comparing non-Hispanic blacks or Hispanics with non-Hispanic whites. In 2010, there were a total of 19,080 pregnancies to NYC residents age 15-19, and non-Hispanic black and Hispanic teens accounted for 88% of these pregnancies (42% and 46% respectively), compared to non-Hispanic whites (6%) and Asian/Pacific Islanders (API) (3%).(12) Approximately two-thirds of NYC non-Hispanic black and Hispanic females ages 15-17 resided in high poverty neighborhoods (poverty rate 20% or higher), compared to a little over one-third of non-Hispanic white and API females. Not surprisingly, a similar and somewhat higher proportion of pregnant non-Hispanic black and Hispanic teens ages 15-17 (69.6% and 72.5% respectively) resided in high poverty

neighborhoods compared to pregnant non-Hispanic white and API teens (32.8% and 46.3% respectively).(12) (TABLE 2.2)

TABLE 2.2 – Distribution of Female NYC Residents*, Ages 15-17 by Race/Ethnicity and Neighborhood Poverty, 2010

	All Teens				Pregnant Teens			
Neighborhood Poverty Rate**	Non-Hispanic Black	Hispanic	Non-Hispanic White	Asian/ Pacific Islander	Non-Hispanic Black	Hispanic	Non-Hispanic White	Asian/ Pacific Islander
Low (0 - < 10%)	10.2	6.8	33.2	21.0	5.5	4.4	23.7	9.0
Medium (10-<20%)	27.1	26.0	29.5	42.5	23.4	21.7	41.5	44.0
High (20% or higher)	62.7	67.2	36.2	36.3	69.6	72.5	32.8	46.3

* DOHMH Office of Vital Statistics, prepared by the Bureau of Maternal, Infant and Reproductive Health.
**percent of population with incomes below the federal poverty line, US Census 2000

In 2010, almost 90% (87.2%) of pregnancies among NYC teens age 15-19 were reported to be unintended; there is an even higher rate of reported unintended pregnancy among school-age teens 15-17, at 92.8%.(1) More than two-thirds (67%) of these pregnancies ended in abortion (much higher than the US as noted above), with the percent ending in abortion increasing as the neighborhood poverty rate increased. This suggests, as will be described in greater detail below, that it is important to examine both individual and contextual factors that influence teen sexual risk behavior.

Socioeconomic and racial/ethnic disparities point to other compelling reasons why teen pregnancy is an important public health issue. New York City data and recent research has made it clear that teen pregnancy and birth are not a significant cause of poverty but more a marker of disadvantage as well as the result of limited educational and career options that inform teens' sexual behaviors.(13) Socioeconomic status and residential racial segregation have been shown to predict risky sexual behaviors among teens, with one study finding neighborhood racial composition to be the key neighborhood variable predicting high teen

birth rates in low income neighborhoods.(14) Colen et al note that while the proximal causes of decreases in teen pregnancy and teen birth are due to delays in initiation of sex and increases in contraceptive use, larger national forces, in particular the federal economy, can play a role.(15) This appeared to be the case in the 1990s, when black teens delayed their first pregnancies during a time of economic growth.(15) However, this has not been a consistent finding, and the association did not continue in the 2000s when the teen pregnancy rate continued to decrease at a time the economy was in decline.(6) There appears to be a complex weighing of the risks and benefits of adolescent childbearing, with individual, family and social circumstances influencing adolescents' decision-making process.

Broader findings on the association between racism and health, while not specific to teen childbearing, provide further evidence on the impact of the environment on health. Several studies have found an impact of racism, and in particular how it manifests through racial/residential segregation on disparities in health outcomes.(16-18) These studies highlight how racial/ethnic segregation limits access to social and economic opportunities and increases the likelihood of poor health outcomes among black and Hispanic children and adults.(16-18)

Thus, teen contraceptive use, pregnancy and birth reflect broader inequities and the resultant unequal access to the information, skills and resources teens need to make healthy decisions about their sexual and reproductive health.

2.2 Racial/Ethnic and Socioeconomic Differences in Teen Contraceptive Use in NYC

Although the majority of NYC adolescents initiate sexual activity by the time they are in the 12th grade, hormonal or IUD contraceptive use is low while condom use is relatively high. Among public high school students who were sexually active in 2009, 16% used hormonal birth

control or long-acting reversible contraception (LARC), 65% used a condom or some other method, 6% used withdrawal and 14% did not use any method to prevent pregnancy the last time they had sex.(19) There were differences in teen contraceptive use by race/ethnicity and socioeconomic status (SES) in NYC. When stratified by race/ethnicity, 18.5% of Hispanic teens did not use any method (hormonal, LARC or condom), compared to 14.3% of blacks, 9.6% of Asian/Pacific Islanders and 9.3% of whites.(19)

A study that calculated the predicted annual risk of pregnancy using the Pregnancy Risk Index (PRI) – based on the percentage of sexually active teens in each group, and contraceptive use based on the proportion of sexually active female teens using each method and the method-specific failure rates – found that half of the variance in the predicted annual number of pregnancies between Hispanic and non-Hispanic white teens and almost one-fifth of the variance between non-Hispanic black and non-Hispanic white teens was accounted for by use of less effective contraception.(20) This study found significant differences in pregnancy risk by school neighborhood, after adjusting for grade level and race/ethnicity, with teens attending schools in the South Bronx having significantly higher risk than those attending schools in the rest of the Bronx and Central/East Harlem.(20)

2.3 Factors Associated with Teen Contraceptive Use and Other Sexual Behaviors/Outcomes

Individual-level Factors

An examination of individual, neighborhood and school-level factors associated with teen contraceptive use was essential to identify which variables were most important to include in a study of individual and school-level factors associated with contraceptive use. There is strong empirical evidence of numerous individual-level antecedents to teen sexual risk

behavior that can influence behavior by either increasing risk or providing protection.(21-28) The studies described below cover a 30-year time period, and some of the findings identified in the 1970s may not apply or be as important in the 2000s, again reflecting the dynamic nature of teen pregnancy, with the influence and interplay of complex behavioral, social, environmental and political factors that change over time.

A national study of young adults ages 18-29 identified several reasons that young adults do not use contraception, in particular limited knowledge, myths about contraceptive methods, and fear of side effects.(21) Among unmarried women aged 18-19, 39% thought that it was likely that using a hormonal contraceptive method would lead to serious side effects; of these women, 59% were less likely to use a hormonal method due to this concern.(21) When asked why they were not using contraception at the time they became pregnant, teen respondents to the NYC Pregnancy Risk Assessment Monitoring System survey (a representative sample of women who give birth in NYC) said they thought they could not get pregnant (42%), did not mind getting pregnant (29%), had side effects from the birth control method they used (15%) and had a problem getting birth control (7%).(22) The most common reasons respondents gave for not using contraception post-partum were not wanting to use birth control (29%), their partner did not want them to use a method (27%) and they could not afford to pay for birth control (20%).(22) Qualitative research conducted in 2009 through interviews of NYC teens attending NYC public schools echoed similar reasons for not using contraception, including limited information and myths about methods, concern about side effects of hormonal contraception, and the need for a method that can be hidden from parents.(23)

Both Dryfoos (1998) and Kirby (2007) examined research findings to determine which factors have the greatest effect on teen sexual behavior, in particular age at first sex.(24, 29) More than 100 factors were found to have a significant effect on sexual risk behavior; these included community, school, family, peer and individual-level factors.(24) Not only does age at first sex, use of contraception and teen pregnancy vary by gender, race/ethnicity, and socioeconomic status (see Tables 2.1 and 2.2), but also by family structure, parent education and mothers' employment. Living with both parents and higher parental education was associated with later age at first sex, increased contraceptive use at last sex and decreased likelihood of experiencing a teen birth.(26-28) Female teens whose mothers gave birth during adolescence had a significantly greater likelihood of teen birth.(28)

Other individual risk factors associated with sexual risk behaviors included alcohol and drug use, depression and suicidal ideation or attempts, physical fighting and carrying weapons, greater frequency of sex, forced sex, and previous pregnancy.(24) Protective factors included sports (only found for girls), school connectedness, older age at first voluntary sex, and use of condom or other contraception at last sex.(24)

Key protective family factors included living with parents, higher family income and educational level, and clear communication with teens about parents' expectations regarding sexual behavior. Influential peer factors included having friends who are sexually active, and/or using alcohol and drugs; and teens' beliefs about their friends' attitudes.(24) Neighborhood and school factors will be discussed in detail later in this chapter.

The four areas found in the literature to have the greatest influence on teen sexual behavior are (1) individual factors, including demographic characteristics (e.g. age, gender and

race/ethnicity), age of first sex and other sexual behaviors, health related factors (e.g. history of forced sex, intimate partner violence, depression or suicidal ideation), and perceived school connectedness and safety; (2) environmental factors teens are exposed to in their daily lives that are associated with social and economic disadvantage; (3) social norms regarding sexual behavior; and (4) clear messages about sexual activity, pregnancy and birth from key adults in teens' lives. The strongest associations found were with the sexual beliefs, values and attitudes held by teens themselves. In addition, as would be expected, increased risk of unprotected sex and pregnancy was associated with a greater number of risk factors and fewer protective factors.(24)

There are several studies that have examined individual teen sexual outcomes while controlling for neighborhood factors, but a more limited number has controlled for school-level factors or has examined contraceptive use as the outcome.(30-45) There are no known studies that have examined the association of school-level factors on contraceptive use among sexually active teens while controlling for the independent effects of individual and school factors.

Contextual Factors – Neighborhoods

Neighborhood factors – the day-to-day influences that teens experience based on where they live – may have an important role to play in teens' sexual behaviors and outcomes, and in particular, on use of contraception and unintended teen pregnancy and birth. While this research will focus on school and individual-level factors, it is important to include and understand the way neighborhood can influence teen sexual behaviors, given the larger body of research on this association and the possible applicability to school-level associations. This

dissertation study drew from neighborhood-related findings from other studies to identify and operationalize school-level factors that may influence sexual risk behavior.

Over the past few years, new theoretical constructs, conceptual frameworks, and analytic methodologies have been developed and applied to understand the specific way neighborhood factors influence teen sexual behaviors.(30-32, 34) There is one common thread in this research, which is the importance of simultaneously including individual and neighborhood-level factors in analyses to assess the independent effects of factors in each level and determine factors with the strongest association at each level. This methodological approach is essential to develop a better understanding of teen sexual risk behavior and to identify effective interventions and policy recommendations to reduce sexual risk behavior, unintended pregnancy and birth among adolescents.

All studies reviewed on the neighborhood effects on teen sexual behavior used US census data to measure neighborhood-level poverty as one key measure of neighborhood context.(30-32) In addition, other constructs were included from census tract data, including educational attainment, racial composition, and adult labor market experience. One study used aggregate measures from individual-level surveys to measure ambient hazards, a construct that is described in further detail below.(32) Table 2.3 summarizes the neighborhood and school factors described below, and whether each factor is associated with an increase or decrease in sexual risk behavior.

TABLE 2.3 - Neighborhood and School-Level Factors Associated with Teen Sexual Behavior*

	Neighborhood-Level	School-Level
Demographic	Poverty (SES, median family income, female unemployment) - Female full-time employment + Race/Ethnicity ± Gender ± Live in single parent families -	Poverty (Eligibility for school lunch) - Race/Ethnicity (diversity of student body) ± Gender ±
Norms **Academics**	Ambient hazards - Prosocial activities +	Higher graduation rates + Learning focused schools + High conflict schools - Higher daily attendance +
Connectedness	Prosocial activities +	Feel cared for, supported and/or close to a teacher or another adult at school + Feel part of, happy at and/or safe at school + Sense of school as community + Prosocial activities +
Safety	Ambient hazards -	Feel safe at school +
Other		Desegregation +

*(+) indicates factors associated with a lower likelihood of engaging in risky sexual behavior; (-) indicates factors associated with a higher likelihood of risky sexual behavior; and (±) indicates a mixed association (gender and race/ethnicity)

There were several consistent findings across studies. All studies found that in addition to neighborhood poverty, access to resources, including recreation and other prosocial opportunities, positive adult role-models, and adult supervision (also referred to as informal social control), had an independent effect on teen sexual risk behavior.(30-32, 34) These findings help explain how neighborhood poverty may be mediated through these other factors to affect risk behaviors in young people. They also provide insight, which will be discussed later, into how school-level factors can address and possibly help compensate for deprivations young people experience in their neighborhood. These findings are further explained by ethnographic studies suggesting that teens with little social capital to draw on will see little cost and possibly much benefit in early sexual activity and childbearing. For these young people, sex may be perceived and/or experienced as the path to intimacy and peer acceptance, and childbearing the path to becoming an adult and having autonomy and independence.(46, 47)

Researchers operationalized social constructs to measure neighborhood cohesion, resources and/or positive adult role models, supervision and social control in several ways, and in each case found significant associations with sexual risk behavior. Ramirez et al (1998) constructed a measure of "prosocial activities", including youth participating in school, church and/or community activities.(31) Upchurch et al (1999) defined the construct "ambient hazards" to measure the degree to which teens experienced their neighborhood as threatening, including perceptions of neighborhood physical deterioration, safety and alternative youth culture.(32) Brewster (1994) included neighborhood-level measures of female unemployment and full employment rates, and the proportion of youth aged 16-19 that did not have a high school diploma and were not in school, employed or in the Armed Forces (defined as "idleness among youth").(30) Browning (2008) operationalized "collective efficacy," a construct developed by Sampson et al (1997) to measure neighborhood cohesion and informal social control, to study neighborhood effects on teen sexual risk behavior.(34, 48)

In addition to finding significant associations with measures of neighborhood context and sexual risk behaviors in all young people studied, a key finding from at least two of the studies was a significant reduction in differences in outcomes by race/ethnicity when controlling for the effects of neighborhood context.(30, 31) These findings support the hypothesis that sexual risk behavior is, at least to some degree, a response to neighborhood factors that constrain options or offer opportunities, and that neighborhood context influences attitudes and expectancies, which in turn influence individual intentions and behaviors.(30) Table 2.3 summarizes empirical findings on neighborhood and school-level factors associated with teen sexual behaviors and outcomes, including contraceptive use.

Contextual Factors – Schools

Schools have the potential to improve health. They are sustainable institutions in every community, serve most children and adolescents in the community, and can support interventions through school-wide policies and service delivery.(49) For the majority of teens, school is the place where they spend the most time with the exception of their family. Thus "the relationship they have with their school experience is important and may influence their involvement in risk behaviors."(41) A statement from the Institute of Medicine underscores the critical role schools can play in the health of young people: a "healthful, psychosocial environment (in school) may be as…or even more important than classroom health education in keeping students away from drugs, …risky sexual behaviors, and the rest of today's social morbidities."(50)

That said, it is important to note that many vulnerable teens drop out of school, losing whatever protections and benefits schools offer. In addition, school interventions are less likely to reach students who are frequently absent. One study found that students who were absent from school were more likely to engage in potentially risky behaviors, including being sexually active and regular use of tobacco, alcohol and marijuana.(51) A 2005 report by the Community Service Society of New York found that almost one out of every six NYC youth ages 16-24 were disconnected, defined as youth that were out-of-school and the labor force. While 71% of these youth were ages 20-24, about half did not have a high school degree or GED. Of particular relevance to this dissertation research, more than one-third of females that were disconnected were mothers. These youth will not be reached by a school-based intervention unless they are reached before they drop out of school.(52)

Kazen et al described the key influence of the school environment on teen behaviors and outcomes including pregnancy and alcohol use, pointing out that "outside of the family, the school is the most proximal socializing agent available to convey societal norms and prohibitions."(53) This study found a significant decrease in teen pregnancy in schools that were "learning-focused," and a non-significant increase in teen pregnancy for female teens attending "high-conflict" schools.(53) This notion of schools as protective, or as described by Duff et al, "enabling environments" pertains to the importance of contextual factors to "support the adoption of those deeper and more enduring habits and practices that support resilience and well-being," and buffering the risks and threats that teens are exposed to.(54) Table 2.3 summarizes the school-level factors described in this section.

There are empirical findings demonstrating the association and inextricable link between academic performance and health behaviors.(35-37, 55) There is strong evidence on the positive association between high school graduation and health outcomes, with less education predicting increased health risk behaviors, worse health outcomes and higher death rates.(55) Teens with higher academic performance or better school attendance were less likely to have initiated sex,(36, 37) and there was an association between school graduation rates and teen pregnancy (although it is not clear which comes first, the pregnancy or school drop-out).(35)

In addition, state and local policies on health can have an impact on academic achievement, and vice versa. Vinciullo and Bradley (2009) examined the association between state policies regarding school health programs - including requirements for school and health education; nutrition, physical and mental health services; and school safety - and two school-

level outcomes - academic test scores and drop-out.(56) They found that states with school health policies had higher statewide academic test scores and lower dropout rates, when compared to states without these policies. In addition, states with SBHCs had higher academic achievement than states without SBHCs.(56) Allensworth et al (2011) concluded from the findings referenced above that the evidence suggests that an effective way to reduce health disparities is to improve high school graduation rates, and they called for a commitment to recommendations developed by the ASCD (formerly Association for Supervision and Curriculum Development) in 2006 through *The Learning Compact Redefined: A Call to Action*. This is a framework for a partnership between public health and education which identified individual and contextual factors that affect health and learning and the common objectives of these two sectors that can result in improved academic achievement and health outcomes.(57)

Exposure to a school environment that provides opportunities for students to "feel a sense of belonging" and to participate "are protective as they buffer stress" and "enhance social integration," which in turn reduces risk taking behavior.(39) This school connectedness is a key construct included as a covariate in several studies on the association between the school environment and teen sexual or other risk behaviors.(38-41, 58-60) Researchers have operationalized school connectedness through aggregate responses to survey questions asking whether or not students feel cared for, supported and/or close to a teacher or another adult at school; and/or if they feel part of, happy at and/or safe at school. While use of individual-level data from self-reported surveys is a limitation of these studies, several found associations between school connectedness and older age of sexual initiation;(38, 40, 41, 60) two found associations with less likelihood of recent sexual activity,(39, 60) and one found an association

with increased use of birth control.(40) Some of these studies also examined other risk behaviors, including substance use and violence, and found that school connectedness protected against these behaviors as well.(38, 58, 59) The power of connectedness is further demonstrated through several studies that found family and/or partner connectedness to reduce the likelihood of sexual risk behavior, including delayed initiation of sex and increased use of contraception or condoms.(38, 60-62)

There are other school-level factors associated with sexual risk behavior and outcomes. While there were variations by student's gender and/or race/ethnicity, one study found participation in prosocial or extracurricular activities to be associated with less likelihood of recent sex.(39) Another study found school racial/ethnic composition, average daily attendance and norms for sexual activity to be associated with age of first sex;(42) a third study found school poverty, measured by percent of students eligible for school lunch, and school safety to be associated with teen birth rates.(43)

A study by Liu at al (2012) also looked at race/ethnicity, conducting a retrospective analysis on the effect of implementation of school desegregation policy on teen birth rates from 1970 to 1980.(44) School desegregation was associated with a significant decrease in births to black teens attending schools in desegregated areas, as compared to teens attending racially segregated schools. There was no significant association for white females. While it is not certain what caused this association, the authors hypothesize that it is likely related to the major change in the school environment and quality of education that black teens were exposed to following school desegregation. With this change there was an associated increase in funding for desegregated schools, a more diverse student body not only by race/ethnicity but

also by socioeconomic status, and a reduction in high school dropout and increased graduation rates.(44) Table 2.4 provides a summary of empirical findings on individual, neighborhood and school-level factors associated with teen sexual behavior and outcomes.

2.4 Theoretical Framework

The theoretical framework for this dissertation research to understand the influence of individual and school-level factors on teen sexual activity and contraceptive use is *social action theory*, which describes how individual behavior change is a "subcomponent of larger social and environmental systems."(63) Social action theory incorporates several individual behavior theories, including *cognitive social learning theory*. Cognitive social learning theory posits that the key factor determining whether or not behavior change occurs is a person's belief that they are "able to successfully execute the behavior required to produce the desired outcome."(64) Social action theory expands upon the influence of individuals' beliefs and situates them in the external environment, stating that the environmental context enhances or constrains individuals' ability to act, regardless of their sense of self-efficacy. This theory "provides a framework for multilevel approaches" to public health interventions, and "offers a theoretical rationale for intervening in health policy and for creating environments that are conducive to self-protective choices."(64)

Social action theory conceptually addresses the main theme of this dissertation research: contextual-level influences on individual level behavior. Social action theory provides a conceptual framework that guided and helped explain the dissertation research findings to answer the question of whether contraceptive use is more likely when teens attend schools

where they are regularly exposed to contextual factors in school that support healthy choices and positive life opportunities.

The conceptual framework for this dissertation research is illustrated in Figure 2.3. This framework illustrates two levels that can have an impact on whether or not sexually active teens utilize contraception: the individual and school levels. The factors included in each of the levels draw from empirical findings on factors significantly associated with teen contraceptive use or other related sexual behaviors. The individual-level factors include the demographic characteristics age, gender and race/ethnicity; health factors including a history of intimate partner violence, forced sex, depression and/or suicidal ideation; perception of school safety; and sexual behaviors including age at first sex, alcohol or drug use at last sex (sexual intercourse), and the number of sexual partners in the past three months.

School-level factors are grouped into five constructs informed by empirical findings on neighborhood and school-level factors associated with teen sexual behavior, and include school demographic characteristics including racial/ethnic composition, gender distribution, and school poverty as measured by the percent of students receiving free school lunch; academics including six-year high school graduation rate and a Quality Review score; school connectedness and prosocial activities; school safety and ambient hazards; and having a SBHC. It was hypothesized that the school-level factors would affect the behavior of sexually active teens, in particular contraceptive use at last sex, before and after controlling for the individual-level factors. Students attending schools with higher graduation rates and attendance, higher measures of school connectedness and safety, and SBHCs were expected to have an increased rate of contraceptive use at last sex when compared to students attending schools with lower

rates of these factors. While not directly part of the conceptual framework, the long-term outcome of increased contraceptive use is a reduction in teen pregnancy (see Figure 2.3).

In addition to social action theory, other theories are important to consider and informed the research, particularly in regard to the role of school connectedness or bonding, a key construct this study measured at the school level.(39, 65, 66) Hawkins et al (1992) describe the *social development model*, which integrates control (see below) and social learning theories and "emphasizes the role of bonding to prosocial family, school and peers as a protection against…" high-risk behaviors (i.e., substance misuse). Successful interventions and/or environments will support "bonding to a [positive] social unit," (as opposed to gangs, for example) which has been found to be protective for a range of risky social and health behaviors and outcomes.(65) Practical application of this approach suggests that bonding or connectedness will occur or be reinforced if the environment the individual is exposed to provides opportunities to be involved in prosocial activities, and to develop skills to be successful at and positive reinforcement of participation in these activities.(65) McBride et al (1995) expanded on this to suggest that the mechanism through which school connectedness protects against high-risk behaviors is by buffering stress, thereby "enhancing social integration and in turn, decreasing adolescents' risk-taking behavior."(39)

Catalano et al (2004) further expound on the theoretical framework for the protective role of school connectedness or bonding.(66) They define school bonding (used interchangeably with school connectedness) as having two interrelated components – attachment through key relationships with school faculty and commitment to doing well in school. They describe three theories that support a mechanism through which connectedness affects behavior: attachment

theory, control theory and social development theory. *Attachment theory* is a key theory in early childhood development, and begins with attachment to the parent/primary provider as an essential foundation to healthy development. This theory has supported the development of evidence-based interventions to develop and strengthen the bond between parent and child. Catalano et al suggest that if a young person has a similar bond to their school (or other important environment in an adolescents' life), feeling safe, secure and nurtured in this environment, they will be protected from engaging in high-risk behaviors. *Control theory* "adds that school commitment and attachment create an informal control that reduces problem behaviors that interfere with school success." And as described above, social development theory "suggests that once bonds to school are strongly established," and the school environment has characteristics promoting academic achievement and healthy development, these bonds "inhibit behavior inconsistent with the norms and values of the school."(66)

The above interrelated theories on individual behavior and response to the environment informed the methodology of the dissertation research, and underscore the importance of examining individual and school-level factors to better interpret adolescent sexual risk behavior, including contraceptive use. These theories point to the importance of school connectedness and safety as key variables to include at the individual and school-levels, as well as measures of school academic quality and other environmental factors that create prosocial opportunities for healthy youth development and reduce the likelihood of sexual risk behaviors such as having sex without hormonal contraception or condoms.

SECTION 2 – High School Interventions and the NYC Public High School Context

2.5 Interventions to Address Teen Contraceptive Use and Other Sexual Behaviors/Outcomes

With evidence demonstrating the significant associations between the school environment and teen sexual behaviors, it is important to understand the role that interventions, particularly school-based interventions have played to modify the school context to reduce sexual risk behaviors among adolescents. This section reviews this literature, with a focus on interventions that have had an effect on contraceptive use among sexually active teens.

A comprehensive review by Kirby of research on interventions to increase contraceptive use and/or condoms among sexually active teens indicates that while there is a paucity of rigorous research on programs that have had large effects and very few with positive results have been replicated, there are several programs that have been successful in delaying initiation of sex, increasing use of contraceptives and condoms, and/or changing other teen sexual behaviors and outcomes.(24)

Of 37 curriculum-based sex or HIV/AIDS education programs that specifically measured condom use, 41% showed a significant increase either across the whole sample or among specific subgroups. Of 13 studies that examined the impact of curriculum-based programs on contraceptive use, four found an increase, eight found no impact, and one found a decrease in contraceptive use. Almost all of these programs were implemented in schools, and had the same impact on both male and female students.(24)

Unlike the numerous rigorous studies of curriculum-based programs, there has been more limited research on clinic-based programs with mixed results. In general, while family

planning clinics provide contraception to many teens every year, the specific impact on pregnancy remains unproven. Of six studies of clinic-based protocols that included one-on-one skills-based counseling on sexual behavior, five found an increase in condom or contraceptive use among teens that received the intervention.(24)

School-based Interventions

Building on the trend of increased contraceptive use among sexually active teenagers, one promising area to expand is school-based interventions in middle and/or high schools. Clinics based in schools have excellent access to students, allowing continuity of care and frequent follow-up when needed, a factor found to be significantly associated with contraceptive use and continuity.(67) In addition to school-based clinical interventions to increase contraceptive use by sexually active teens, there is research on other school-based interventions to reduce teen sexual risk behaviors, pregnancy, and/or birth. There is an extensive body of evidence on curriculum-based sex education programs implemented in schools, which has shown that these programs can delay the initiation of sexual activity and/or increase the use of contraceptives.(24) Significant impacts on reducing sexual risk behavior have also been found in some positive youth development programs that focus on service learning, where youth participate in an organized program that includes unpaid community service and structured time for personal reflection.(24)

Research conducted in NYC helps inform characteristics of effective interventions by examining young teens' intentions and expectancies regarding sexual intercourse, and the importance of incorporating positive expectancies about having sex into interventions to reduce unintended pregnancy and sexually transmitted infections.(68)

What is clear from the school-based studies is that to have an impact, interventions must carefully examine the many antecedents to teen sexual behavior, and implement multi-component interventions that provide teens with the information, skills and resources needed to make healthy decisions about their sexual and reproductive health, including using contraception to prevent unintended pregnancy. In addition, even effective programs have a fairly modest effect, which highlights why this dissertation study on the role of school-level factors on contraceptive use is so important to helping to identify environmental interventions that can support healthy sexual behaviors.

School-based and School-linked Health Centers

SBHCs are primary care delivery sites located within schools, but run by an outside agency - usually a hospital, local health department or other health care agency. These health centers can offer teens a trusted provider, the opportunity for clinic visits without a parent or other caregiver, and the assurance that services will be confidential, which is a key concern of teens.(69-71) In NYC, as in most cities and states, SBHCs are located in schools serving low-income families, with children and adolescents at highest risk of poor health outcomes. Since their inception in 1970, when they were first established to provide primary care services for uninsured, underinsured, low-income and minority children, SBHCs have been found to increase access to health services, address a range of physical and mental health needs, decrease school absenteeism, and reduce emergency room visits. This has been accomplished through the provision of high-quality services that eliminate key barriers to care by being located in school buildings, not requiring payment, and being available during school hours.(72, 73)

Based on data from 2007-2008,[1] there were more than 1,909 SBHCs in the US, with over 46% serving students from 7th to 12th grade.(74) Research has shown that teens with access to SBHCs are more likely to utilize health care services than teens without this access.(75) Access to health care is protective for teens, and research has found improvements in health habits, reduction in risky behaviors, and overall improvement in health for teens who can access comprehensive health services.(76)

Access to SBHCs does not always mean access to comprehensive reproductive health services. While more than 80% of US SBHCs in middle and high schools provide at least one reproductive health service, only about 25% dispense (contraceptive methods available on-site) hormonal contraception or condoms. In the 2007-2008 school year, 61% of SBHCs serving adolescents were prohibited from dispensing contraception.(74)

SBHCs have two key disadvantages: they are not open year round, and they are not available to out-of-school youth, teenagers at the highest risk for poor health outcomes and risky behaviors, including unprotected sex. In addition, many SBHCs require parental consent to provide clinical services, despite the fact that teens have the legal right to consent to reproductive health services including contraception in New York and approximately 20 other states.(75) Because they are usually either run and/or funded by local or state governments, SBHCs are vulnerable to political pressure and government funding priorities, particularly in the delivery of reproductive health services.

[1] This is the most recent data available – data is collected triennially, and 2010-2011 data are not yet publically available.

Studies on the impact of school-based clinical services on sexual activity have been inconsistent. Kirby conducted a review of eight studies,(24) and while all had evidence that SBHCs do not increase sexual activity, there were mixed findings on the effect of these services on delaying sexual activity, contraceptive use, pregnancy and birth. While one study found a significant reduction in birth rates among participating black high school students,(77) and a school-linked program with a nearby health center found a significant delay in sexual initiation and increased contraceptive use,(78) three studies found no impact on any outcomes measured.(79-81) Some studies found that dispensing contraception on site,(82-84) frequent follow-up with the provider,(67, 84) and/or other school-based educational efforts and focus, including classroom sex education,(77, 83) were positively associated with increased use of contraception by teenagers. Some of these studies had small sample sizes (for example, two studies had only 160 and 143 participants, respectively),(67, 84) high attrition rates and/or were of short duration,(82, 84) limiting confidence in study findings. One study found no impact of onsite contraceptive dispensing on contraceptive use.(67) Another study that also found no increase in contraceptive use identified a substitution effect, with a high percent of students in schools *without* SBHCs obtaining contraceptives from a community clinic or pharmacy.(83)

More recent research on the impact of SBHCs on contraceptive use and pregnancy prevention has added to the empirical understanding of this intervention. Ethier et al (2011) examined the effect of SBHCs in California urban high schools through a cross-sectional survey of students attending schools with and without SBHCs.(85) California state laws on minors' rights to confidential reproductive health services, without parental consent, are similar to laws in New York State, providing particularly useful information to inform interventions in NYC.

This study found a positive association between SBHCs and contraceptive use for female students with access to SBHCs. Females attending schools with SBHCs had greater odds of using hormonal contraception and emergency contraception at last sex, as well as screening for sexually transmitted infections (STIs), than females without access to SBHCs.(85) The study found no impact on condom use or STI screening for male students with access to a SBHC. Of note, this study did not report on pre-intervention differences between students with and without access to a SBHC, to determine if there were baseline differences in outcomes examined. In addition, of concern is why even with easy access to services, the rates of contraceptive use (18.1%) and STI testing (33.8%) remained relatively low among sexually active students.(85) This cross-sectional study that examined only individual level data could not help explain why this might be the case.

In addition to examining the impact of SBHCs on reproductive health outcomes, studies have examined SBHC impact on service quality, students' willingness to use these services, and high school graduation rates.(86-88) Klein et al (2007) surveyed and compared teens who were commercially insured, Medicaid insured, and SBHC users. Interestingly, only about one-third of the SBHC users said that the SBHC was their usual or another source of care, and about 90% of students classified as commercially or Medicaid insured reported non-SBHC services as their usual or another source of care. Researchers found that students using SBHCs were more likely to report being informed that services were confidential, to have received preventive counseling on STIs and pregnancy, and to report that the care they received was helpful, as compared to commercially insured and Medicaid insured students.(86) Coyne-Beasley et al (2003) conducted a non-representative cross-sectional survey of students in schools with

SBHCs to assess sexually active students' willingness to use school-based clinics for sexual and reproductive health services.(87) This is particularly relevant in states like North Carolina, where this study was conducted, and where SBHCs do not prescribe or dispense contraceptives or condoms. At the time the study was conducted a very small percent of students (3%) reported the SBHC as their regular source of health care. Study findings included that 80% of females and almost half of males (47%) stated they would use a SBHC for reproductive health care services if available. For females, using contraception inconsistently, and being low-income (measured by receipt of free or reduced price school lunch) significantly increased the odds of being willing to use a SBHC for these services; for males, academic performance (i.e. higher grades) was associated with increased willingness to use these services.(87)

In a study that highlights the intersection between health and education, as well as the role of SBHCs as a school-level contextual factor, Kerns et al (2011) examined the association between SBHC use and academic outcomes including high school graduation. They analyzed a dataset that linked SBHC clinic data and school district data, with the main variables of interest being level of clinic use (independent variable) and "time to dropout" (dependent variable) in a retrospective, quasi-experimental longitudinal study.(88) The SBHCs in this study provided a full range of primary care services, including "reproductive health/family planning," although the specific reproductive health services provided are not described, and only overall SBHC use, and not specific reproductive health service use and outcomes, were reported. When compared to non-users of SBHCs, low and moderate users had a 33% and 32% respectively lower likelihood of high school drop-out at any point during high school, whereas high SBHC use was not associated with high school drop-out. In a stratified analysis comparing SBHC use (low,

moderate or high) with no SBHC use, low use of SBHCs (compared to no use) was significantly associated with lower risk of high school drop-out regardless of grade point average and percent school attendance. This association existed for all racial/ethnic groups except white students and students not qualifying for free or reduced price lunch. There was a significant association with moderate or high SBHC use (compared to no use) and decreased high school dropout for students who were black or Hispanic, qualified for free or reduced lunch, had a GPA less than 2.5, and had less than 90% school attendance.(88) This unique study provides interesting individual-level findings on the association between SBHC use and high school graduation; the addition of other school-level variables could strengthen this research.

While the above described studies on SBHCs provide encouraging - albeit sometimes mixed - findings, there remains a relative paucity of studies on SBHCs to date. In addition, most of the existing studies had methodological limitations and differences in programmatic focus that limit the ability to draw conclusions on which program components are essential, although a focus on the provision of reproductive health services appears to be associated with an increase in contraceptive use.(24) Similarly, there has been limited research on school condom availability programs, despite the fact that many schools have implemented this intervention. Results of four studies found decreased condom use (one), no effect (one), and increased condom use (two).(24)

In a related study on the role of SBHCs in providing reproductive health services, an intervention to make Chlamydia screening a routine clinic procedure for sexually active teens seen at high school SBHCs found that 89% of sexually active students were screened during a one-year intervention period. This rate, which was more than twice the rate for individuals

aged 25 years and younger (including teens) who were seen in managed care clinics, suggests that SBHCs provide an opportunity to increase access to reproductive health services, and to identify teens at risk.(89)

2.6 NYC Public High School Context

In addition to the peer-reviewed articles on school-level effects on health and academic outcomes, several education policy and advocacy organizations and individuals have published on school-level factors that influence academic achievement, some with a particular focus on New York State and New York City.(90-98) Many of the school-level factors found to be associated with improved academic outcomes are the same or similar to those found to be associated with sexual and other health risk behaviors, and provide further evidence on the important influence of school-level factors on young people's lives and on the intersection of public health and education. An understanding of the overall NYC public high school environment is essential to this dissertation research, which examines the independent effect of school-level factors on contraceptive use by sexually active adolescents attending public high schools. While all of the factors described in this section were not measured in the dissertation research, they informed the interpretation of study findings as well as policy recommendations.

The NYC high school context is best understood if first situated in the national context. In the US, schools where at least 35% of children enrolled [2] qualify for free or reduced lunch (less than 130% and 185% of the federal poverty level, respectively) are entitled to federal

[2] Note that in some jurisdictions this is calculated as the percent of children that qualify for free or reduced lunch in a set geographic area where students are zoned to attend a particular school, regardless of the percent in students actually attending the school.

funding under Title 1. With the implementation of the federal No Child Left Behind (NCLB) legislation in 2002, Title 1 schools were further assessed as to whether they met federal standards for Adequate Yearly Progress (AYP), based on progress made on state standardized tests in English, math and science and/or high school graduation rates. If these "student achievement targets" are not met, the school is designated a School in Need of Improvement (SINI). In 2011, more than one-fourth of NYS schools (1,325 out of 4,685 schools) were SINI schools.(99)

SINI schools may receive additional federal funding, and are monitored each year to determine if they have improved and can get off the SINI list, or have not improved which eventually leads to them being considered failing schools that are likely to be closed. It is important to note that the results on standardized tests are the only criteria used to assess school "progress."[3]

New York State and Public Education

In 1993, the Campaign for Fiscal Equity (CFE) filed a lawsuit against NYS, charging educational inequity based on poverty and race/ethnicity. A report by the Education Trust documented that "New York ranked first among the 50 states with the widest gap between spending per student in the wealthiest and poorest schools."(90) In 2006, the NYS Court of Appeals found that "NYS had failed to meet its obligation to provide a 'meaningful high school

[3] A more complete discussion of standardized, high stakes testing through NCLB and over the past 11 years by the NYC Department of Education (DOE) is beyond the scope of this dissertation and has been addressed in detail elsewhere (see Ravitch D. The Death and Life of the Great American School System: How Testing and Choice are Undermining Education. New York, NY; 2010). Suffice it to say that the focus on test scores over more than a decade in NYC and nationally has meant that other school-level factors that affect student academic achievement and health have been largely neglected, with some important exceptions that are discussed below.

education' to students in schools with high rates of poverty."(90) This resulted in increased funding for many NYC public high schools from 2007-2009. Unfortunately, the NYC response to the 2010 fiscal crisis included large cuts to the Department of Education budget, resulting in larger class sizes and cuts to important programs for high-need students including tutoring, literacy classes, guidance counselors, and after school programs. In addition, many NYC public schools, particularly those in low-income neighborhoods and/or serving a high percent of poor and minority students, often continue to have inadequate resources and poor working conditions for teachers (e.g. too many students in classroom, deteriorating facilities, insufficient and/or poor quality books).(90)

NYC Public High Schools – Small Schools, Attendance, Graduation Rates, Safety and Student Satisfaction

In addition to changes at the federal and state levels, there have been major changes in the NYC public school environment over the past decade, beginning when NYS granted the Mayor control over the Department of Education in 2002.(100) For public high schools (HS), one dramatic change has been the shift from large high schools (schools with >1,400 students) to small schools (schools with <550 students). The large non-selective (i.e., no academic criteria for selection into the school) high schools averaged about 3,100 students and made up the majority of large HSs. From 2002 to 2008, the percent of public high school students in large HSs decreased 17%, from 69% to 52%, and the proportion of HS students enrolled in small schools increased from about 5% to about 19%.(91) Most of the remaining large schools in 2008 were in Queens and Staten Island, and had higher percentages of middle class, non-Hispanic white and Asian students. With an overall public HS enrollment of 311,652 in the 2007-2008 school year, approximately 62,000 HS students attended small HSs that year.

During this time period, several large high schools were closed and replaced by new small schools, often in the same building which the DOE then called a "campus." In addition, some small schools were started in separate locations, sometimes in a building housing an elementary and/or middle school as well. The schools targeted for closing were almost all in low-income neighborhoods and served predominantly non-Hispanic black and Hispanic youth in the Bronx and Brooklyn; the new small schools were for the most part placed in these same communities, and intentionally targeted the highest need students. As stated by Quint et al in the report *New York City's Changing High School Landscape – High Schools and Their Characteristics 2002-2008*, "An underlying premise of small schools is that such schools will provide a different, better, and more personalized academic experience than will larger schools."(91) Fine and Powell note that the benefits of small schools include improved academic achievement, decreased violence, suspensions and drop-out from school, and increased college admission. They state, "Small schools, particularly high schools, are the single most powerful intervention within the field of education for transforming the outcomes of urban youth and young adults."(92)

When compared to large non-selective schools, small schools had smaller class size and a higher percent of poor (80%) and non-Hispanic black and Hispanic (>90%) students. In addition, small schools had a higher percent of teachers with less than three years classroom experience. When compared to all other public high schools except small academically selective schools, students attending small non-selective schools ranked their schools higher in academic expectations, communication (including questions on school connectedness), safety and respect, as well as engagement.(91)

A study was conducted by MDRC comparing students attending small non-selective high schools (also referred to as small schools of choice [SSC]) with students attending other high schools on attendance, credits earned each school year (one measure of a student being on track to graduate), failure in one or more subject, and high school graduation rates. Results demonstrated that students attending a small non-selective school had a 10.8% greater likelihood of earning 10 or more credits in 9^{th} grade, were 7.8% less likely to fail one core subject, had a 3% higher overall attendance rate and an 8% higher attendance rate at $\geq$ 90% of school days.(93) For the first cohort studied (class of 2009), the four-year graduation rate was 6.8% higher than for the "control group", which if taken to scale, would reduce by about one-third the HS graduation disparity between white students and black and Hispanic students.(93)

As stated by Bloom et al, what small schools can offer are "smaller, personalized units of adults and students, where students (have) a better chance of being known and noticed, and where teachers know enough about their charges to provide appropriate academic and socioemotional supports."(93) These school qualities describe the school-level factors referred to as school connectedness or bonding in the empirical research that has found these factors to be significantly associated with sexual and other health and social risk behaviors and outcomes.(38-40, 58-60) Of particular importance, the study by MDRC shows the importance of a supportive, "relationship–promoting" environment on student outcomes.

It is important to note that another report documenting that small schools were successful in improving academic outcomes (particularly for students at high risk of dropping out) also pointed out important limitations of small schools, including fewer resources for students to take advanced courses or participate in extracurricular activities. In addition, some

of the new small schools have been unable to sustain the level of improvement achieved in their first 2-3 years, have had high teacher and principal turnover, and some have closed.(94) What appears to be essential, however, regardless of school size, is a school's ability to provide students with a safe environment (something found consistently in small schools) and individual attention. Hemphill et al suggest that large schools that incorporate small learning communities, or mid-size schools (600-900 students) "may be the best of both worlds" by combining the "intimacy of small schools with the resources of a large(r) school."(94)

Teacher quality is another important school-level measure to incorporate when examining student outcomes. This can be challenging to measure, and there are differences of opinion on how important some of the measures are. When the Campaign for Fiscal Equity (CFE) report compared teacher quality in schools serving low- versus higher-income students, they used four quantitative measures: NYS certification (indicates meeting a minimum level of state requirements), classroom teaching experience (percent with less than three years' experience), educational level (Master's Degree), and college from which teachers received their degree.(95) Based on these criteria, they concluded that NYC has many unqualified teachers, that a high percent lacked state certification, and that they were less experienced than in others parts of NYS, with almost 15% having $\leq$ 2 years teaching experience.(95) The MDRC analysis found that the teachers in small non-selective schools had less experience, and were less likely to have NYS certification or a Master's degree, but concluded that with the exception of math and science, research findings do not demonstrate a strong link between these credentials and effective teaching.(91) There does not appear to be any dispute that years of teaching experience are important. It is noteworthy that despite having less qualified

teachers at the small non-selective HSs, and serving the highest need students, they were able to achieve significant improvements for their students when compared to students not attending these schools.

There is tremendous variability in graduation rates among high schools even when serving students with similar demographic and academic characteristics when entering HS in 9th grade. The CFE 2010 report on standards for the Regents diploma reported that the NYC public high school class of 2008 had an overall four-year graduation rate of 61%, and 43% graduated with a Regents Diploma. The range by school for four-year graduation was from 34% to 90%, and the range for obtaining a Regents Diploma was from 0% to 83%. The strongest predictor of HS graduation was 8th grade attendance.(101)

A report by the Schott Foundation for Public Education compared US high school graduation rates for black and white males by state and city. The report found that for the class of 2008, NYC was one of the ten lowest performing large districts (defined as serving more than 10,000 black male high school students), with a 22-point gap in four-year graduation rates between black males (28%) and white males (50%).(97)[4] NYC was the largest district, with a black male HS enrollment of 167,277. New York State had the highest "inequity index" of any state, with a 43 point gap in graduation rates for black and white males, and the lowest graduation rate for black males, at 25%.(97)

Finally, a report by the NYC Civil Liberties Union (NYCLU) examined the impact of the New York City Police Department taking over school safety in 1998, the use of permanent

[4] This analysis only included graduation with diplomas defined by state criterion, which in the case of NYS was a Regents Diploma.

metals detectors with daily student scanning in some schools, and the designation of a few schools with the highest crime levels as Impact Schools, resulting in a higher degree of policing including armed police officers. Through use of the Freedom of Information Law (FOIL), NYCLU obtained the 2006-2007 school year list of 88 schools with daily metal detector use.[5] Schools with metal detectors are more likely to be in schools serving a high percent of poor, black and Hispanic students. In addition, according to NYCLU, the money that goes to daily scanning and other security measures in some schools reduces the budget they have for educational services, further reducing the already lower per student spending for students in NYC.(98)

Students in schools with permanent metal detectors reported harassment by some school security guards, and being late to or missing classes because they were waiting on line to go through the metal detector. The NYCLU report includes numerous quotes from students and teachers on the effect these safety measures had on them and how they felt about their school.(98) These sentiments provide a compelling sense of the negative impact that metal detectors and police officers at schools can have on students and teachers, paradoxically reducing their sense of safety and undermining their sense of being in an educational environment. Students reported being treated "like criminals rather than children" and that the classroom sometimes "feels like a jail cell." One teacher summed it up as follows: *"Can we please not treat already-struggling, inner-city teenagers who have gotten themselves to school like they've already committed a crime?"*(98)

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[5] Based on conversations with a knowledgeable government source who does not wish to be identified, once a daily metal detector is placed in a school it is unlikely to be removed, and so the 2006/07 list is likely the same in subsequent years, and it was included as a school-level variable in the school-level dataset created for this study.

NYC School-Based Health Center Reproductive Health Project

New York City is an excellent setting to study the impact of school-based interventions on urban teens. It has the largest urban public school system in the nation, serving about one million students each year with about 250,000 in public high schools (grades 9-12). NYC public high schools are diverse, with four predominant racial/ethnic groups – non-Hispanic black; Hispanic; non-Hispanic white and Asian/Pacific Islander. More than two-thirds of NYC public high school students are non-Hispanic black (34.9%) or Hispanic (34.9%) , while 13.9% are non-Hispanic white, 15.4% Asian/Pacific Islander (API), and 0.9% other race/ethnicity.(102) In the school year 2011-2012, 61.3% of students qualified for free lunch (less than 130% of the federal poverty level [FPL], 6.6% qualified for reduced lunch (130-185% FPL) and 32.1% has an income >185% FPL and did not qualify for a reduced lunch price.(103)

About 25% of NYC public high school students attend schools with access to a SBHC. A total of 137 NYC public high schools are served by 46 school-based clinics, which are operated by 23 distinct sponsoring institutions. In NYC, public high schools are often co-located in the same building, referred to as a campus, and SBHCs serve all high schools in the building in which they are located. Since 2009, Department of Education policies allow public high school SBHCs to provide sexual and reproductive health services, including dispensing contraceptives. Since 2010, parental consent is not required for reproductive health services provided by SBHCs at public high schools.

In 2008, the NYC Health Department (DOHMH) received a privately funded grant to support an intervention, the School-Based Health Center Reproductive Health Project (SBHC RHP), to substantially improve and standardize the quality of and access to reproductive health

services, including provision of onsite contraception. As of August 2012, 40 (87%) of the SBHCs, represented by 17 sponsoring institutions, were participating in the SBHC RHP. While not directly participating, the remaining six SBHCs attended provider trainings and received educational materials for students and health care providers related to provision of reproductive health services.

The primary goal of the SBHC RHP is to increase contraceptive use among sexually active teens, and ultimately to reduce unintended teen pregnancy and birth among NYC public high school students. The project objectives are to work with SBHCs to ensure provision of best clinical practices for the delivery of reproductive health services to teens, including onsite dispensing of all contraceptive methods and increased access to long-acting reversible contraception (LARC), specifically IUDs and implants, methods that are safe and effective options for most teens. The project has provided technical assistance to help SBHCs build or strengthen an infrastructure and develop a culture among SBHC clinic providers that supports and prioritizes the provision of reproductive health services. Project accomplishments include development of a policy/procedure manual to standardize clinical practices including onsite dispensing of most contraceptive methods; provider training and continuing education on best clinical practices; establishment of a mechanism to facilitate contraceptive purchasing; development of educational materials for providers and teens on long-acting reversible contraception; establishment of eight community clinics as LARC Regional Referral Centers, and implementation of on-site IUD insertions at some SBHCs; and development of a universal data collection and tracking system for use by all participating SBHCs.(104)

The on-going DOHMH evaluation finds tremendous variability in service delivery among SBHCs, from non-participation in the project (four SBHCs) to the consistent provision of clinical best practices and reaching a large percentage of sexually active students on a high school campus. There is a range in the quality of SBHCs in the project, including the small number of early adopters that were providing reproductive health services before the project began, with further improvement through participation in the project; clinics that have made tremendous progress and now provide comprehensive reproductive health services; and clinics that still have a long way to go to meet project standards.

Preliminary findings from clinic administrative data show a marked increase in clinics screening students regarding sexual activity (taking a sexual history), clinics providing best reproductive health clinical practices including onsite dispensing of most or in some cases all contraceptive methods (including IUD insertion at ten SBHCs), and implementation of the Quick Start method of initiating contraception at any time during the menstrual cycle and not requiring a pelvic exam prior to contraceptive provision.(105)

Clinic data show increased use of hormonal contraception by sexually active teens from 2009 (49%) to 2011 (51%).(105) Results comparing the 2009 and 2011 Youth Risk Behavior Survey (YRBS), a representative survey of NYC public high schools students (see Chapter 3 for a detailed description of the YRBS), show that there was an 56% increase in use of hormonal contraception or IUDs at last sex among sexually active female students (from 17.3% in 2009 to 26.9% in 2011 when including emergency contraception; excluding emergency contraception the increase was from 13.4% in 2009 to 20.7% in 2011).(11) In addition, in 2009 sexually active females in schools with SBHCs had a significantly higher likelihood of using hormonal or IUD

contraception at last sex than teens in schools without a SBHC, and this trend continued in 2011.(11)

There was no significant difference in the increase in contraceptive use in schools with or without SBHCs. Possible explanations for this finding are that the sample size for females using hormonal contraception was too small, resulting in inadequate power to detect a difference that may exist between SBHC and non-SBHC schools; that students in schools without SBHCs benefited from concurrent school-based, community-based and citywide initiatives to promote adolescent sexual and reproductive health including improvement of the citywide school-based condom availability program, implementation of sex education in middle and high schools, and public awareness campaigns with messages on contraception geared to adolescents; secular trends in contraceptive use among sexually active teens in NYC; or that the SBHC Reproductive Health Project intervention had no impact on contraceptive use by sexually active teens. Further exploration through other data sources including clinic administrative data and school-level birth rates, as well as school-level factors included in this dissertation research, should help explain this finding.

The finding of higher contraceptive use in students with access to SBHCs in both time periods suggests that even without comprehensive reproductive health services that were fully implemented by 2011, the existence of accessible primary care services and in some cases partial or even comprehensive reproductive health services, significantly increases the likelihood of contraceptive use among sexually active teens attending schools with SBHCs.

SECTION 3 – Intersections and Significance

2.7 Intersection between individual and contextual levels to effect teen sexual behaviors and outcomes, and impact of school-based interventions

There are extensive empirical findings on the effects of teens' individual characteristics, programs interventions, and neighborhood and school-level factors on teen sexual risk behaviors and outcomes, and to a lesser degree, on the specific outcome of contraceptive use at last sex among sexually active teens. What is lacking, however, is an examination of the intersections between these bodies of work, and the combined effect on adolescent sexual risk behaviors. In fact, the published literature is fairly siloed, with intervention studies often standing on their own.

It is now well established that contextual factors including poverty and social inequities,(106, 107) school equity,(107) school engagement and quality,(108) and other characteristics that measure social and economic disadvantage, play a pivotal role in predicting and influencing teen sexual behaviors and outcomes, including contraceptive use.(30-45, 53, 109, 110) The empirical evidence on antecedents to teen sexual risk behaviors and pregnancy fall into four broad areas, described by Kalmuss et al as: "race and ethnicity; socioeconomic status; social influences; and, attitudes toward contraception, condoms and pregnancy and safer-sex behavioral skill."(109) The authors single out two significant socioeconomic predictors– educational attainment of the teens' parent, and single-parent household. They further deconstruct social influences as social norms and the perceptions and attitudes of key people in teens' lives including parents, siblings, and friends.

School-level factors, as previously discussed, have the potential to influence two of these four factors, that is, social influences and attitudes and skills related to pregnancy

prevention. The first two, race/ethnicity and socioeconomic status, are highly correlated with each other and with other measures of social and economic disadvantage. By gaining a better understanding of the influence of school contextual factors on teen sexual behaviors, effective strategies can be advocated for and implemented.

What is evident from the preceding review of trends in teen pregnancy and birth rates in the US and NYC, evidence on individual and contextual factors associated with teen sexual behavior, evaluation studies of interventions to address teen contraceptive use and other sexual behaviors, and the NYC public high school context, is that teen contraceptive use is a dynamic, complex behavior affected by all these factors and contexts, as well as the temporal shifts in the social, economic and political climate. This is particularly the case for teen sexual behavior, which has been and continues to this day to be a source of major political controversy.

Taken together, the findings on school-level effects on sexual behavior and outcomes, while limited in number and some methodological aspects noted above, provide consistent evidence of the influence the school environment can have in either reducing or increasing sexual risk behaviors, and point to the importance of including school-level variables in an analysis of factors associated with contraceptive use by sexually active teens. The limited number of studies also points to the importance of this dissertation study in filling a gap in the empirical research. This is reiterated by Kirby (2002) in his article reviewing the impact of schools and school programs on adolescent sexual behaviors, when he notes the unevenness of the research, with more extensive research on interventions including school-based sex education, SBHCs and condom availability than on the effect of school-level factors.(111) While

Kirby's review was conducted about ten years ago, and not all findings may apply given changes in the political and social context over the past decade both nationally and locally, there continues to be a large void in our understanding of school-level factors that influence sexual behaviors and outcomes, and the implications for this research on the ground.

The main contexts or "environments" for adolescents are family, peer groups, school, community and media/social marketing. These environments can promote or buffer risks that teens are exposed to, and when buffering these risks they can help young people internalize beliefs, habits, and behaviors that reduce risk-taking and support healthy development.(54, 65)

Previous studies on neighborhood and school-level factors associated with adolescent health risk behaviors reveal much overlap with regard to specific factors included in the analyses.(30-34, 38-43, 53, 58-60) It is not surprising that poverty is a critical factor in both environments; in addition, the neighborhood constructs of prosocial activities and ambient hazards appear analogous to the constructs of connectedness and safety at the school-level.

It is clear from the review and synthesis provided in this chapter that there remain many unanswered questions and gaps in our knowledge about the factors influencing contraceptive use by adolescents. Gaining a better understanding of which school-level factors affect contraceptive use by sexually active teens, before and after adjusting for individual-level factors, and the variation in this effect by race/ethnicity, provides important evidence to improve understanding of teen sexual behavior, and inform policy recommendations to increase contraceptive use and reduce the rate of unintended pregnancy among NYC adolescents. Associations between school-level factors and contraceptive use help drive home the importance of structural change as a key aspect of public health efforts to improve health,

by changing the school environment and norms so that it is easy to make healthy decisions.(108, 112-114)

2.8 Significance

Given the complexities of adolescent development, human sexual behavior, and the many influential individual, peer, family, school and neighborhood factors, it is important for research to tease out individual and school factors associated with teen sexual behaviors, pregnancy and birth, so that program and policy interventions can address these factors and increase program impact on unintended teen pregnancy.

Teen sexual behaviors associated with health risk outcomes remains an important public health concern requiring further research into effective interventions. Teen sexual behaviors and outcomes are strongly associated with both individual and contextual factors, requiring a fuller understanding of the association between these factors. School-based interventions have been proven to reduce teen sexual risk behaviors and outcomes, but there are many gaps in existing studies, and even successful programs have only modest effects.

Identification of school-level factors that are associated with contraceptive use expands the limited empirical evidence on the role of the school environment on contraceptive use by sexually active teens, and the specific school characteristics that may predict sexual risk behaviors such as having sex without using contraception.

This research addresses some of the limitations of previous research on school-level factors associated with contraceptive use among sexually active adolescents. Previous studies have had one or more of the following limitations:

- Individual-level data from samples not representative of the population being studied

- Limited operationalization of school-level factors
- Contextual variables derived from the mean of individual-level responses, use of the same data source for individual-level factors and school-level factors, and/or school-level variables from school administrators' self-report or another self-administered survey
- School-level poverty measure combining percent of students who qualify for reduced *and* free lunch, thus aggregating different degrees of poverty (based on the federal poverty level [FPL]).
- Only examine individual level data, with individual responses to questions about school-level factors
- Lack of analytic approach to allow for assessment of independent effects of individual and school-level factors on the individual-level outcome

The strengths of this study include:

- Individual level data that are representative of the NYC public high school population
- School-level dataset containing many contextual variables that have been associated with sexual and other risk behaviors in previous studies, obtained from school-level NYC and NYS Department of Education administrative and other data sources distinct from the individual dataset (YRBS)
- School poverty measure with four levels, allowing for better specificity in measuring the potential effect of income level
- Linked dataset combining individual and school-level datasets

A multi-level modeling analytic approach both measures the effect of contextual level independent variables on individual level outcomes, and takes into account the non-independence of individual level outcomes when they are nested in the same schools. This allowed for measurement of the independent effects of both contextual and individual level predictors on the individual level outcome. The extensive literature review, creation of a linked dataset with individual and school-level variables which will be available to other interested researchers, study findings and policy recommendations make an important contribution to understanding the connection between the school environment and contraceptive use by sexually active teenagers.

Today no prior study has examined the contribution of school-level effects - including graduation rates, racial/ethnic composition, percent of students below the federal poverty level, and students' perception of school safety and connectedness - to contraceptive use. This research makes a unique contribution to understanding the connection between the school environment, including availability of SBHCs, and contraceptive use by teens; the mechanism through which factors in the school environment may have an impact on students' use of contraceptive use; and the implications of these findings, including recommendations for far-reaching environmental changes in schools to support young people to make healthy decisions about their sexual and reproductive health.

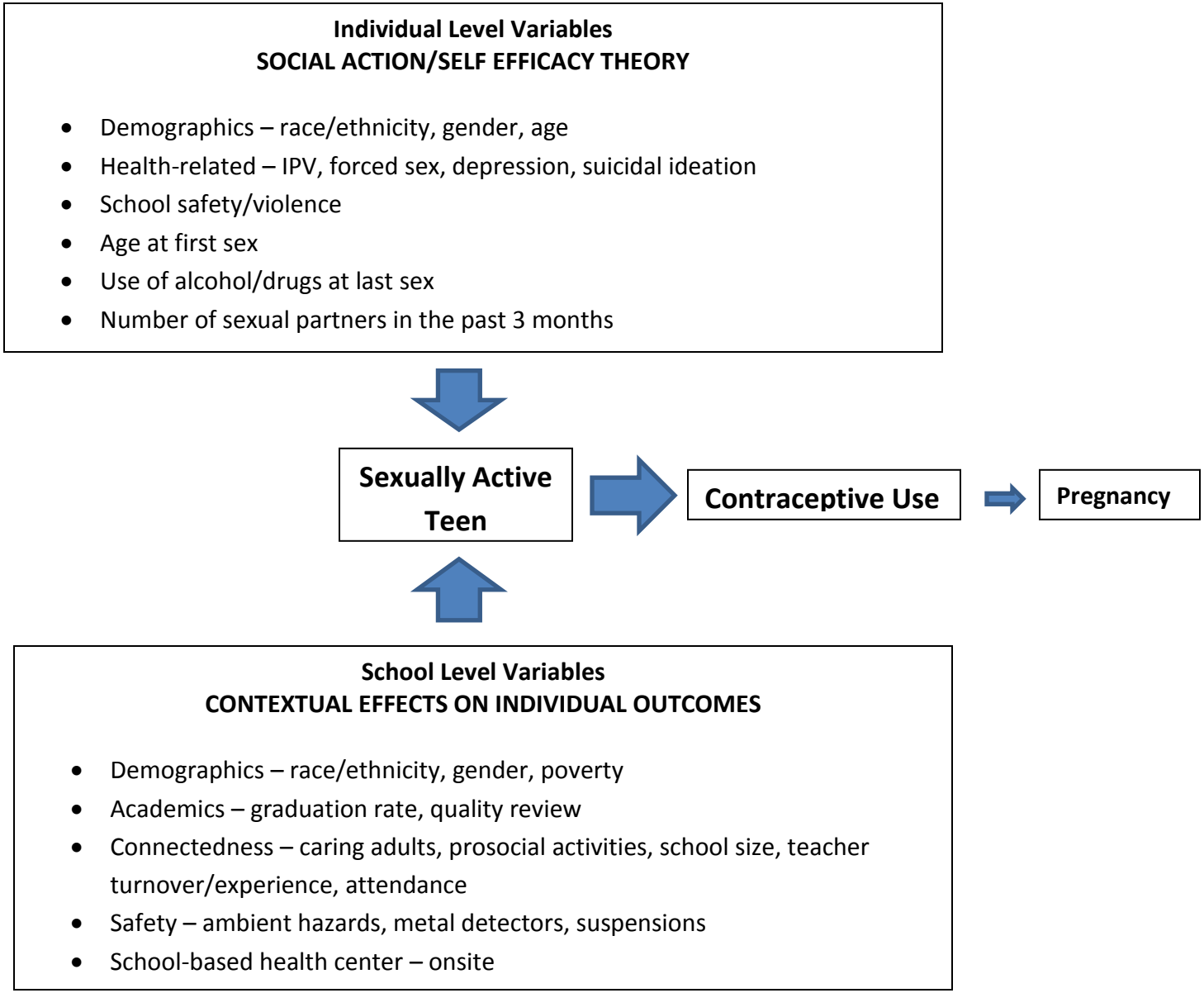
TABLE 2.4 – Empirical Findings from the Literature* on Individual, Neighborhood and School-level Factors Associated with Teen Sexual Behavior**

	Individual-level	**Neighborhood-level**	**School-Level**
Demographic	Gender ± Race/ethnicity ± ↑ Age + ↑ Parent education + ↑ Family income + Mother employed + Mother was teen parent -	Poverty (SES) - Gender ± Race/Ethnicity ± Live in single parent families -	Poverty (Eligibility for school lunch) - Gender ± Race/Ethnicity (diversity of student body) +
Norms **Academics**	Peer behaviors and beliefs ±	Ambient hazards -	↑ Graduation rates + Learning focused schools + High conflict schools - ↑ Daily attendance + School-Based Health Center ±
Connectedness	Family and/or peers + School +	Prosocial activities +	Feel cared for, supported and/or close to a teacher or another adult at school + Feel part of, happy at and/or safe at school + Sense of school as community + Prosocial activities +
Safety	Physical fighting, carrying weapons - History of forced sex, partner violence -	Ambient hazards –	Feel safe at school +
Sexual behaviors	Older age at first sex + Alcohol or drug use –		
Mental health	Depression, suicidal ideation/attempts -		
Other			Desegregation +

* See references 24-48

** (+) indicates factors associated with a lower likelihood of engaging in risky sexual behavior;
(-) indicates factors associated with a higher likelihood of risky sexual behavior; and (±) indicates a mixed association (gender and race/ethnicity

Figure 2.3 CONCEPTUAL FRAMEWORK



CHAPTER 3 – METHODS

3.1 Overview

This dissertation research examined the contribution of school-level factors to contraceptive use among sexually active adolescents in NYC public high schools. The research questions for this study were:

1) What is the effect of school-level factors on contraceptive use among sexually active adolescents in NYC public high schools, before and after controlling for individual-level factors?
2) Does the association between school-level factors and contraceptive use vary by race/ethnicity?
3) What are the policy implications of research findings on the effect of school-level factors on contraceptive use among sexually active adolescents in public high schools?

The study hypotheses were:

1) School-level constructs that operationalize the school environment based on findings from previous studies on school and neighborhood-level associations with adolescent sexual behaviors – low poverty, connectedness/prosocial activities, safety, positive academic environment and having a SBHC – would be associated with higher rates of contraceptive use among sexually active adolescents, before and after controlling for individual level factors.
2) School-level associations with contraceptive use among sexually active adolescents would vary with race/ethnicity.

This cross-sectional study used data from the NYC Youth Risk Behavior Survey (YRBS) linked to a dataset with school-level data from several data sources. The 2007, 2009 and 2011 YRBs datasets were combined with comparable years of school-level data for schools included in the YRBS datasets. The merged dataset contained 32,527 observations. The analytic sample was limited to YRBS respondents 14 or older who reported having sexual intercourse in the past three months and had complete responses to the YRBS question on contraceptive use at last sex (N=8,054).

The outcome variable was contraceptive use at last reported episode of sexual intercourse, referred to as "last sex." Individual level variables in the analysis included demographic and health related characteristics, measures of perceived safety and sexual behaviors. School-level variables measured five constructs – (1) demographics, (2) academics, (3) connectedness/prosocial activities, (4) safety/ambient hazards, and (5) whether or not a school had a SBHC. Descriptive analyses as well as binary and multinomial logistic regression were performed accounting for the complex sample design of the YRBS and the clustering of individual outcomes within the schools.

3.2 Individual-level Data Source and Measurement of Variables

Individual-level Data Source

The source of data for the individual-level variables is the NYC Youth Risk Behavior Survey (YRBS). The NYC YRBS is a representative sample of NYC public high school students in grades 9-12. This survey is part of the Centers for Disease Control and Prevention's (CDC) Youth Risk Behavior Surveillance System, which monitors a broad range of risk factors for morbidity and mortality among young adults in the United States.(115) The YRBS has high validity and

reliability in measures of behaviors related to injury, depression or suicide, substance use, sexual activity, physical activity and diet.(115-117) A two-week test/retest of YRBS responses from the United States 2000 YRBS found that most of the questions related to sexual behaviors had significantly higher than average consistency in responses (Kappa = 62.7%). As expected, the most reliable responses were about recent activities.(118)

The NYC YRBS was first conducted with a representative sample of NYC public high school students in 1997 and has since been conducted every two years.(119) It is administered by the NYC Department of Health and Mental Hygiene (DOHMH) in partnership with the NYC Department of Education (DOE). NYC YRBS is collaboration with the CDC, which works with DOHMH on questionnaire development, data collection and analysis. The NYC YRBS has a two-stage cluster sample design, with public high schools (grades 9-12) as the primary sampling unit, and individual class periods within selected schools as the secondary sampling unit. Every student in a selected class period is eligible to take the self-administered question during a 45-minute class period.[6]

Primary sampling units (PSU) and stratum variables were included in each dataset to account for the YRBS two-stage complex sample design and for the clustering inherent in the sample design (students selected from the same school). The sampling frame excludes alternative and special education schools, English-as-a-second-language and special-education

[6] If a large number of students are absent on the day of survey administration the survey is administered again on another day. When only a few students are absent, the school is asked to give them the survey within 1-2 weeks, and school staff is provided with instructions on how to administer the survey. There are some returned make-up surveys although this varies by school. (Email communication with Kinjia Hinterland, Research Scientist, NYC DOHMH, 4.29.13)

classrooms, and students in juvenile detention centers.(119) The YRBS uses passive parental consent by which parents are informed about the survey and could request that their child not participate. Parent refusals are incorporated into the overall response rate. Participation in the YRBS is both voluntary and anonymous. Both DOHMH and DOE Institutional Review Boards approved the YRBS study protocol.

As per CDC requirements, all YRBS surveys must include two-thirds of the CDC core instrument questions.(120) The NYC YRBS also includes questions developed or selected for inclusion to measure specific behaviors of particular relevance in NYC. The NYC YRBS provides representative data at the city and borough levels as well as at the level of the three DOHMH District Public Health Office neighborhoods in the South Bronx, Central/North Brooklyn and East/Central Harlem in Manhattan.(119) In response to implementation of the SBHC RHP (see Chapter 2), for the 2009 and 2011 YRBS surveys, the DOHMH received permission from the CDC to oversample schools with SBHCs and to add questions to the YRBS on awareness that there was a SBHC on the high school campus, clinic used at last clinic visit (SBHC, community health center, etc.) and a second question on contraceptive use at last sex in addition to the core question, to include all hormonal and intrauterine device (IUD) contraceptive methods as response options. While schools with SBHCs were not oversampled in 2007, about 20% of the 2007 sample included schools with SBHCs.

In 2007 the total YRBS sample (students from schools with and without SBHCs) was 9,080 students. The overall school response rate was 98% (87 out of 89 schools sampled) and the student response rate was 70%. The sample size for 2009 was 11,887**,** with a school response rate of 95% (105 out of 110 schools) and a student response rate of 83%; the sample

size for 2011 was 11,570, with a school response rate of 93% (102 out of 110 schools) and a student response rate of 79% (see Table 3.1). Some schools were sampled in more than one of these years; school-level data was included for these schools for each year they participated in the YRBS.

Outcome variable and measurement

The outcome variable for this study was contraceptive use at last sex. Contraceptive use was collected in 2007 through one question, a CDC core question: "The last time you had sexual intercourse, what one method did you or your partner use to prevent pregnancy?" The response options for this question were: I have never had sexual intercourse, no method was used to prevent pregnancy, birth control pills, condoms, Depo-Provera (injectable birth control), withdrawal, some other method and not sure.

For the 2009 YRBS, a new question was added on contraceptive use to include three additional contraceptive methods that are being offered at SBHCs (as part of the intervention that began in spring 2009) either directly or by referral – vaginal ring, IUD and Implanon (an implant that slowly releases hormones into the body, usually placed in the upper arm). This question asked: "If you used some other method the last time you had sexual intercourse, what other birth control method did you or your partners use to prevent pregnancy?" For the 2011 YRBS, the CDC changed the core question on contraceptive use at last sex, to "The last time you had sexual intercourse, what one method did you or your partner use to prevent pregnancy?" Once again a second question was added to the NYC YRBS to account for missing options in the CDC core question (see Table 3.2).

The year-specific questions were recoded into three outcome categories from the most effective to the least effective methods to prevent pregnancy, with methods of similar effectiveness grouped together. Thus, the responses to the 4 questions on contraceptive use at last sex (one in 2007, 1 new question in 2009, and 2 new questions in 2011) were coded into one of the three categories: (1) hormonal method or IUD; (2) condoms, withdrawal or other method; and (3) no method or not sure. Hormonal methods included the following question response options - birth control pills (BCPs), Depo, The Patch, The Ring or Nuva Ring, Implanon, and emergency contraception (EC or the morning after pill). Withdrawal was grouped with condoms given evidence that this method, if used correctly, is a relatively effective pregnancy prevention method, and typical use effectiveness rates are just slightly lower than for condoms.(121) The 2009 and 2011 response category "none of these methods," an option in the second question on contraceptive use, was excluded from the analysis as it had ambiguous meaning when combining categories (i.e. it could mean "no method" or "some other method"). (See Table 3.2)

Individual-Level Variables and Measurement

All individual-level variables were from the YRBS dataset. Only variables that were in all three years of the combined dataset (2007, 2009, and 2011) were included in the analysis. The individual-level variables included in this analysis were grouped into four categories – demographics, health-related, school safety and sexual behavior. Demographics included age, gender and race/ethnicity. The variables from the other three categories were included as there are extensive empirical findings on the strong associations between most of them and

sexual risk behaviors (see Chapter 2), or they are individual measures of safety/ambient hazards, a construct operationalized at the school-level.

Individual health-related variables included intimate partner violence, forced sex, sadness or hopelessness, and suicidal ideation. School safety variables included not attending school due to safety concerns and being threatened or injured on school property. Sexual behavior variables included age at first sexual intercourse, use of alcohol or drugs at last sex, and the number of sexual partners in the past three months. (See Table 3.3 for a listing of individual-level variables that are included in the analysis.) A "year" variable was also included for the year of the YRBS survey administration to control for unobserved cohort effects and as a measure of time.

3.3 School-level Data Sources and Measurement of Variables

School-level Data Sources

Based on the theoretical framework and empirical findings discussed in Chapter 2,(30-34, 38-43, 53, 58-60, 63-66) as well as discussions with key informants, researchers and experts in public health and education, five main school-level constructs were identified as likely to influence contraceptive use by sexually active adolescents – (1) demographics, (2) academics, (3) connectedness/prosocial activities, (4) safety/ambient hazards, and (5) availability of a SBHC (see Chapter 2). With the exception of demographics, these constructs were identified as measures of whether or not a school creates an enabling, protective, supportive and health-promoting environment for adolescents. For most of the constructs of interest, several variables were identified that operationalized the measures in a variety of ways.

Several school-level data sources were identified to obtain variables that operationalize these constructs. The two main data sources contained survey and administrative data. With the exception of two data sources, the school-level data are publically available through either the NYC Department of Education (NYC DOE) or the NYS Education Department (NYSED). School-level data for three school years, to correspond with the three YRBS cohorts – 2006-2007 (Spring 2007 YRBS cohort), 2009-2010 (Fall 2009 YRBS cohort), and 2010-2011 (Fall 2011 cohort) were used. For the latter YRBS cohort, ideally school-level data from the 2011-2012 school year would have been used, but these data were not yet available at the time the data were linked to the YRBS dataset. The data sources are listed below by theoretical construct. (See Table 3.4 for a listing of school-level data sources and constructs measured from each source.)

1) Demographics

- NYC Health Department Fitnessgram dataset (*% Female, % non-Hispanic Black, % Hispanic,% Free School Lunch*)

  These data are not publically available in the same format included in this analysis, although similar data are available on the NYC DOE website.(122) Race/ethnicity and gender data are collected by each school on a school enrollment form, and family income (poverty measure) is collected in lunch forms to determine if the student is eligible for free, reduced price or full price lunch. This information is collected at the beginning of the school year and entered by the principal's designee into the DOE school-based administrative database system *Automate the Schools* (ATS). ATS can be accessed electronically by the DOE central office for reporting purposes.

2) Academics

- School Progress Report – NYC DOE (123) *(% 6-Year High School Graduation*)

  The Progress Report is administered annually as one of the accountability measures introduced by the NYC DOE in 2006, and data are available by school. Each school gets an overall grade from A-F. There are four main areas that are measured: student progress, student performance, school environment and closing the achievement gap. Four-and six-year high school graduation rates are part of "student performance."

- NYC DOE Quality Review (124) (*Quality Review Score*)

  The NYC DOE Quality Review is "a 2-3 day school visit by experienced educators to each NYC school [not conducted every year]. During the review, the external evaluator visits classrooms, talks with school leaders, and uses a rubric to evaluate how well the school is organized to educate its students."(123) Schools are assessed and receive scores in five areas – instructional and organizational coherence, gathering and analyzing data, planning and setting goals, aligning capacity building, and monitoring and revising. Schools receive an overall score which was used in the school-level dataset.

3) Connectedness/Prosocial Activities

- School Progress Report – NYC DOE *(% Average Daily Attendance*)

  The Progress Report is described above. Average daily attendance rates are part of "school environment," one of the four areas measured by the School Progress Report.

- NYC Health Department Fitnessgram dataset (*School enrollment*)

  See above for an explanation of this data source.

- NYC School Survey of students, parents and teachers (122) (Questions from these surveys were used to measure connectedness/prosocial activities – including survey response rates for students and teachers – as measures of student, parent and teacher engagement. See Measurement of School-Level Variables for specific variables.) The NYC School Survey is an annual survey administered by the NYC DOE to all students, teachers and parents in grades six through 12. The NYC DOE states that these data are used to provide information on the school's learning environment, and "survey results contribute 10%-15% of a school's (annual) Progress Report grade."

- CEP 2006-2010 demographics data – DOE administrative data (125) (*Teachers > 2 years at school*) These data are collected by each school and routinely reported to the NYC DOE. Data included in this data source are superintendent suspensions, students in temporary housing, and several measures of teacher qualifications.

4) Safety/Ambient Hazards

- NYC School Survey of students and teachers (Questions from these surveys were used to measure safety/ambient hazards. See Measurement of School-Level Variables for specific variables.) See above for an explanation of this data source.

- New York State Education Department (NYSED) - NYS Report Card (126) (*Percent Suspensions*) This report includes annual data at the state, county, district and

school levels. It includes data collected by both the NYSED and the NYC DOE on a number of accountability measures, including enrollment, class size, attendance, suspension, teacher qualifications, test scores and graduation rates.

- Appendix G from New York Civil Liberties Union (NYCLU) Report "Criminalizing the Classroom: The Over-Policing of New York City Schools." (*Permanent Metal Detector*) Data on which school had a permanent metal detector installed were obtained by NYCLU through a Freedom of Information Law request to the NYC DOE.(98) The data are reported annually by the DOE, but are not generally available to the public.

5) School-Based Health Center on high school campus *(SBHC)*

Information on whether or not a student attends a school with a SBHC is determined by DOHMH staff responsible for YRBS administration, using information provided by the SBHC RHP program staff.

Measurement of School-level Variables

1) School-level demographic characteristics were measured by (1) racial/ethnic composition - *% non-Hispanic black* and *% Hispanic*, (2) gender - *% female,* and (3) poverty level - *% qualifying for free school lunch and enrolled in a government entitlement program* (household income < 100% federal poverty level [FPL]). Each of these variables is an aggregate of the individual data on student demographic characteristics at each school.

2) Academics was measured by the *six-year high school graduation rates*, and the overall *school quality evaluation score* from the Quality Review.

- *Six-Year Graduation Rate* - The *six-year graduation rate* is calculated based on a four-year cohort, using the same inclusion criteria, and is the percentage of students in the four-year cohort that graduate within six years of beginning high school. (123) The four-year high school graduation rate is calculated based on a four-year cohort, which is defined by the NYC DOE as students that entered 9th grade for the first time anywhere four years prior to the year of graduation, and were "active in the school on June 30th of the graduation year or "the school is the last diploma-granting high school that they attended before June 30th." Based on this definition, the four-year graduation rate is "the percentage of students in the school's four-year cohort (defined above) that graduated with a Regents or Local Diploma, including August graduates" for the year being reported.(123) Depending on the academic abilities of students when they enter high school, it may take them longer to graduate, and an increased percentage of graduates after six years may reflect a school's positive academic environment and commitment to supporting students who require additional time and support in order to graduate.(127)
- *Quarterly Review (QR) Score* - The overall school QR scores are categorical based on a numeric score, as follows: well developed (4), proficient (3), developing (2) and underdeveloped (1). According to documents on the DOE website, the Quarterly Review is a comprehensive onsite assessment that attempts to capture data in three broad areas – "instructional core," which includes whether or not curricula are engaging and research based; "school culture," including whether there appears to be a positive, supportive learning environment; and "systems of improvement," including whether the

school has implemented collaborative teaching practices and research-based teacher evaluations.

3) School Connectedness/Prosocial Activities were measured through survey and administrative data from five different data sources:

- *Average daily attendance* is measured by dividing the number of days attended by all students in the school year by the number of days on the school register for the year.
- *School enrollment* is the total number of students in grades 9-12.
- Stable community of adults was measured by the *percent of teachers with more than two years teaching at the school*.
- *Student perception of being welcome at their school and having caring adults at the school* was measured by two questions from the DOE Student Survey – How much do you agree or disagree (with response options strongly agree, agree, disagree, and strongly disagree) with the following statements about your school?
    - *I feel welcome in my school*
    - *The adults at my school look out for me*
- *Prosocial activities* was measured by a question on the NYC DOE Parent Survey - *My child's school offers a wide enough variety of courses and activities to keep my child interested in school*, with response categories strongly agree, agree, don't know, disagree and strongly disagree.

4) Safety/Ambient Hazards were operationalized by variables from three different data sources:

- *Students' perception of school safety* came from responses to two groups of questions in the DOE Student Survey.

  1. How often are the following things true about you or about your school (never, some of the time, most of the time, all the time)?

     - *I stay home because I don't feel safe at school*
     - *Students threaten or bully other students at school*
     - *Students get into physical fights at my school*
     - *There is gang activity in my school*

  2. How much do you agree or disagree with the following statements about your school (strongly agree, agree, disagree, strongly disagree)?

     - *I am safe in my classes*
     - *I am safe in the hallways, bathrooms and locker rooms at my school*
     - *I am safe on school property outside my school building*

- *Percent Suspensions* includes suspensions by principals and superintendents. The rate is calculated by dividing the numbers of students suspended for one or more days during the school year, by the number of days on the school register for the year. Each student is counted only once regardless of how many times they may have been suspended.
- *Schools with Permanent Metal Detectors* were assessed through a list of schools that had metal detectors in the school year 2006-2007 and measured as whether or not the school had a detector. Based on a conversation with a DOE administrator who chose to

remain anonymous, once a metal detector is installed in a school, it usually remains there permanently.

5) *School-Based Health Center - Attending a public high school with a SBHC* was measured as a dichotomous variable with each individual student coded as "Yes" or "No" depending on if they have a SBHC at their school. This measure captures whether a student has access to onsite comprehensive health services, which in most NYC high school SBHCs includes reproductive health services and onsite availability of a range of contraceptive methods. In addition, SBHCs may provide a vehicle for students to feel connected to their school, in particular the development of a supportive, trusting relationship with an adult in the school, as many SBHCs are not only staffed with a health provider (usually a physician or a nurse practitioner), but also with a health educator, social worker and/or other mental health professional. (See Table 3.5 for a listing of school-level variables included in the analysis.)

School-Level Dataset

A total of 294 public high schools[7] were included in the school-level sample, based on the schools participating in the Youth Risk Behavior Survey (YRBS) in each of the years included in the study sample (87 schools in 2007, 105 in 2009 and 102 in 2011). With the exception of two dichotomous variables (permanent metal detector and SBHC), the school-level variables were initially continuous variables. However, in order to minimize the risk of specific schools being inadvertently identified due to unique school and individual-level characteristics, all

[7] Schools that were selected for the YRBS in more than one year of the sample are included in this count, so that the actual number of schools represented is less than 294.

continuous variables were categorized into quartiles based on the distribution of each variable in each of the three years included in the sample. The quartiles are an average of the cutpoints in each year. Appendix 1 is a table of school-level variable cutpoints by year for each of the school years included in the sample.

3.4 Individual- and School-Level Datasets Linkage

The 2007, 2009 and 2011 YRBS representing the individual-level data were linked to the school-level datasets by the District Borough Number (DBN) school identifier, and then the DBN identifier was replaced by a random "fake" identifier to prevent identification of specific schools. Consistent with CDC guidelines,(96) the survey weight variable provided for each year of the YBRS was adjusted by dividing by three (the number of survey years included in the analyses) to obtain the average NYC school adolescents attending the sampled schools.

3.5 Analytical Sample

The merged dataset contained 32,527 observations. The analytical sample was limited to respondents aged 14 or older who reported having sexual intercourse in the past three months and had complete responses to the YRBS question on contraceptive use at last sex (N = 8,054).

Due to unstable estimates (residual standard errors ≥ 0.30 or n ≤ 50), the following variable categories were excluded from the binary and/or multinomial logistic regression models: age 14 in the multinomial logistic regression; the race/ethnicity category "other" for all regression analyses, and "Asian/Pacific Islander" for multinomial regression. Response

categories for each of the questions on safety at school were combined and reduced to three for binary logistic regression, and two for multinomial logistic regression.

3.6 Analytic Plan

Descriptive statistics included frequencies, proportions and standard errors for the proportions. Spearman's correlation was conducted to identify predictor variables that were highly correlated ($r>0.6$). Bivariate analyses were conducted to examine the association between each of the individual- and school-level variables (predictors) and contraceptive use. Significant associations between independent variables and the outcome were evaluated using the chi-square statistics.

To estimate the strength of the associations between the school-level exposures and contraceptive use, binary logistic regression was used when the outcome was defined as use of any method of contraception (i.e. hormonal/IUD/condoms/withdrawal/other method) versus no method/not sure. When the outcome was defined using three response categories – hormonal or IUD contraception (hormonal); condoms, withdrawal or other method (condoms); and no method or not sure (no method) with no method as the reference category, multinomial regression was used. Multinomial regression models were also fitted with condoms as the reference category.

Unadjusted logistic and multinomial regressions were used to estimate the independent effects ($p<0.05$) of each of the school-level factors on contraceptive use before controlling for any individual-level factors. A 95% confidence interval is the standard used in multivariable regression analyses, and was used for unadjusted models to identify possible associations between school-level factors and contraceptive use. However, due to the large number of

exposures (school-level variables), in all subsequent analyses a 99% confidence interval was applied to reduce the risk of incorrectly rejecting the null hypothesis (i.e. type 2 error). (See Table 3.6 for individual and school-level variables included in regression models.)

In addition to the unadjusted analyses (Model 1), five models were fitted: for each school variable adjusted for individual demographic characteristics (age, gender, and race/ethnicity) (Model 2); for the other three categories of individual-level covariates (Model 3); and all school-level exposures while controlling for individual-level demographic characteristics and the other covariates (Model 4). Model 5 included all school-level variables that were statistically significant in the fully adjusted model (Model 4) plus variables that were significant in at least two previous models. For Model 6, due to continued concern regarding unstable estimates, an even more parsimonious model was fit, with only the variables that were significant in Model 4. When the reference category was 'condoms' Model 6 was fit somewhat differently, with one variable from Model 5 omitted because two variables – six-year high school graduation rate and average daily attendance - were highly correlated.

A variable representing the YRBS survey administration year was included in Models 4, 5 and 6 to control for unobserved cohort effects and/or secular trends. To determine whether the associations between exposures and contraceptive use varied by race/ethnicity, interaction terms of race/ethnicity with selected school-level variables were tested in the fully adjusted model. These terms were tested in separate models to avoid multicollinearity.

An analysis exploring the association between School-Based Health Centers and contraceptive use by year was considered, particularly since the SBHC Reproductive Health Project was introduced in the middle of the study period and had the primary objective of

increasing contraceptive use among sexually active high school students. However, individual year sample sizes for respondents using hormonal contraception were too small to produce meaningful estimates, precluding this analysis.

Due to the hierarchical nature of the sample (individuals within schools) and consistent with previous studies,(128-132) marginal models using a generalized estimating equation (GEE) approach were used to account for possible residual intra-school correlations.(133, 134) GEE accounts for correlations between the outcomes of individuals selected from the same schools by modeling the correlations or covariances themselves rather than allowing for random effects or random coefficients, as in hierarchical linear models. Thus, such correlations are taken into account in the regression coefficients and their standard errors. As a result, the estimates reported are population averages rather than unit-specific estimates. These estimates provide an accurate approximation of the true school effect on the outcome.(135)

Data management was conducted with SAS 9.3 (the SAS Institute, Cary, NC) while the analyses were conducted with SAS-callable SUDAAN 10.1 (the Research Triangle, Research Triangle Park, NC) to account for the complex survey sampling design and nested nature of individuals within schools. YRBS variable response categories were not reported in the tables when the cell size was unreliable, determined by $n<50$ and/or a residual standard error (RSE) > 0.30. Sample sizes presented in Table 4.1 were unweighted, but all other estimates – proportions, standard errors, and odds ratios (ORs) with their 95% (unadjusted) or 99% (adjusted) confidence intervals (CIs) – were weighted.

Table 3.1 - NYC YRBS Sample and Response Rates for SBHC and Non-SBHC Schools

	2007*			2009			2011		
	SBHC	Non-SBHC	Total	SBHC	Non-SBHC	Total	SBHC	Non-SBHC	Total
# of schools participating	17	70	87	29	76	105	30	72	102
School Response Rate	94%	99%	98%	91%	97%	95%	94%	92%	93%
# of useable completes	1,804	7,276	9,080	2,484	9,403	11,887	2,375	9,195	11,570
Student Response Rate	66%	71%	70%	76%	85%	83%	73%	81%	79%
Overall Response Rate	63%	70%	68%	69%	82%	79%	68%	75%	73%
Total Schools Sampled	18	71	89	32	78	110	32	78	110
Total Students Sampled	2,721	10,268	12,989	3,256	11,123	14,379	3,251	11,370	14,621

*Available documentation for 2007 does not match total sampled students in CDC documentation.
Adjustment made to compensate. Response rates calculated for SBHC and non-SBHC are approximate (overall RR is Final).

Table 3.2 - Contraceptive Use at Last Sex (Outcome variable), 2007-2011, NYC*

Question	Recode	Year
The last time you had sexual intercourse, what one method did you or your partner use to prevent pregnancy? (I have never had sexual intercourse, no method, birth control pills (BCPs), Condoms, Depo, Withdrawal, Some other method, not sure) (CDC CORE QUESTION)	1. I have never had sexual intercourse 2. No method/not sure 3. Hormonal contraception/IUD 4. Condoms, withdrawal, some other method*	2007 2009
If you used some other method the last time you had sexual intercourse, what other birth control method did you or your partner use to prevent pregnancy? (I have never had sexual intercourse, The Patch, The Ring, The IUD, Implanon, EC or the Morning After Pill, I did not use any of these methods the last time I had sexual intercourse**, not sure)	Same as above (2 questions asked in 2009 were combined)	2009
The last time you had sexual intercourse, what one method did you or your partner use to prevent pregnancy? (I have never had sexual intercourse; no method; BCPs; Condoms; Depo, Nuva Ring, Implanon, or any IUD; Withdrawal; Some other method; not sure) (CDC CORE QUESTION)	Same as above (2 questions asked in 2011 were combined)	2011
The last time you had sexual intercourse, what one birth control method did you or your partner use? (I have never had sexual intercourse, Depo, The Ring, The Patch, The IUD or Implanon, EC or the Morning after Pill, None of these methods**, Not sure)	Same as above	2011

* Year-specific questions were recoded into three categories from the most effective to the least effective method to prevent pregnancy:

1) hormonal method (includes birth control pills, Depo, The Patch, The Ring/Nuva Ring, Implanon, emergency contraception) or IUD
2) condoms, withdrawal, or other method
3) no method or note sure

**This response category, added to the second contraceptive question in 2009 and 2011, was excluded from the analysis as it could mean no method, or a method in the previous question on contraceptive use.

Table 3.3 Individual Level (YRBS) Variables Measured, NYC, 2007-2011

Variable Construct	Question	Variable Name
Demographics	How old are you? (14, 15, 16,17, 18 or older)	Age
Demographics	What is your sex? (Female, Male)	Gender
Demographics	In what grade are you? (9^{th}, 10^{th}, 11^{th}, 12^{th})	Grade
Demographics	What is your race/ethnicity? (Recode of questions, with 5 response categories: White, Black, Hispanic, Asian/Pacific Islander, Other)	Race/ethnicity
Individual Health Related	During the past 12 months, did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing some usual activities? (Yes, No)	Depression
Individual Health Related	During the past 12 months, did you ever seriously consider attempting suicide? (Yes, No)	Suicidal ideation
Individual Health Related	During the past 12 months, did your boyfriend or girlfriend ever hit, slap, or physically hurt you on purpose? (Yes, No)	Intimate partner violence
Individual Health Related	Have you ever been physically forced to have sexual intercourse when you did not want to? (Yes, No)	Forced sex
Safety	During the past 30 days, on how many days did you not go to school because you felt you would be unsafe at school or on your way to or from school? (0 days, 1, 2-3, 4-5, 6 or more)	Unsafe at school
Safety	During the past 12 months, how many times has someone threatened or injured you with a weapon such as a gun, knife, or club on school property? (0 times, 1, 2-3, 4-5, 6-7, 8-9, 10-11, 12 or more)	Threatened or injured at school
Sexual behavior	How old were you when you had sexual intercourse for the first time? (I have never had sexual intercourse, 11 years old or younger, 12, 13, 14, 15, 16, 17 or older)	Age of first sex
Sexual behavior	Did you drink alcohol or drugs before you had sexual intercourse the last time (I have never had sexual intercourse, Yes, No)	Alcohol or drugs at last sex

FILTER VARIABLE	Question	
Sexual behavior	Have you ever had sexual intercourse? (Yes, No)	Ever had sex
Sexual behavior	During the past 3 months, with how many people did you have sexual intercourse? (I have never had sexual intercourse, I have had sexual intercourse but not in the past 3 months, 1 person, 2,3,4,5,6 or more people)	# sexual partners in past 3 months (sex in past 3 months=1 or more partners)

Table 3.4 – School-Level Data Sources, 2007-2011, NYC

Data Source	Constructs Measured
NYC Health Department (DOHMH) Fitnessgram	Student Demographic Characteristics • Age • Gender • Race/ethnicity • Poverty (qualification for free school lunch = <100% of Federal Poverty Level)
NYC School Survey NYC Department of Education (NYC DOE)	Student Survey • Connectedness • Safety/Ambient Hazards Teacher Survey • Safety/Ambient Hazards Parent Survey • Prosocial Activity
School Progress Report (NYC DOE)	Academics • Four and Six-year graduation rates Connectedness • Average daily attendance
NYC DOE Quality Review	Academics • Quality Review score
CEP 2006-2010 Demographics NYC DOE Administrative Data	Connectedness • Teacher stability and experience Safety/Ambient Hazards • Suspensions
NYS Report Card NYS Education Department (NYSED)	Safety/Ambient Hazards • Suspensions
Appendix G from NY Civil Liberties Union Report	Safety/Ambient Hazards • Permanent metal detectors
NYC Youth Risk Behavior Survey	School-Based Health Center at school

TABLE 3.5 - School-Level Variables Measured, NYC Public High Schools, 2007-2011

Model #	Variable Description	Variable Measure
Demographics	Race	% non-Hispanic black, % non-Hispanic white, API, other
Demographics	Ethnicity	% Hispanic
Demographics	Gender	% Female
Demographics	Poverty (School lunch)	% free HRA (students enrolled in government programs; e.g. food stamps, WIC and TANF) % free non-HRA (household income at or <130% of poverty) % reduced (household income between 131% and 185% of poverty) % full price (household income >185% of poverty)
Academics	HS Graduation 4 year	% 4 year graduation
Academics	HS Graduation 6 year	% 6 year graduation
Academics	Overall School Quality Rating (based on 3-day site visit by educators)	QR Score % Underdeveloped % Developing % Proficient % Well Developed
Connectedness/ Prosocial Activities	Feel Connected To School	NYC School Student Survey – % strongly agree, agree, disagree How much do you agree or disagree with the following statements about your school: I feel welcome in my school The adults at my school look out for me.
Connectedness/ Prosocial activities	Average Daily Attendance	% attendance
Connectedness/ Prosocial Activities	Prosocial Activities	Parent Survey My child's school offers a wide enough variety of courses and activities to keep my child interested in school. (% strongly agree, agree, don't know, disagree, strongly disagree)
Connectedness/ Prosocial Activities	School Size (9^{th}-12^{th} grade)	School enrollment

Category	Variable Description	Variable Measure
Connectedness/ Prosocial Activities	Stable Community of Adults	% teachers more than 2years teaching in this school
Connectedness/ Prosocial Activities	Stable Community of Adults	% teachers teaching > 5 years
Connectedness/ Prosocial Activities	NYC School Survey response rate	Student, Teacher and Parent Survey Response Rate (possible measure of school engagement/involvement)
Safety/Ambient Hazards	Ambient Hazards	<u>Student Survey</u> How often are the following things true about you or about your school? - % never, some of the time, most of the time, all the time. I stay home because I don't feel safe at school. Students threaten or bully other students at school. Students get into physical fights at my school. There is gang activity in my school
Safety/Ambient Hazards	Ambient Hazards	<u>Student Survey</u> How much do you agree or disagree with the following statements about your school? - % strongly agree, agree, disagree, strongly disagree I am safe in my classes. I am safe in the hallways, bathrooms, and locker rooms at my school. I am safe on school property outside my school building.
Safety/Ambient Hazards	Ambient Hazards	<u>Teacher survey</u> – % strongly agree, agree, disagree, strongly disagree Crime and violence are a problem in my school
Safety/Ambient Hazards	Suspensions	% suspensions Superintendent suspensions
Safety/Ambient Hazards	School with Metal Detectors	School has Metal Detectors – Yes, No
SBHC	School has SBHC	SBHC – Yes, No

Table 3.6 Individual and School-level Variables Included in Regression Models

MODEL*	INDIVIDUAL-LEVEL VARIABLES	SCHOOL-LEVEL VARIABLES
Model 1		% Black Non-Hispanic % Hispanic % Female % Free School Lunch (<100% FPL) % 6-year High School Graduation Quarterly Review Score % Average Daily Attendance Enrollment % Teachers < 2 Years at School % Feel Welcome at School (Strongly Agree) % Adults at School Look Out for Me (Strongly Agree) % Prosocial Activities (Strongly Agree) Parent Survey Response Rate Teacher Survey Response Rate % School Crime/Violence a Problem (Strongly Agree) % Stay Home as Don't Feel Safe (Most of Time) % Students Threaten Other Students (Most of Time) % Students Get Into Fights (Most of Time) % Gang Activity at School (Most of Time) % Safe in Classes (Strongly Agree) % Safe in School Building (Strongly Agree) % Safe on School Property (Strongly Agree) % Suspensions School has Permanent Metal Detector School has School-Based Health Center (SBHC)
Model 2	Age Gender Race/Ethnicity	See Model 1

MODEL*	INDIVIDUAL-LEVEL VARIABLES	SCHOOL-LEVEL VARIABLES
Model 3	Age Gender Race/Ethnicity Intimate Partner Violence in Past Year Forced Sex Ever Sad/Hopeless in Past Year Suicidal Ideation in Past Year Did not attend school as felt unsafe (past 30 days) Threatened or Hurt with Weapon at School (past year) Age of First Sexual Intercourse Number of Sex Partners Alcohol or Drugs at Last Sex Contraceptive Method at Last Sex	See Model 1
Model 4	See Model 3 + Year of Survey Administration	See Model 1
Model 5	See Model 4	% Black Non-Hispanic % Hispanic % Free School Lunch % Six-Year Graduation % Average Daily Attendance % Teachers > 2 Years at School % Prosocial Activities (Strongly Agree)[i] Teacher Survey Response Rate % Safe in Classes (Strongly Agree) % Safe in School Building (Strongly Agree) % Safe on School Property (Strongly Agree) % Suspensions School has SBHC[ii]

MODEL*	INDIVIDUAL-LEVEL VARIABLES	SCHOOL-LEVEL VARIABLES
Model 6	See Model 4	% Black Non-Hispanic % Hispanic % Free School Lunch % Teachers > 2 Years at School Teacher Survey Response Rate % Safe in Classes (Strongly Agree) % Safe in School Building (Strongly Agree) % Safe on School Property (Strongly Agree) % Suspensions % Average Daily Attendance[2] School has SBHC[2]

*Model 1: Independent effects of each school-level exposure on the outcome (unadjusted model)

Model 2: Model 1 + adjusted for age, gender, race/ethnicity

Model 3: Model 2 + adjusted for remaining individual-level variables

Model 4: All individual-level and school-level variables together (Full Model)

Model 5: All individual-level variables + school-level variables that were significant in Model 4 plus variables that were significant in at least 2 previous models

Model 6: All individual-level variables + only school-level variables that were significant in Model 4 (when reference category=no method); all individual-level variables + school-level variables that were significant in Model 4 + one additional variable (when reference category=condom)

[i] Only in Multinomial Logistic Regression Model 5 when Reference Category = No Method (Table 4.5a)

[ii] Only in Multinomial Logistic Regression Model 5 and Model 6 when reference category = Condoms (Table 4.5b)

Chapter 4 – RESULTS

4.1 Sample Description

Individual-level Variables

Demographic Characteristics. Table 4.1 shows the distribution of characteristics of participants in the NYC YRBS during 2007-2011 according to selected domains. The distribution of individual variables in the YRBS 2007-2011 study sample was representative of the demographic composition of the NYC public high schools from 2007-2011. The full unweighted sample was 32,527 students, representing a total of 243,190 NYC public high school students in general education classes (see Chapter 3 for a description of exclusion criteria). Nearly 70% of the weighted sample was non-Hispanic black or Hispanic (35% for each group), with the remaining 30% almost evenly divided between non-Hispanic white and Asian-Pacific Islander (API) students (13.9% and 14.6% respectively). A small percent of students identified as another or several racial/ethnic groups combined in the category "other" (1.6%). Fifty-one percent of the sample was female and over 90% were between the ages of 14 and 18 - with 20.8% age 15, 51% either 15 or 16, and 19.2% age 17. Only 6.9% of students were age 18 or older. There were fewer students in the higher grades, with 31% of students in the 9th and only 19.6% in the 12th grade.

The sample distribution changed substantially by race/ethnicity, age and gender when including only students who ever had sex, with over 82% either non-Hispanic black or Hispanic, 53.3% male, and as would be expected, a much smaller percent who were age 14 or in the 9th grade (12.2% and 22.5%, respectively) and a larger percent who were age 17 or older or in the

12th grade (36.0% and 27.0%, respectively). This distribution remained similar when compared to students who had sex in the past three months, with small increases in the older and higher-grade students, and a small decrease in the percent who were male (49.5%).

Health-Related Factors. Among the full YRBS sample, 10.6% reported intimate partner violence in the past year, increasing to 17.3% among sexually active students; and 7.2% had been forced to have sex at some time in their life, compared to 12.6% of sexually active students. Over one-fourth (28.5%) of the full sample felt sad or hopeless for more than 2 weeks in the past year and 12.3% had considered suicide; this compared to 35.3% and 16.0%, respectively, for sexually active students.

Safety/Ambient Hazards. Regardless of whether or not they had ever had sex or were sexually active, about 10% of the sample did not attend school for one or more days in the past 30 days because they felt unsafe. Almost 7% of the full sample was threatened or hurt with a weapon on school premises at least once in the past year; this increased to over 9% for sexually active students.

Sexual Behavior. A little over 40% of students reported ever having sex, and among these students, over two-thirds (68.1%) reported having sex in the past three months. More than one-third (37.7%) were less than 14 years old the first time they had sex. Most students (70%) who had sex in the past three months (sexually active) had only one sexual partner during that time period; 15.2% had three or more partners in the past three months, and 16.7% used alcohol or drugs the last time they had sex. For contraceptive use at last sex among sexually active students, 9.3% used a hormonal contraceptive method or an intrauterine device (IUD);

72.7% used condoms, withdrawal or some other method; and 18.0% did not use any method or were not sure if a contraceptive method was used.

School-level Variables

Demographics. Tables 4.2a, 4.2b and 4.2c show the distribution of school-level variables in the full sample, for students who ever had sex, and for sexually active students. Appendix 1 shows school-level variable cutpoints for each of the school years included in the sample. In each of the three years, the racial/ethnic composition of the schools showed that not only were the majority of students attending NYC public high schools either *non-Hispanic black* or *Hispanic*,[8] but most public high schools were highly segregated by race/ethnicity. Non-Hispanic white students comprised less than 18% of the student body in 75% of the schools, and half of the schools had less than 1% white students. In the 2006-07 school year, one-fourth of schools had more than 37% of their students qualifying for *free school lunch* due to a family income less than 100% of the federal poverty level, increasing to 43% in 2009-10 and 52% in 2010-11. (Appendix I)

Enrollment, Attendance and High School Graduation. In 2006-2007, the total *school enrollment* ranged from 100 students to more than 2,500, with 25% of the sample attending schools with 100-500 students; the other quartiles were 500-1,000, 1,000-2,500, and more than 2,500 students. Reflecting the break-up of larger high schools to establish smaller schools during the time period of this study, in 2011 *school enrollment* by quartile was approximately 75-300 (Q1), 300-400 (Q2), 400-1500 (Q3), and more than 1500 students (Q4), a notable change over a five-

[8] School-level variables that were included in the dissertation analysis are italicized.

year period. *Average daily attendance* by quartile was 65%-80%, 81-85%, 85-89%, and over 90%. There was little variation in each of the three years, and half of the schools had an attendance rate less than about 85%. For the *six-year graduation rate*, 25% of schools had a rate under 66% (2007), 63% (2009) and 62% (2011), and 25% had a rate over 87.5% (2007), 85% (2009) and 90% (2011). (Appendix I)

Other School-Level Factors. In 25% of high schools in each of the sample years, less than 55% of *teachers had been at the school for more than 2 years*. Almost one-fifth of students in the sample attended a school with a *SBHC* (19.0%), and 14% went to a school that had a *permanent metal detector* they had to pass through when entering the school building. (Table 4.2a)

Bivariate Analysis

Table 4.3a shows the associations between school-level factors at the schools attended by 2007-2011 YRBS participants who ever had sex, by contraceptive use at last sex. Table 4.3b shows these associations for YRBS participants who had sex in the past three months. Bivariate analyses were conducted to examine the association between each of the individual- and school-level variables and contraceptive use before conducting multivariable analyses. While the study research questions did not ask about individual-level factors, individual level associations with contraceptive use were examined to better understand the role of individual-level factors that were adjusted for in the multivariable logistic regression analyses. The bivariate analyses were first conducted on the sample of students who reported that they ever had sexual intercourse (N=11,987) to compare associations for students who had ever had sex with associations for students who had sex in the past three months (N=8,054), and confirmed

the decision to only include sexually active students in subsequent analyses. Only the school-level associations with contraceptive use are shown in Table 4.3a and 4.3b.

Ever Had Sex Subsample. Among teens who ever had sex, age, gender, race/ethnicity, a history of intimate partner violence or forced sex, feeling sad or hopeless for two or more weeks, and seriously considering suicide in the past year were all significantly associated with contraceptive use at last sex ($p<0.001$). A greater proportion of females used a hormonal method, while a greater proportion of males used condoms the last time they had sex. A lower proportion of black non-Hispanic teens used a hormonal method compared with other racial/ethnic groups, and API teens had the highest percentage of any racial/ethnic group for not using any contraceptive method (data not shown). There were also significant associations between individual measures of safety (not attending school because felt unsafe and threatened or injured with a weapon) and contraceptive use ($p<0.05$). All sexual behaviors included in the analysis – early age of first sex, use of alcohol or drugs at last sex, and higher number of sexual partners – were negatively associated with contraceptive use ($p<0.001$).

School-level factors that were associated with contraceptive use at last sex included *percent Hispanic students* ($p<0.01$), *percent qualifying for free school lunch* ($p<0.05$), *six-year high school graduation rate* ($p<0.01$), and attending a school with a *SBHC* ($p<0.01$) (see Table 4.3a) There was a trend towards increased use of a hormonal method among students attending schools with a higher *percent of Hispanic students* as well as a decreased use of condoms and a higher proportion of students not using any method. Attending a school with a smaller *percent of students qualifying for free school lunch* was positively associated with condom use, as was attending a school with a higher *six-year graduation rate*. Attending a

school with a *SBHC* was positively associated with hormonal contraceptive use, and negatively associated with condom use compared to attending a school without a *SBHC*.

Sexually Active Subsample. All individual level factors remained significant and in the same direction among sexually active teens as compared to teens that ever had sex. A lower proportion of black non-Hispanic teens used a hormonal method, and a lower proportion of Hispanic and API teens used condoms. A greater proportion of Hispanic and API teens did not use any method of contraception, with one in four API teens (25.5%) and one in five Hispanic teens (20.1%) not using a method, compared to 16.8% of non-Hispanic black and 10.7% of non-Hispanic white teens.

School-level factors with significant associations with contraceptive use among students that had sex in the past three months included *percent non-Hispanic black* ($p<0.05$), *percent Hispanic* ($p<0.01$), *percent qualifying for free school lunch* ($p<0.05$), *parents' survey response rate* ($p<0.05$), *percent of students that strongly agreed they were safe on school property* ($p<0.05$), and attending a *school with a SBHC* ($p<0.01$). (see Table 4.3b). The direction of the association remained similar to that for teens who ever had sex for *percent Hispanic students*, *percent of students qualifying for free school lunch* and whether or not a school had a *SBHC*. The direction of the association was not clear for *percent black non-Hispanic students*, or *parents' survey response rate*. Attending a school where a higher percent of students *strongly agreed that they were safe on school property* was negatively associated with use of any contraceptive method.

4.2 Binary and Multinomial Logistic Regression

The logistic regression models included only the sample of sexually active teens. In the binary logistic regression models, the outcome 'contraceptive use' was defined as any contraceptive method and included all hormonal methods, the IUD and condoms. In the multinomial logistic regression models, the outcome 'contraceptive use' was defined as either hormonal/IUD method or condoms.

Only associations between school-level variables and contraceptive use are reported, as that was the focus of this study and the specific research questions. Odds ratios (ORs) are reported for the unadjusted models (Model 1); adjusted odds ratios (AOR) are reported for all adjusted models (Models 2-6). Binary logistic regression results are presented in Table 4.4; multinomial logistic regression results are presented in Tables 4.5a (reference category = no method) and 4.5b (reference category = condoms).

Overview of Significant Findings in Fully Adjusted Models (Models 4-6)

Only results from the fully adjusted models are presented in the forthcoming overview. Findings for all models, with odds ratios and confidence intervals, are presented following the overview. With the exception of academics, one or more measures of the other four constructs were significantly associated with contraceptive use in at least one of the regression models.

Demographics. Consistent with findings in the bivariate analysis, teens that attended schools with a lower *percentage of black non-Hispanic or Hispanic students* were significantly more likely to use any contraceptive method compared to no method, and to use condoms compared to no method; a lower *percentage of black non-Hispanic students* was associated with an increased likelihood of using a hormonal method compared to no method. Teens at schools

with a higher *percentage of students qualifying for school lunch* were more likely to use any method than no method, to use condoms versus no method, and to use condoms versus a hormonal method.

Connectedness/Prosocial Activities. Students attending schools with a lower *teacher survey response rate* (a possible proxy for teacher engagement) and *percent of teachers at their school for more than two years* were less likely to use any contraceptive method or condoms versus no method; attending schools with a lower *teacher survey response* rate was also significantly associated with being less likely to use a hormonal method versus no method, and a hormonal method versus condoms. Neither of these associations was significant in the bivariate analyses.

Safety/Ambient Hazards. Several of the measures of safety/ambient hazards were significantly associated with contraceptive use at last sex. Attending schools where a lower *percent of students strongly agreed that they felt safe in their classes* (as compared to schools where a higher percent of students felt this way) was associated with an increased likelihood of using a hormonal method versus condoms. Teens in schools where a lower *percent of students strongly agreed that they felt safe in the school building* were less likely to use either a hormonal method or condoms versus no method; conversely, attending a school where a *lower percent of students strongly agreed that they felt safe on school property* was associated with an *increased* likelihood of using any contraceptive method versus no method, a hormonal method or condoms versus no method, and a hormonal method versus condoms. Of all these factors, only *feeling safe on school property was* significant in the bivariate analysis.

School-Based Health Center. While there were no significant associations between *attending a school with a SBHC* and using any contraceptive method, a hormonal method or condoms

versus no method, students attending a school with a SBHC were more likely to use a hormonal contraceptive method than condoms the last time they had sex, when compared to students in schools without a SBHC. This is consistent with findings in the bivariate analysis. (See Figure 4.1 for a summary of significant results and the direction of the associations.)

Figure 4.1 Significant Results in Binary (B) and Multinomial (M) Logistic Regressions with Fully Adjusted Models, 2007-2011, NYC

CONTRACEPTIVE METHOD USED AT LAST SEX	SIGNIFICANT RESULTS (School-Level Domain)
Any Method vs. No Method (B)	↑ Lower % black non-Hispanic students (Demographics) ↑ Lower % Hispanic students (Demographics) ↑ Higher % students qualifying for free school lunch (Demographics) ↑ Lower % students feel safe on school property (Safety) --- ↓ Lower teacher survey response rate (Connectedness) ↓ Lower % teachers at school for > 2 years (Connectedness)
Hormonal Method vs. No Method (M)	↑ Lower % black non-Hispanic students (Demographics) ↑ Lower % students feel safe on school property (Safety) --- ↓ Lower teacher survey response rate (Connectedness) ↓ Lower % students feel safe in the school building (Safety)
Condom vs. No Method (M)	↑ Lower % black non-Hispanic students (Demographics) ↑ Lower % Hispanic students (Demographics) ↑ Higher % students qualifying for free school lunch (Demographics) ↑ Lower % students feel safe on school property (Safety) --- ↓ Lower teacher survey response rate (Connectedness) ↓ Lower % teachers at school for > 2 years (Connectedness) ↓ Lower % students feel safe in the school building (Safety)
Hormonal Method vs. Condom (M)	↑ Lower % students feel safe in classes (Safety) ↑ Lower % students feel safe on school property (Safety) ↑ School-Based Health Center --- ↓ Higher % students qualifying for free school lunch (Demographics) ↓ Lower teacher survey response rate (Connectedness) ↓ Lower % students feel safe in the school building (Safety) ↓ Higher % suspensions (Safety)

Figure 4.1 (continued)

CONTRACEPTIVE METHOD USED AT LAST SEX	SIGNIFICANT RESULTS (School-Level Domain)
No Method vs. Condom (M)	↑ Higher attendance rate (Connectedness)*

↑ = increased likelihood of using a contraceptive method vs. no method, or hormonal method vs. condom
↓ = decreased likelihood of using a contraceptive method vs. no method, or hormonal method vs. condom

* This significant association was only found when the reference group was 'condoms', and only in Model 6. This difference with the same comparison (condoms vs. no method) when the reference group was 'no method' is because Model 6 included different variables when 'condoms' were the reference group (see Chapter 3).

A. Demographics

Any Contraceptive Method vs. No Contraceptive Method (Table 4.4)

Teens attending schools with the lowest *percentage of Hispanic students* were over 1.5 times more likely to use contraception than teens in schools with the highest *percentage of Hispanic students* (OR= 1.58; 95% Confidence Interval [CI]=1.1, 2.2) in the unadjusted model, and almost 2 ½ times more likely to use contraception in the fully adjusted model[9] (AOR=2.44; 99% CI=1.13, 5.27). An association between *percentage of non-Hispanic black students* and contraceptive use was only present in the full model, with students in schools with the lowest *percentage of non-Hispanic black students* about twice as likely to use contraception as students in schools with the highest percent blacks (AOR=2.05; 99% CI=1.01,4.17).

Teens attending schools with a higher *percent of students qualifying for free school lunch* were 1.6 times less likely to use contraception than teens in schools with the lowest *percent of students qualifying for free school lunch* (AOR=0.64; 99% CI=0.42, 0.99) when adjusting for individual level covariates; in the fully adjusted model the direction of this association changed, and teens with in a school with a lower *percent of students qualifying for*

[9] The full model controlled for all individual-level covariates and school-level exposures.

free school lunch were about two times as likely to use any contraceptive method than no method (AOR=2.06; 99%CI=1.23, 3.45). The measure for school-level poverty was the only variable tested where the significant relationship changed from less likely to more likely to use a contraceptive method from the unadjusted to an adjusted model.

Hormonal Contraception vs. No Method and Condoms vs. No Method (Table 4.5a)

The *percent of Hispanic students* was significantly associated with condom use compared to no method in the unadjusted model (OR=1.66; 95%CI=1.19, 2.32); this association remained in the full model, with students attending schools with the lowest *percent of Hispanic students* 2.6 times more likely to use condoms than no method (AOR=2.59; 99%CI=1.09, 6.13). Students attending a school with a lower *percentage of non-Hispanic black students* were six times more likely to use a hormonal contraceptive method than no method (AOR=6.01; 99%CI=1.55, 23.4) in the fully adjusted model, although there was a wide confidence interval. These students were 2 ½ times more likely to use condoms than no method in the fully adjusted model (AOR=2.50; 99%CI=1.14, 5.49).

As in the binary logistic regression model, the direction of the association between school-level poverty and contraceptive use changed from the unadjusted to the adjusted models. Teens attending schools with a higher *percent of students qualifying for free school lunch* were significantly less likely to use hormonal contraception (OR=0.64; 95%CI=0.49, 0.85) or condoms (OR=0.70; 95%CI=0.54, 0.92) than no method in the unadjusted model, but over two times more likely to use condoms in the fully adjusted model (AOR=2.26; 99%CI=1.36, 3.77).

Hormonal Contraception vs. Condoms (Table 4.5b)

When comparing hormonal contraceptive use with condom use, in the unadjusted model students in schools with a lower *percentage of non-Hispanic black students* were significantly more likely to use hormonal contraception than those attending schools with a higher *percentage of non-Hispanic black students* (OR=1.73; 95% CI=1.26, 2.37), while students in schools with a lower *percentage of Hispanic students* were significantly less likely to use hormonal contraception than to use condoms (OR=0.66; 95% CI=0.46, 0.94); these associations did not remain significant in the fully adjusted model. Students in schools with the highest *percent of students qualifying for free school lunch* were more than four times less likely to use hormonal contraception than condoms (AOR=0.23; 99% CI=0.05, 0.94) in the fully adjusted model.

B. Academics

Both variables measuring a schools' academic environment, *percent six- year high school graduation* and *Quality Review score*, were significantly associated with contraceptive use at last sex although the *Quality Review score* was only significant in unadjusted models. The *six-year graduation rate* and *average daily attendance*, two correlated variables (r=.63), were both significant in unadjusted and adjusted models, though neither was significantly associated with contraceptive use in the full model. It is not certain to what degree high school graduation and attendance are measuring similar constructs, and both could be viewed as constructs measuring academics and/or connectedness. Associations between these school-level constructs and contraceptive use will both be reported in this section.

Any Contraceptive Method vs. No Contraceptive Method (Table 4.4)

Students attending schools with lower *six-year graduation* and *average daily attendance rates* were 1.6 (AOR=0.64; 99% CI=0.41, 0.99) and 1.7 (AOR=0.58; 99%CI=0.37, 0.92) times less likely, respectively, to use any contraception than students attending schools with higher rates when adjusting for all individual level covariates (Model 3).

Hormonal Contraception vs. No Method and Condoms vs. No Method (Table 4.5a)

After adjusting for all individual level covariates, students in schools with lower *six-year graduation rates* were about two times less likely to use hormonal contraception (AOR=0.41; 99%CI=0.18, 0.94) and 1.4 times less likely to use condoms (AOR=0.61; 99%CI=0.40, 0.93) compared to no contraceptive method. *Attendance rate* was only significantly associated with condom use compared to no method in Model 3; teens in schools with the lowest *attendance rates* were 1.8 times less likely to use condoms after adjusting for all individual-level covariates (OR=0.56; 99%CI=0.35, 0.89).

C. School Connectedness/Prosocial Activities

Five of the school-level variables included in regression models to estimate the association between school connectedness and contraceptive use were significant in at least one of the regression models – *average daily attendance* (described above), the *percent of teachers at the school for more than 2 years*, *the teacher school survey response rate*, *percent of parents strongly agreeing that their child's school offered sufficient prosocial activities*, and *percent of students strongly agreeing they felt welcome at school*.

Any Contraceptive Method vs. No Contraceptive Method (Table 4.4)

Students at schools with a lower *percent of teachers at the school for more than two years* were 1.4 times less likely to use any contraceptive method in the fully adjusted model (AOR=0.70; 99% CI=0.50, 0.96); students were also two times less likely to use any contraception if they went to a school with a lower *teacher survey response rate* in the fully adjusted model (OR=0.48; 99%CI=0.32, 0.72). This was the *only* school-level variable that was significant in all binary logistic regression models.

Hormonal Contraception vs. No Method and Condoms vs. No Method (Table 4.5a)

In schools with the lowest percent of parents *strongly agreeing that their child's school offered prosocial activities*, compared to schools with the highest percent of parents strongly agreeing that this was the case, students were 1.7 times less likely to use hormonal contraception than no method (OR=0.58; 95% CI=0.36, 0.94) in the unadjusted model, but this association was not significant in any of the adjusted models. Consistent with findings on associations with use of any contraceptive method, students attending schools with a lower *percent of teachers working there for more than two years* were 1.7 times less likely to use condoms than no method in the fully adjusted model (OR=0.60; 99% CI=0.42, 0.84). Students at schools with lower *teacher survey response rates* were 3 times less likely to use hormonal contraceptives (AOR=0.33; 99% CI=0.13, 0.81) and 1.7 times less likely to use condoms (AOR=.59 ; 99% CI=0.38, 0.93) than students in schools with higher *teacher survey response rates* in the fully adjusted model.

Hormonal Contraception versus Condoms (Table 4.5b)

The only school-level measure of connectedness that was significant in the adjusted models was the *teacher survey response rate*, with students attending schools with lower *teacher survey response rates* 3 times less likely to use hormonal contraception than condoms in the adjusted model (AOR=0.33; 99% CI=0.14, 0.77).

D. School Safety/Ambient Hazards

Several school-level factors measuring school safety/ambient hazards were significantly associated with contraceptive use. Five of these factors were measured by the annual student school survey, and the sixth was the percent of student suspensions.

Any Contraceptive Method vs. No Contraceptive Method (Table 4.4)

Two school-level measures of safety were significantly associated with any contraceptive use - the percent of students at the school who reported that *students get into fights most of the time*, and the percent of students at the school who *strongly agreed that they were safe on school property*. Students from schools where a higher percent of students reported that *students' get into fights most of the time* were 1.5 times less likely to use any contraception after adjusting for all individual-level covariates (AOR=0.65; 99%CI=0.43, 0.99). An unexpected finding was that students from schools where a lower *percent of students strongly agreed that they were safe on school property* were 3.7 time more likely to use contraception at last sex, but this finding should be interpreted with caution due to the wide confidence interval (AOR=3.70; 99% CI=1.26, 10.8), bringing into question the validity of the measure (e.g. the question may be interpreted differently by different respondents).

Hormonal Contraception vs. No Method and Condoms vs. No Method (Table 4.5a)

All of the student survey questions measuring safety were significantly and positively related to hormonal and/or condom use when compared to no method, and with the exception of *strongly agreeing that it is safe on school property* (which again had extremely wide confidence intervals) all went in the predicted direction. Of particular note, students at schools with a low *percent of students strongly agreeing that they were safe in the school building* were significantly less likely to have used hormonal contraception at last sex, and this was significant in the unadjusted and all adjusted models. After adjusting for all individual level covariates, these students were 1.6 times less likely to use hormonal contraception (OR=0.61; 99% CI=0.61, 0.95), and after further adjusting for all school-level factors, students were almost six (5.9) times less likely to have used hormonal contraception than no method (AOR=0.17; 99% CI=0.03, 0.92), although this association had a wide confidence interval.

A higher school *suspension rate* was significantly associated with being less likely to use hormonal contraception when compared with not using any contraceptive method, in both the unadjusted model (OR=0.52; 95% CI=0.31, 0.86) and after adjusting for all individual-level factors (OR=0.49; 99%CI=0.26, 0.93).

Hormonal Contraception vs. Condoms (Table 4.5b)

Students at schools where a lower *percent of students strongly agreed that they were safe in the school building* were 8.3 times less likely to use hormonal contraception than condoms (AOR=0.12; 99%CI=0.03, 0.53). Students at schools where a lower *percent of students strongly agreed that they were safe on school property* were almost two times (1.9) less likely to use hormonal contraception than condoms after adjusting for all individual-level covariates

(OR=0.54; 99% CI=0.31, 0.94). This significant association reversed direction after further adjusting for school-level variables, with students almost 8 times more likely to use hormonal contraception than condoms (OR=7.73; 99% CI=1.72, 34.8), although again there was a wide confidence interval with this variable, and thus this finding needs to be interpreted with caution.

Students attending schools with a higher *suspension rate* were significantly less likely to use hormonal contraception than condoms in unadjusted and adjusted models. In the fully adjusted model, students attending schools with the highest *suspension rate* were three times less likely to use hormonal contraception than condoms (AOR=0.33; 99% CI=0.11, 0.99).

E. School-Based Health Center

There was no significant association between *attending a school with a SBHC* and use of any contraceptive method compared to no method, or with use of either hormonal contraception or condoms when compared with no method. However, there was a significant association between *SBHCs* and use of hormonal contraception when compared to use of condoms at last sex. In the unadjusted model, students not *attending a school with a SBHC* were 1.6 times less likely to use a hormonal contraceptive method than a condom at last sex (OR=0.63; 95% CI=0.49, 0.82), and after adjusting for all individual level covariates (AOR=0.62; 99% CI=0.40, 0.95). This association was no longer significant in the fully adjusted model.

4.3 Multinomial Logistic Regression –Models 5 and 6 for Best Fit

Due to concern regarding unstable estimates in the fully adjusted models with multinomial logistic regression,[10] with a large number of variables included in the model and a small sample size for the outcome category 'hormonal contraception,' two further models were fitted in the multinomial regression analyses. Both models were adjusted for all individual-level covariates, and selected school-level variables (see Chapter 3 for further detail).

Hormonal Contraception vs. No Method and Condoms vs. No Method (Table 4.5a)

The eight variables that were significant in Model 4 were included in Model 5 – three demographic variables (*percent non-Hispanic black*, *percent Hispanic*, *percent qualifying for free school lunch*), two connectedness variables (*teacher survey response rate* and *percent teachers at the school for more than 2 years*), and three safety variables (*percent who strongly agree that they are safe in classes*, *in the school building*, and *on school property*). Four additional school-level variables, *6-year high school graduation rate*, *average daily attendance*, *parents strongly agreeing that their child's school had prosocial activities,* and *suspension rate* were also included as they were significant in adjusted models run prior to Model 4. For Model 6, due to continued concern regarding unreliable estimates, an even more parsimonious model was fit, with only the eight variables that were significant in Model 4.

None of the demographic variables were significantly associated with hormonal or condom use in Models 5 or 6. In Model 5, students attending schools with a lower *teacher*

[10] This was not a concern in the binomial logistic regression models, as the sample size for the outcome category 'any contraceptive method' was large (respondents using hormonal, IUD and condom methods were combined).

survey response rate were almost two (1.9) times less likely to use hormonal contraception than no method (AOR=0.52; 99% CI=0.30, 0.92). Students in schools where a lower *percent of students strongly agreed that they were safe in the school building* were over four times (4.2) less likely to use hormonal contraception than no method in Models 5 and 6 (AOR=0.23; 99% CI=0.07, 0.78 and AOR=0.24; 99% CI=0.08, 0.77 respectively). Attending schools where a lower *percent of students strongly agreed that they were safe on school property* remained significant in association with hormonal contraception use compared to no method in Models 5 (OR=5.72; 99% CI=1.93, 16.9) and 6 (OR 5.07; 99% CI=2.04, 12.6), respectively, but in the opposite direction than expected and then other variables measuring school safety; the result for this variable again had a wide confidence interval.

Of note, when the reference group was 'condoms' (see Table 4.5b), there were two significant associations in Model 6 when comparisons were made with students not using any method that were not found when comparisons were made with 'no method' as the reference group. These differences were possible because Model 6 included different variables when 'condoms' was the reference group. Students at schools with a lower *attendance rate* were almost two times more likely (OR=1.91; 99%CI=1.04, 3.49) to use no method than to use condoms. In contrast and in the opposite direction than expected, students at schools where a lower *percent of students felt safe on school property* were less likely to use no method than condoms (OR=0.38; 99%CI=0.19, 0.77). With the *safe on school property* variable, there was also a significant association in the fully adjusted model (Model 4) when the reference group was 'no method' (Table 4.5a).

Hormonal Contraception vs. Condoms (Table 4.5b)

Model 5 included the nine variables that were significant in Model 4 (eight of these variables were also significant in Model 4 when the reference group was 'no method') In addition, three variables that were significant in previous adjusted models but not in Model 4 - *six-year high school graduation rate, average daily attendance rate* and *SBHC* – were included in Model 5. For Model 6, only percent *six-year high school graduation* was omitted, and all other variables were kept in the model. The rationale for this was that six-year high school graduation and average daily attendance rate were significant when only one was included in the model.

Four school-level variables were significantly associated with hormonal use compared to condom use in Models 5 and 6. Students in schools with the lowest *percent of students strongly agreeing that they were safe in their classes* were over four times more likely to use hormonal contraception than condoms when compared to students in schools with the highest *percent of students strongly agreeing they were safe in their classes* in Models 5 (AOR=4.72; 99% CI=1.01, 22.1) and 6 (AOR=4.42; 99% CI=1.11, 17.6), respectively. In contrast, students attending schools with the lowest *percent strongly agreeing that they were safe in the school building* were nine times less likely to use hormonal contraception than condoms in both Models 5 (AOR=0.11; 99% CI=0.02, 0.52) and 6 (AOR=0.11; 99% CI=0.03, 0.46), respectively. For both these results the estimates should be viewed with caution due to the wide confidence intervals. Another safety/ambient hazards measure, *suspension rate*, was also significant in Models 5 and 6 – students in schools with higher *suspension rates* were 2.6 (AOR=0.39; 99% CI = 0.21, 0.74) and 2.1 (AOR=0.47; 99% CI = 0.27, 0.83) times less likely, respectively, to use

hormonal contraception than condoms when compared to students attending schools with lower *suspension rates*.

Finally, students attending a school without a SBHC were 2.4 times less likely to use hormonal contraception than condoms in Model 5 (AOR=0.42; 99% CI=0.24, 0.74), and 2.2 times less likely to use hormonal contraception than condoms in Model 6 (AOR=0.45; 99% CI=0.26, 0.77).

4.5 Interactions by Race/Ethnicity

When the regression models were fitted with an interaction term of race/ethnicity with each of 12 selected school-level variables, three were significant in the multinomial regression analyses – *percent of students qualifying for free school lunch*, *percent of students strongly agreeing that their classes were safe,* and *percent of students strongly agreeing that they were safe on school property,* although there were differences in magnitude and direction of the association by racial/ethnic group (see Table 4.6 and Appendix II).[11]

When stratifying analyses by race/ethnicity for the three significant school-level variables, significant associations by race/ethnicity only existed when comparing students using a 'hormonal method' to students using 'condoms'. Attending a school with a higher *percent of students qualifying for free school lunch* was significantly associated with a greater likelihood of using hormonal methods than condoms only for Hispanic students (OR=2.30; 99%CI=1.10, 4.80). Attending a school with a lower *percent of students strongly agreeing that their classes*

[11] Due to unstable estimates for Asian/Pacific Islander category when conducting multinomial logistic regression, these analyses are limited to black non-Hispanic, white non-Hispanic and Hispanic students.

were safe was significantly associated with less likelihood of using hormonal conception than condoms only for white non-Hispanic students (OR=0.22; 99%CI=0.06, 0.84), whereas attending a school with a lower *percent of students strongly agreeing that they were safe on school property* was significantly associated with less likelihood of using hormonal contraception than condoms only for black non-Hispanic students (OR=0.45; 99%CI=0.20, 0.98).

Table 4.1 - Distribution of Selected Individual-Level Characteristics of Participants in the New York City YRBS*: 2007-2011

VARIABLE	Full Sample N= 32,527 % (SE)**	Ever had sex N= 11,987 % (SE)	Sex in past 3 mos N= 8,054 % (SE)
DEMOGRAPHICS			
RACE/ETHNICITY			
Black	35.05 (1.94)	41.74 (2.15)	41.69 (2.09)
White	13.92 (0.99)	10.50 (0.99)	10.74 (1.03)
Hispanic	34.82 (1.38)	40.85 (1.82)	41.01 (1.79)
Asian/Pacific Islander	14.62 (1.26)	5.22 (0.56)	4.68 (0.60)
Other	1.59 (0.13)	1.70 (0.18)	1.88 (0.26)
GENDER			
Female	51.18 (1.10)	46.69 (1.16)	50.49 (1.26)
Male	48.82 (1.10)	53.31 (1.16)	49.51 (1.26)
AGE			
12	0.21 (0.03)	0.16 (0.05)	0.16 (0.05)
13	1.94 (0.19)	0.70 (0.11)	.61 (0.11)
14	20.80 (1.04)	12.16 (0.80)	10.37 (0.73)
15	26.93 (0.96)	23.81 (1.11)	22.58 (1.21)
16	24.04 (0.66)	27.23 (0.86)	27.18 (0.89)
17	19.18 (0.87)	25.85 (1.20)	27.41 (1.29)
18 or older	6.89 (0.56)	10.10 (0.79)	11.69 (0.97)
GRADE			
9^{th}	31.31 (1.46)	22.54 (1.55)	20.40 (1.58)
10^{th}	28.18 (1.30)	26.19 (1.39)	24.79 (1.37)
11^{th}	21.15 (0.86)	24.26 (1.14)	25.49 (1.27)
12^{th}	19.6 (1.25)	27.00 (1.94)	29.32 (2.04)
Ungraded or other grade	-	-	-
HEALTH RELATED			
Intimate partner violence in past year	10.58 (0.27)	15.53 (0.48)	17.26 (0.66)
Forced sex ever	7.24 (0.24)	11.79 (0.44)	12.56 (0.54)
Sad/Hopeless in past year	28.48 (0.50)	34.05 (0.72)	35.30 (0.84)
Suicidal ideation in past year	12.26 (0.29)	15.33 (0.60)	15.98 (0.70)
SCHOOL CONNECTEDNESS/SAFETY			
In past 30 days, did not attend school as felt unsafe – no days	91.71 (0.39)	90.18 (0.52)	89.83 (0.59)
In past 30 days, did not attend school as felt unsafe – 1 day	4.41 (0.22)	4.84 (0.31)	4.62 (0.34)
In past 30 days, did not attend school as felt unsafe – 2-5 days	*2.53 (0.17)*	*3.24 (0.27)*	*3.48 (0.31)*
In past 30 days, did not attend school as felt unsafe – 6+ days	1.35 (0.11)	1.74 (0.20)	2.07 (0.25)

Table 4.1 - Distribution of Selected Individual-Level Characteristics of Participants in the New York City YRBS*: 2007-2011

VARIABLE	Full Sample N= 32,527 % (SE)**	Ever had sex N= 11,987 % (SE)	Sex in past 3 mos N= 8,054 % (SE)
In past year, times threatened or hurt with weapon – no times	93.12 (0.23)	91.10 (0.39)	90.79 (0.48)
In past year, times threatened or hurt with weapon – 1 time	3.39 (0.15)	4.29 (0.25)	4.07 (0.27)
In past year, times threatened or hurt with weapon - 2-3 times	1.62 (0.10)	2.14 (0.19)	2.31 (0.26)
In past year, times threatened or hurt with weapon - > 3 times	1.87 (0.12)	2.47 (0.23)	2.83 (0.29)
SEXUAL BEHAVIOR			
Ever had sex	41.24 (1.18)	--	--
First sex <14 years old	--	37.70 (0.93)	37.35 (1.02)
First sex age 14 or older	--	62.30 (0.93)	62.65 (1.02)
# sex partners past 3 mos – no sex past 3 mos	--	31.87 (0.76)	--
# sex partners past 3 mos – 1	--	47.89 (0.77)	70.28 (0.81)
# sex partners past 3 mos – 2	--	9.90 (0.44)	14.53 (0.62)
# sex partners past 3 mos – 3+	--	10.35 (0.42)	15.19 (0.61)
Alcohol or drugs at last sex	--	15.77 (0.49)	16.69 (0.59)
Hormonal Contraception/IUD at last sex	--	7.72 (0.46)	9.31 (0.54)
Condom/Withdrawal/Other method at last sex	--	73.26 (0.65)	72.67 (0.75)
No contraception at last sex	--	19.02 (0.67)	18.02 (0.72)

*YRBS=Youth Risk Behavior Survey

** SE=Standard Error

Table 4.2a - Distribution of School-Level Variable Characteristics in the Full Sample of Participants in the New York City YRBS: 2007-2011 (N = 32,527)

VARIABLE	First Quartile* % (SE)**	Second Quartile* % (SE)**	Third Quartile* % (SE)**	Fourth Quartile* % (SE)**
DEMOGRAPHICS				
RACE/ETHNICITY				
Black	32.02 (3.27)	24.06 (2.73)	21.48 (2.79)	22.44 (3.20)
Hispanic	31.65 (3.66)	27.14 (3.20)	24.07 (2.92)	17.13 (2.04)
GENDER				
Female	25.72 (3.12)	23.91 (2.78)	26.03 (3.00)	24.35 (3.28)
POVERTY (SCHOOL LUNCH)				
≤ 100% FPL	34.26 (3.11)	29.68 (3.27)	23.46 (2.84)	12.60 (41.83)
ACADEMICS				
6 Year HS Graduation	20.97 (2.67)	27.34 (3.35)	24.81 (3.38)	26.87 (3.42)
Quality Review [a]	8.43 (2.47)	8.80 (1.90)	51.04 (3.93)	31.72 (3.78)
CONNECTEDNESS				
Attendance	19.66 (2.44)	23.07 (2.72)	25.52 (3.19)	31.74 (3.37)
Enrollment	15.86 (2.34)	19.90 (2.83)	25.70 (3.14)	38.55 (3.79)
Teachers > 2 years	17.93 (2.91)	18.79 (2.54)	30.69 (3.22)	32.60 (3.39)
Student Survey [b]				
Feel welcome (SA)	20.41 (2.99)	28.22 (3.13)	27.26 (3.51)	24.11 (2.86)
Look out for me (SA)	31.11 (3.60)	22.92 (2.82)	24.24 (2.98)	21.73 (2.79)
Parent Survey [b]				
School activities (SA)	21.97 (3.12)	25.37 (2.90)	28.10 (3.27)	24.56 (2.68)
Survey RR (Parent)	26.57 (2.91)	30.02 (3.05)	20.09 (2.82)	23.32 (2.60)
Survey RR (Teacher)	26.47 (2.75)	24.45 (3.12)	25.55 (2.86)	23.53 (2.68)

Table 4.2a - Distribution of School-Level Variable Characteristics in the Full Sample of Participants in the New York City YRBS: 2007-2011 (N = 32,527)

Variable	First Quartile* % (SE)**	Second Quartile* % (SE)**	Third Quartile* % (SE)**	Fourth Quartile* % (SE)**
SAFETY				
Teacher Survey [b]				
Crime Problem (SA)	33.54 (3.38)	31.00 (3.14)	19.76 (2.95)	15.71 (2.32)
Student Survey [b]				
Stay home – Most of time	17.84 (2.71)	21.20 (2.93)	30.76 (3.13)	30.21 (3.12)
Bully – Most of time	24.07 (3.16)	28.22 (3.32)	21.99 (2.81)	25.71 (2.79)
Fights – Most of time	25.24 (3.14)	22.49 (2.96)	27.77 (3.06)	24.50 (2.67)
Gangs – Most of time	24.27 (3.03)	19.98 (2.66)	28.59 (3.27)	27.16 (2.64)
Safe in Class (SA)	21.89 (2.82)	22.95 (2.80)	28.11 (3.57)	27.05 (3.32)
Safe Building (SA)	23.37 (2.96)	24.87 (3.04)	26.20 (3.46)	25.57 (3.11)
Safe Property (SA)	19.15 (2.78)	25.30 (2.99)	29.67 (3.49)	25.88 (3.13)
Suspensions (%)	22.42 (3.63)	28.17 (3.29)	30.36 (3.44)	19.05 (3.06)
Metal Detector [c]	14.48 (2.56)	85.52 (2.56)		
SBHC [c]				
SBHC	18.78 (2.10)	81.22 (2.10)		

*Continuous variables were categorized into quartiles based on the distribution of each variable in each of the three years included in the sample. The quartiles are an average of the cutpoints in each year. Appendix 1 is a table of school-level variable cutpoints by year for each of the school years included in the sample.

** Weighted Proportions (Standard Error)

[a] Quarterly Review - Quartile 1 = Underdeveloped, Quartile 2 = Developing, Quartile 3 = Proficient, Quartile 4 = Well Developed

[b] SA = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree

[c] Metal Detector and SBHC (School-Based Health Center) are dichotomous variables - Quartile 1 = Yes, Quartile 2 = No

Table 4.2b - Distribution of School-Level Variable Characteristics Among Students Who Ever Had Sex in the New York City YRBS: 2007-2011 (N=11,987)

VARIABLE	First Quartile* % (SE)**	Second Quartile* % (SE)**	Third Quartile* % (SE)**	Fourth Quartile* % (SE)**
DEMOGRAPHICS				
RACE/ETHNICITY				
Black Non-Hispanic	23.26 (2.79)	23.55 (2.89)	22.90 (3.07)	28.28 (3.97)
Hispanic	28.89 (3.88)	24.82 (3.10)	25.55 (3.20)	20.74 (2.45)
GENDER				
Female	24.08 (2.96)	24.64 (2.90)	26.94 (3.19)	24.34 (3.710
POVERTY (SCHOOL LUNCH)				
≤ 100% FPL	26.38 (3.23)	28.93 (3.23)	29.12 (3.59)	15.57 (2.28)
ACADEMICS				
6 Year HS Graduation	26.73 (3.35)	27.64 (3.39)	24.74 (3.86)	20.89 (3.07)
Quality Review [a]	11.52 (3.62)	9.80 (2.08)	53.89 (3.97)	24.79 (3.22)
CONNECTEDNESS				
Attendance	25.72 (3.19)	26.19 (3.05)	24.93 (3.11)	23.15 (3.130
Enrollment	16.73 (2.52)	22.68 (3.56)	27.34 (3.29)	33.23 (3.58)
Teachers > 2 years	20.12 (3.59)	20.93 (3.01)	29.07 (3.20)	29.89 (3.47)
Student Survey [b]				
Feel welcome (SA)	23.85 (3.41)	29.04 (3.49)	26.17 (3.82)	20.95 (2.69)
Look out for me (SA)	33.32 (3.98)	21.53 (2.85)	24.07 (3.25)	21.08 (2.81)
Parent Survey [b]				
School activities (SA)	25.05 (3.75)	26.31 (3.12)	27.50 (3.41)	21.13 (2.49)
Survey RR (Parent)	29.68 (3.23)	31.09 (3.46)	18.55 (3.03)	20.37 (2.48)
Survey RR (Teacher)	27.41 (2.89)	24.58 (3.49)	25.76 (3.07)	22.26 (2.63)

Table 4.2b - Distribution of School-Level Variable Characteristics Among Students Who Ever Had Sex in the New York City YRBS: 2007-2011 (N=11,987)

VARIABLE	First Quartile % (SE)**	Second Quartile % (SE)**	Third Quartile % (SE)**	Fourth Quartile % (SE)**
SAFETY				
Teacher Survey [b]				
Crime Problem (SA)	34.34 (3.81)	33.22 (3.39)	16.00 (2.52)	16.44 (2.54)
Student Survey [b]				
Stay home – Most of time	13.74 (2.31)	18.12 (2.89)	33.16 (3.50)	34.98 (3.33)
Bully – Most of time	17.82 (2.82)	28.09 (3.72)	23.88 (2.97)	30.21 (3.34)
Fights – Most of time	18.60 (2.81)	20.03 (2.69)	31.24 (3.50)	30.14 (3.14)
Gangs – Most of time	17.88 (2.64)	18.96 (2.69)	30.81 (3.61)	32.35 (3.08)
Safe in Class (SA)	25.94 (3.21)	23.24 (2.81)	29.28 (3.83)	21.55 (3.01)
Safe Hallways (SA)	27.01 (3.38)	24.63 (2.99)	28.02 (3.99)	20.33 (2.69)
Safe Property (SA)	21.53 (3.17)	26.41 (3.02)	30.30 (3.91)	21.76 (2.98)
Suspensions (%)	16.98 (3.12)	27.15 (3.35)	33.08 (3.87)	22.79 (3.52)
Metal Detectors [c]	18.35 (3.21)	81.65 (3.21)		
SBHC [c]				
SBHC	21.65 (2.44)	78.35 (2.44)		

*Continuous variables were categorized into quartiles based on the distribution of each variable in each of the three years included in the sample. The quartiles are an average of the cutpoints in each year. Appendix 1 is a table of school-level variable cutpoints by year for each of the school years included in the sample.

** Adjusted Proportions (Standard Error)

[a] Quarterly Review - Quartile 1 = Underdeveloped, Quartile 2 = Developing, Quartile 3 = Proficient, Quartile 4 = Well Developed

[b] SA = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree

[c] Metal Detector and SBHC (School-Based Health Center at school) are dichotomous variables - Quartile 1 = Yes, Quartile 2 = No

Table 4.2c - Distribution of School-Level Variable Characteristics Among Students Who Had Sex in the Past 3 Months Among Participants in the New York City YRBS: 2007-2011 (N=8,054)

VARIABLE	First Quartile* % (SE)**	Second Quartile* % (SE)**	Third Quartile* % (SE)**	Fourth Quartile* % (SE)**
DEMOGRAPHICS				
RACE/ETHNICITY				
Black	23.22 (2.72)	26.01 (2.95)	22.58 (3.10)	28.19 (3.96)
Hispanic	28.81 (3.89)	25.61 (3.30)	24.61 (3.12)	20.97 (2.53)
GENDER				
Female	23.71 (2.92)	25.04 (2.94)	27.38 (3.26)	23.87 (3.65)
POVERTY (SCHOOL LUNCH)				
≤ 100% FPL	26.05 (3.15)	28.55 (3.40)	29.35 (3.60)	16.05 (2.41)
ACADEMICS				
6 Year HS Graduation	27.71 (3.50)	28.47 (3.48)	23.92 (3.74)	19.90 (2.30)
Quality Review [a]	11.31 (3.45)	9.80 (2.15)	53.75 (3.94)	25.14 (3.23)
CONNECTEDNESS				
Attendance	26.32 (3.15)	26.10 (3.04)	25.15 (3.20)	22.43 (3.07)
Enrollment	16.49 (2.58)	22.67 (3.51)	27.15 (3.34)	33.69 (3.64)
Teachers > 2 years	20.14 (3.50)	20.74 (3.06)	29.15 (3.19)	29.97 (3.50)
Student Survey [b]				
Feel welcome (SA)	24.26 (3.55)	28.94 (3.45)	25.87 (3.87)	20.93 (2.67)
Look out for me (SA)	33.26 (4.01)	21.96 (2.95)	23.87 (3.24)	20.91 (2.85)
Parent Survey [b]				
School activities (SA)	24.62 (3.69)	27.00 (3.30)	27.33 (3.43)	21.05 (2.42)
Survey RR (Parent)	30.22 (3.32)	30.89 (3.44)	18.53 (3.11)	20.36 (2.45)
Survey RR (Teacher)	28.26 (3.10)	23.98 (3.38)	25.76 (3.15)	21.99 (2.61)

Table 4.2c - Distribution of School-Level Variable Characteristics Among Students Who Had Sex in the Past 3 Months Among Participants in the New York City YRBS: 2007-2011 (N=8,054)

VARIABLE	First Quartile* % (SE)**	Second Quartile* % (SE)**	Third Quartile* % (SE)**	Fourth Quartile* % (SE)**
SAFETY				
Teacher Survey [b]				
Crime Problem (SA)	34.20 (3.73)	34.21 (3.44)	15.31 (2.43)	16.27 (2.53)
Student Survey [b]				
Stay home – Most of time	13.46 (2.27)	18.34 (2.97)	32.46 (3.46)	35.75 (3.39)
Bully – Most of time	17.34 (2.81)	27.97 (3.60)	24.52 (3.11)	30.17 (3.36)
Fights – Most of time	17.62 (2.68)	20.75 (2.77)	30.70 (3.47)	30.93 (3.28)
Gangs – Most of time	17.43 (2.59)	19.20 (2.72)	30.83 (3.57)	32.54 (3.10)
Safe in Class (SA)	23.13 (2.83)	23.13 (2.83)	28.98 (3.73)	34.20 (3.73)
Safe Hallways (SA)	27.21 (3.49)	24.82 (2.99)	27.85 (3.91)	20.11 (2.67)
Safe Property (SA)	21.48 (3.29)	26.47 (3.05)	30.58 (3.85)	21.47 (2.99)
Suspensions (%)	17.32 (3.18)	26.88 (3.22)	32.69 (3.77)	23.10 (3.60)
Metal Detectors [c]	19.04 (3.35)	80.96 (3.35)		
SBHC [c]				
SBHC	21.97 (2.51)	78.03 (2.51)		

*Continuous variables were categorized into quartiles based on the distribution of each variable in each of the three years included in the sample. The quartiles are an average of the cutpoints in each year. Appendix 1 is a table of school-level variable cutpoints by year for each of the school years included in the sample.

**Weighted Proportions (Standard Error)

[a] Quarterly Review - Quartile 1 = Underdeveloped, Quartile 2 = Developing, Quartile 3 = Proficient, Quartile 4 = Well Developed

[b] SA = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree

[c] Metal Detector and SBHC (School-Based Health Center at school) are dichotomous variables - - Quartile 1 = Yes, Quartile 2 = No

Table 4.3a- Characteristics of Teens who EVER HAD SEX[a] and School-Level Factors at the Schools They Attend, by Contraceptive Use[b] - NYC Public High Schools, 2007-2011

VARIABLE	Hormonal or IUD Contraceptive Use at Last Sex	Condom, Withdrawal or Other Method at Last Sex	No Method
	% (SE)	% (SE)	% (SE)
SCHOOL-LEVEL VARIABLES (%)[c]			
DEMOGRAPHICS			
Black^			
1st quartile	7.46 (0.9)	74.52 (1.4)	18.02 (1.2)
2nd quartile	9.26 (0.9)	70.11 (1.4)	20.63 (1.3)
3rd quartile	8.01 (1.0)	73.67 (1.3)	18.32 (1.0)
4th quartile	6.30 (0.8)	74.74 (1.3)	18.96 (1.6)
Hispanic**			
1st quartile	7.08 (0.9)	76.96 (1.4)	15.95 (1.8)
2nd quartile	7.18 (0.9)	73.67 (1.3)	19.15 (1.0)
3rd quartile	7.73 (0.9)	72.06 (1.3)	20.21 (1.2)
4th quartile	9.24 (0.9)	69.03 (1.6)	21.73 (1.1)
Female			
1st quartile	7.29 (0.8)	73.86 (1.3)	18.86 (1.2)
2nd quartile	7.52 (0.7)	73.98 (1.1)	18.50 (1.0)
3rd quartile	7.46 (0.9)	72.45 (1.3)	20.09 (1.0)
4th quartile	8.60 (1.2)	72.84 (1.5)	18.56 (1.9)
Household Income ≤ 100% Federal Poverty Level (FPL)*			
1st quartile	7.17 (0.8)	77.02 (1.2)	15.80 (1.1)
2nd quartile	8.43 (0.8)	73.00 (1.3)	18.57 (1.0)
3rd quartile	7.03 (0.9)	71.06 (1.3)	21.91 1.5)
4th quartile	8.63 (0.8)	71.34 (1.3)	20.04 (1.0)

^p<1.0, *p<0.05, *p<0.01, ***p<0.001

Table 4.3a- Characteristics of Teens who EVER HAD SEX[a] and School-Level Factors at the Schools They Attend, by Contraceptive Use[b] - NYC Public High Schools, 2007-2011

VARIABLE	Hormonal or IUD Contraceptive Use at Last Sex	Condom, Withdrawal or Other Method at Last Sex	No Method
	% (SE)	% (SE)	% (SE)
ACADEMICS			
6-year graduation**			
1st quartile	8.98 (0.8)	70.88 (1.6)	20.15 (1.2)
2nd quartile	8.65 (1.0)	71.47 (1.4)	19.88 (1.2)
3rd quartile	5.40 (0.8)	73.82 (1.6)	20.78 (1.8)
4th quartile	8.29 (1.0)	76.25 (1.4)	15.47 (1.2)
Overall School Quality Rating			
Underdeveloped	7.13 (1.9)	67.84 (2.0)	25.03 (2.5)
Developing	9.38 (1.7)	73.18 (2.6)	17.44 (2.2)
Proficient	7.48 (0.7)	72.79 (0.9)	19.73 (0.8)
Well Developed	7.76 (0.9)	74.63 (1.5)	17.60 (1.2)
CONNECTEDNESS/ PROSOCIAL ACTIVITIES			
Average daily attendance ^			
1st quartile	7.39 (0.9)	70.54 (1.5)	22.06 (1.6)
2nd quartile	8.48 (0.9)	71.95 (1.2)	19.57 (1.2)
3rd quartile	8.24 (0.8)	73.20 (1.4)	18.56 (1.1)
4th quartile	6.82 (1.1)	77.03 (1.4)	16.15 (1.2)
Enrollment			
1st quartile	7.98 (0.8)	71.83 (1.4)	20.19 (1.2)
2nd quartile	7.93 (1.2)	73.44 (1.4)	18.63 (1.8)
3rd quartile	7.75 (0.8)	72.91 (1.4)	19.34 (1.1)
4th quartile	7.43 (0.9)	74.13 (1.1)	18.44 (1.1)
Teachers > 2 years at school			
1st quartile	7.75 (0.5)	73.22 (0.7)	19.03 (0.7)
2nd quartile	7.59 (0.7)	75.06 (1.1)	17.35 (0.9)
3rd quartile	8.31 (0.8)	72.25 (1.3)	19.44 (1.0)
4th quartile	8.00 (0.9)	74.19 (1.2)	17.81 (1.2)

^p<1.0, *p<0.05, *p<0.01, ***p<0.001

Table 4.3a- Characteristics of Teens who EVER HAD SEX[a] and School-Level Factors at the Schools They Attend, by Contraceptive Use[b] - NYC Public High Schools, 2007-2011

VARIABLE	Hormonal or IUD Contraceptive Use at Last Sex	Condom, Withdrawal or Other Method at Last Sex	No Method
	% (SE)	% (SE)	% (SE)
Connected to school (SA)[d]			
1st quartile	7.8 (0.9)	72.69 (1.4)	19.51 (1.3)
2nd quartile	6.60 (0.8)	72.54 (1.2)	20.85 (1.3)
3rd quartile	8.11 (0.8)	73.94 (1.1)	17.95 (0.9)
4th quartile	8.67 (1.0)	74.03 (1.4)	17.30 (1.2)
Adults at school look out for me (SA)[d]			
1st quartile	7.29 (0.9)	72.52 (1.3)	20.20 (1.4)
2nd quartile	8.05 (1.0)	73.76 (1.3)	18.20 (1.2)
3rd quartile	7.39 (0.7)	74.29 (1.1)	18.32 (0.9)
4th quartile	8.45 (1.0)	72.74 (1.3)	18.81 (1.1)
4th quartile	7.35 (0.8)	73.07 (1.1)	19.57 (0.9)
Prosocial activities (SA)[e]			
1st quartile	6.16 (0.9)	72.27 (1.5)	21.57 (1.6)
2nd quartile	7.55 (0.8)	73.31 (1.1)	19.14 (1.0)
3rd quartile	8.05 (0.9)	73.42 (1.4)	18.53 (1.1)
4th quartile	9.33 (0.8)	74.16 (1.3)	16.51 (1.1)
Parent survey response rate^			
1st quartile	6.72 (0.6)	73.75 (1.1)	19.53 (1.1)
2nd quartile	8.20 (1.0)	70.90 (1.1)	20.89 (1.3)
3rd quartile	7.84 (1.0)	75.31 (1.1)	16.85 (0.9)
4th quartile	8.31 (1.0)	74.24 (1.7)	17.45 (1.3)
Teacher survey response rate			
1st quartile	8.11 (1.0)	73.00 (1.3)	18.89 (1.1)
2nd quartile	7.71 (1.0)	70.66 (1.3)	21.62 (1.5)
3rd quartile	6.69 (0.7)	75.73 (1.1)	17.58 (0.9)
4th quartile	8.45 (0.9)	73.56 (1.4)	17.99 (1.2)

^p<1.0, *p<0.05, *p<0.01, ***p<0.001

Table 4.3a- Characteristics of Teens who EVER HAD SEX[a] and School-Level Factors at the Schools They Attend, by Contraceptive Use[b] - NYC Public High Schools, 2007-2011

VARIABLE	Hormonal or IUD Contraceptive Use at Last Sex	Condom, Withdrawal or Other Method at Last Sex	No Method
	% (SE)	% (SE)	% (SE)
SAFETY/AMBIENT HAZARDS			
School crime and violence a problem (SA)[g]			
1st quartile	7.78 (0.8)	73.51 (1.2)	18.71 (1.3)
2nd quartile	6.79 (0.7)	73.54 (0.8)	19.67 (0.9)
3rd quartile	7.87 (1.0)	72.90 (1.8)	19.24 (1.4)
4th quartile	9.38 (0.9)	72.48 (1.8)	18.14 (1.5)
Stay home as don't feel safe (most of time)[f]			
1st quartile	8.60 (1.0)	73.66 (1.8)	17.74 (1.7)
2nd quartile	8.52 (1.1)	74.67 (1.7)	16.81 (1.4)
3rd quartile	6.45 (0.8)	73.70 (1.2)	19.85 (1.4)
4th quartile	8.17 (0.7)	71.95 (1.2)	19.87 (0.9)
Students threaten other students (MT)[f]			
1st quartile	7.31 (1.0)	75.76 (1.3)	16.92 (1.3)
2nd quartile	6.96 (0.9)	73.04 (1.3)	20.00 (1.5)
3rd quartile	8.87 (0.9)	70.37 (1.4)	20.76 (1.2)
4th quartile	7.78 (0.7)	74.21 (1.2)	18.01 (1.0)
Students get into fights (MT)[f]			
1st quartile	7.28 (1.0)	75.76 (1.3)	16.96 (1.4)
2nd quartile	8.81 (1.2)	72.04 (1.7)	19.16 (1.2)
3rd quartile	7.13 (0.8)	72.10 (1.2)	20.77 (1.4)
4th quartile	7.88 (0.7)	73.64 (1.0)	18.47 (0.9)
Gang activity at school (MT)[f]			
1st quartile	8.22 (1.0)	74.96 (1.5)	16.82 (1.4)
2nd quartile	7.92 (1.0)	73.18 (1.6)	18.90 (1.1)
3rd quartile	7.41 (0.9)	72.33 (1.2)	20.26 (1.5)
4th quartile	7.61 (0.7)	73.21 (1.2)	19.18 (1.0)

^p<1.0, *p<0.05, *p<0.01, ***p<0.001

Table 4.3a- Characteristics of Teens who EVER HAD SEX[a] and School-Level Factors at the Schools They Attend, by Contraceptive Use[b] - NYC Public High Schools, 2007-2011

VARIABLE	Hormonal or IUD Contraceptive Use at Last Sex	Condom, Withdrawal or Other Method at Last Sex	No Method
	% (SE)	% (SE)	% (SE)
Safe in classes (SA)[d]			
1st quartile	8.27 (0.8)	71.88 (1.3)	19.84 (1.2)
2nd quartile	5.89 (0.8)	75.22 (1.6)	18.89 (1.2)
3rd quartile	8.32 (1.0)	71.48 (1.1)	20.20 (1.5)
4th quartile	8.15 (0.9)	75.23 (1.3)	16.62 (1.1)
4th quartile	7.70 (0.7)	73.70 (1.1)	18.60 (1.0)
Safe in school building (SA)[d]			
1st quartile	8.33 (0.8)	72.20 (1.2)	19.47 (1.1)
2nd quartile	5.88 (0.8)	75.14 (1.3)	18.98 (1.1)
3rd quartile	7.48 (0.9)	72.78 (1.2)	19.74 (1.5)
4th quartile	9.40 (1.0)	73.10 (1.3)	17.50 (1.1)
Safe on school property (SA)[d]			
1st quartile	9.45 (1.0)	72.56 (1.5)	17.99 (1.2)
2nd quartile	6.16 (0.6)	74.43 (1.2)	19.41 (0.9)
3rd quartile	7.04 (0.9)	73.39 (1.2)	19.57 (1.6)
4th quartile	8.82 (1.0)	72.37 (1.3)	18.81 (1.1)
Suspensions			
1st quartile	9.94 (1.3)	73.02 (2.0)	17.04 (1.4)
2nd quartile	5.83 (0.7)	75.43 (1.3)	18.74 (1.2)
3rd quartile	5.60 (0.7)	73.02 (1.5)	21.39 (1.7)
4th quartile	7.51 (0.9)	74.04 (1.2)	18.45 (1.1)
School had permanent metal detector			
Yes	6.39 (0.7)	71.89 (1.5)	21.72 (1.3)
No	7.09 (0.6)	74.25 (0.8)	18.67 (0.8)
SBHC			
School-Based Health Center**			
Yes	10.13 (0.8)	69.86 (1.3)	20.01 (1.0)
No	7.06 (0.5)	74.19 (0.8)	18.75 (0.8)

^p<1.0, *p<0.05, *p<0.01, ***p<0.001

Table 4.3a- Characteristics of Teens who EVER HAD SEX[a] and School-Level Factors at the Schools They Attend, by Contraceptive Use[b] - NYC Public High Schools, 2007-2011

[a] Ever Had Sex is defined as teens that answer "yes" to the question "Have you ever had sex?"

[b] Contraceptive Use coded as method used at last sex – (1) Hormonal Contraception or IUD (2) Condoms, Withdrawal or Other Method , (3) No Contraceptive or not sure ("none of these methods" coded to "missing")

[c] See Appendix XX for quartile cutpoints by year (2007, 2009, 2010)

[e] Student survey – SA=strongly agree, A=agree, D= disagree

[f] Parent survey – SA=strongly agree, A=agree, D=disagree

[g] Student survey – ST=some of the time, MT=most of the time, AT=all the time

[h] Teacher survey – SA=strongly agree, A=agree, D=disagree, SD=strongly disagree

Table 4.3b- Characteristics of Teens who are SEXUALLY ACTIVE[a] and School-Level Factors at the Schools They Attend, by Contraceptive Use[b] - NYC Public High Schools, 2007-2011

VARIABLE	Hormonal or IUD Contraceptive Use at Last Sex	Condom, Withdrawal or Other Method at Last Sex	No Method
	% (SE)	% (SE)	% (SE)
SCHOOL-LEVEL VARIABLES (%)[c]			
DEMOGRAPHICS			
Black*			
1st quartile	8.59 (1.1)	73.69 (1.7)	17.73 (1.3)
2nd quartile	11.70 (1.2)	68.63 (1.6)	19.67 (1.5)
3rd quartile	9.69 (1.2)	73.29 (1.6)	17.02 (1.2)
4th quartile	7.41 (0.8)	75.07 (1.5)	17.52 (1.8)
Hispanic**			
1st quartile	8.38 (1.0)	77.61 (1.6)	14.01 (1.8)
2nd quartile	8.60 (1.1)	72.95 (1.7)	18.45 (1.3)
3rd quartile	9.50 (1.2)	70.24 (1.5)	20.26 (1.4)
4th quartile	11.21 (1.2)	68.33 (2.0)	20.46 (1.3)
Female			
1st quartile	8.44 (1.0)	73.35 (1.6)	18.21 (1.4)
2nd quartile	9.13 (0.9)	73.32 (1.7)	17.56 (1.4)
3rd quartile	9.02 (1.2)	72.29 (1.4)	18.68 (1.1)
4th quartile	10.60 (1.3)	71.88 (1.7)	17.52 (2.0)
Household Income ≤ 100% Federal Poverty Level (FPL)*			
1st quartile	8.18 (0.9)	76.89 (1.4)	14.93 (1.4)
2nd quartile	10.19 (1.0)	72.86 (1.8)	16.95 (1.4)
3rd quartile	9.18 (1.2)	69.73 (1.4)	21.09 (1.6)
4th quartile	9.83 (0.9)	70.69 (1.4)	19.48 (1.1)

^p<1.0, *p<0.05, *p<0.01, ***p<0.001

Table 4.3b- Characteristics of Teens who are SEXUALLY ACTIVE[a] and School-Level Factors at the Schools They Attend, by Contraceptive Use[b] - NYC Public High Schools, 2007-2011

VARIABLE	Hormonal or IUD Contraceptive Use at Last Sex	Condom, Withdrawal or Other Method at Last Sex	No Method
	% (SE)	% (SE)	% (SE)
ACADEMICS			
6-year graduation^			
1st quartile	10.68 (1.1)	70.07 (1.8)	19.26 (1.4)
2nd quartile	10.09 (1.1)	71.18 (1.7)	18.73 (1.3)
3rd quartile	6.87 (1.0)	73.01 (1.9)	20.12 (2.1)
4th quartile	10.55 (1.4)	74.99 (1.5)	14.46 (1.5)
Overall School Quality Rating			
Underdeveloped	9.54 (2.3)	67.92 (2.0)	22.54 (2.6)
Developing	11.06 (2.1)	72.57 (2.5)	16.37 (2.2)
Proficient	8.64 (0.7)	72.29 (1.3)	19.07 (1.1)
Well Developed	9.65 (1.2)	73.98 (1.6)	16.37 (1.3)
CONNECTEDNESS/ PROSOCIAL ACTIVITIES			
Average daily attendance			
1st quartile	9.49 (1.1)	69.45 (1.7)	21.06 (1.6)
2nd quartile	9.96 (1.2)	71.28 (1.6)	18.76 (1.5)
3rd quartile	9.74 (1.0)	72.63 (1.6)	17.64 (1.3)
4th quartile	8.07 (1.3)	76.99 (1.9)	14.94 (1.8)
Enrollment			
1st quartile	8.98 (1.0)	71.08 (2.2)	19.94 (1.8)
2nd quartile	9.81 (1.4)	72.16 (1.6)	18.03 (1.8)
3rd quartile	10.06 (0.9)	72.74 (1.4)	17.20 (1.2)
4th quartile	8.51 (1.0)	73.75 (1.4)	17.73 (1.3)
Teachers > 2 years at school			
1st quartile	7.54 (1.1)	70.76 (2.0)	21.70 (2.1)
2nd quartile	8.92 (0.9)	74.24 (1.5)	16.84 (1.1)
3rd quartile	10.64 (1.1)	70.72 (1.5)	18.64 (1.2)
4th quartile	9.55 (1.0)	74.38 (1.5)	16.07 (1.4)

^p<1.0, *p<0.05, *p<0.01, ***p<0.001

Table 4.3b- Characteristics of Teens who are SEXUALLY ACTIVE[a] and School-Level Factors at the Schools They Attend, by Contraceptive Use[b] - NYC Public High Schools, 2007-2011

VARIABLE	Hormonal or IUD Contraceptive Use at Last Sex	Condom, Withdrawal or Other Method at Last Sex	No Method
	% (SE)	% (SE)	% (SE)
Connected to school (SA)[d]			
1st quartile	9.67 (1.1)	72.86 (1.8)	17.47 (1.6)
2nd quartile	7.91 (1.0)	72.47 (1.3)	19.62 (1.4)
3rd quartile	9.54 (0.8)	72.34 (1.4)	18.12 (1.2)
4th quartile	10.51 (1.2)	73.15 (2.0)	16.34 (1.6)
Adults look out for me (SA)[d]			
1st quartile	8.98 (1.1)	72.76 (1.4)	18.26 (1.6)
2nd quartile	9.45 (1.0)	73.32 (1.5)	17.23 (1.4)
3rd quartile	9.31 (1.0)	73.07 (1.3)	17.62 (1.0)
4th quartile	9.67 (1.1)	71.42 (2.0)	18.92 (1.6)
Prosocial activities (SA)[e] ^			
1st quartile	7.80 (1.2)	72.13 (1.5)	20.08 (1.7)
2nd quartile	8.55 (0.8)	71.67 (1.5)	19.78 (1.4)
3rd quartile	10.05 (1.1)	74.43 (1.8)	15.53 (1.2)
4th quartile	11.05 (1.0)	72.32 (1.5)	16.63 (1.4)
Parent survey response rate*			
1st quartile	8.02 (0.9)	73.65 (1.4)	18.33 (1.3)
2nd quartile	10.09 (1.1)	69.92 (1.3)	19.99 (1.4)
3rd quartile	8.89 (1.2)	75.46 (1.4)	15.64 (1.1)
4th quartile	10.40 (1.2)	72.83 (1.7)	16.77 (1.4)
Teacher survey response rate^			
1st quartile	10.16 (1.3)	73.19 (1.9)	16.65 (1.6)
2nd quartile	9.40 (1.2)	68.93 (1.2)	21.67 (1.3)
3rd quartile	7.41 (0.7)	75.38 (1.2)	17.21 (1.0)
4th quartile	10.35 (1.1)	72.91 (1.8)	16.74 (1.5)

Table 4.3b- Characteristics of Teens who are SEXUALLY ACTIVE[a] and School-Level Factors at the Schools They Attend, by Contraceptive Use[b] - NYC Public High Schools, 2007-2011

VARIABLE	Hormonal or IUD Contraceptive Use at Last Sex	Condom, Withdrawal or Other Method at Last Sex	No Method
	% (SE)	% (SE)	% (SE)
SAFETY/AMBIENT HAZARDS			
Stay home don't feel safe (MT)[f]			
1st quartile	10.03 (1.2)	72.45 (2.6)	17.51 (2.5)
2nd quartile	10.20 (1.4)	73.79 (2.0)	16.02 (1.7)
3rd quartile	7.67 (0.9)	73.37 (1.4)	18.96 (1.5)
4th quartile	10.08 (0.9)	71.56 (1.5)	18.36 (1.2)
Students threaten others (ST)[f]			
1st quartile	8.92 (1.1)	73.47 (2.2)	17.61 (1.9)
2nd quartile	9.20 (1.0)	71.68 (1.4)	19.11 (1.2)
3rd quartile	10.43 (1.0)	71.21 (1.7)	18.36 (1.6)
4th quartile	8.87 (1.0)	73.67 (1.4)	17.46 (1.4)
Students threaten others (MT)[h]			
1st quartile	9.32 (1.2)	75.00 (1.9)	15.68 (1.8)
2nd quartile	8.26 (1.1)	72.50 (1.5)	19.25 (1.5)
3rd quartile	10.21 (1.1)	68.98 (1. 6)	20.82 (1.5)
4th quartile	9.56 (0.9)	74.44 (1.4)	16.00 (1.1)
Students get into fights (MT)[f]			
1st quartile	9.20 (1.3)	74.85 (1.9)	15.95 (1.9)
2nd quartile	10.28 (1.4)	70.92 (2.0)	18.79 (1.5)
3rd quartile	8.53 (0.9)	71.57 (1.4)	19.90 (1.6)
4th quartile	9.48 (0.9)	73.63 (1.1)	16.89 (0.9)
Gang activity at school (MT)[f]			
1st quartile	9.77 (1.2)	74.19 (2.2)	16.04 (2.1)
2nd quartile	9.59 (1.3)	72.56 (1.8)	17.85 (1.2)
3rd quartile	8.78 (1.0)	71.62 (1.5)	19.60 (1.6)
4th quartile	9.38 (0.9)	72.90 (1.4)	17.72 (1.1)

*^p<1.0, *p<0.05, *p<0.01, ***p<0.001

Table 4.3b- Characteristics of Teens who are SEXUALLY ACTIVE[a] and School-Level Factors at the Schools They Attend, by Contraceptive Use[b] - NYC Public High Schools, 2007-2011

VARIABLE	Hormonal or IUD Contraceptive Use at Last Sex	Condom, Withdrawal or Other Method at Last Sex	No Method
	% (SE)	% (SE)	% (SE)
Safe in classes (SA)[d]			
1st quartile	10.20 (1.0)	72.20 (1.4)	17.60 (1.2)
2nd quartile	6.99 (1.0)	73.64 (2.0)	19.37 (1.6)
3rd quartile	9.86 (1.1)	71.38 (1.3)	18.76 (1.6)
4th quartile	9.85 (1.1)	73.97 (1.8)	16.19 (1.5)
Safe in school building (SA)[d] ^			
1st quartile	10.06 (1.0)	73.07 (1.4)	16.86 (1.2)
2nd quartile	6.91 (0.9)	73.58 (1.6)	19.51 (1.4)
3rd quartile	9.38 (1.1)	72.20 (1.4)	18.42 (1.6)
4th quartile	11.04 (1.1)	71.73 (1.9)	17.23 (1.4)
Safe on school property (SA)[d*]			
1st quartile	11.50 (1.2)	73.36 (1.7)	15.14 (1.2)
2nd quartile	7.43 (0.8)	73.73 (1.5)	18.83 (1.2)
3rd quartile	8.53 (1.0)	73.05 (1.3)	18.41 (1.6)
4th quartile	10.50 (1.2)	70.19 (1.9)	19.30 (1.6)
School crime and violence a problem (SA)[g]			
1st quartile	9.73 (1.0)	72.25 (1.4)	18.02 (1.4)
2nd quartile	8.08 (0.8)	73.53 (1.2)	18.39 (1.2)
3rd quartile	9.24 (1.2)	71.45 (2.1)	19.31 (1.7)
4th quartile	11.10 (1.3)	72.91 (2.0)	15.99 (1.5)
Suspensions			
1st quartile	11.53 (1.5)	72.35 (2.3)	16.12 (2.0)
2nd quartile	6.47 (0.8)	76.26 (1.6)	17.27 (1.3)
3rd quartile	7.48 (1.0)	72.24 (1.7)	20.28 (1.8)
4th quartile	9.04 (1.1)	73.57 (1.6)	17.39 (1.2)
School had permanent metal detector			
Yes	8.20 (1.0)	71.01 (2.0)	20.79 (1.5)
No	8.47 (0.7)	73.94 (0.9)	17.59 (0.9)

Table 4.3b- Characteristics of Teens who are SEXUALLY ACTIVE[a] and School-Level Factors at the Schools They Attend, by Contraceptive Use[b] - NYC Public High Schools, 2007-2011

VARIABLE	Hormonal or IUD Contraceptive Use at Last Sex	Condom, Withdrawal or Other Method at Last Sex	No Method
	% (SE)	% (SE)	% (SE)
SBHC			
School-Based Health Center**			
Yes	12.34 (1.0)	68.43 (1.4)	19.23 (1.1)
No	8.46 (0.6)	73.86 (1.0)	17.68 (0.9)

^p<1.0, *p<0.05, *p<0.01, ***p<0.001

[a] Sexually active defined as teens who answer "yes" to have you ever had sex, and had sex in the past three months

[b] Contraceptive Use coded as method used at last sex – (1) Hormonal Contraception or IUD (2) Condoms, Withdrawal or Other Method , (3) No Contraceptive or Not Sure

[c] See Appendix XX for quartile cutpoints by year (2007, 2009, 2011)

[d] Student survey – SA=strongly agree, A=agree, D= disagree

[e] Parent survey – SA=strongly agree, A=agree, D=disagree

[f] Student survey – ST=some of the time, MT=most of the time, AT=all the time

[g] Teacher survey – SA=strongly agree, A=agree, D=disagree, SD=strongly disagree

Table 4.4– Binary Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents, NYC Public High Schools, 2007-2011 (Any Contraceptive Method vs. No Method)

Variable	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]
	OR (95% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
DEMOGRAPHICS				
% Black Non-Hispanic				
1st quartile	0.99 (0.73, 1.33)	1.00 (0.65, 1.52)	1.02 (0.68, 1.54)	2.05 (1.01, 4.17)**
2nd quartile	0.87 (0.64, 1.17)	0.92 (0.61, 1.38)	0.93 (0.61, 1.41)	1.65 (0.94, 2.89)
3rd quartile	1.04 (0.76, 1.42)	1.08 (0.71, 1.64)	1.13 (0.74, 1.73)	2.02 (1.12, 3.63)**
4th quartile (ref)	1.00	1.00	1.00	1.00
% Hispanic				
1st quartile	1.58 (1.13, 2.20)**	1.45 (0.92, 2.30)	1.51 (0.94, 2.42)	2.44 (1.13, 5.27)**
2nd quartile	1.14 (0.89, 1.46)	1.09 (0.79, 1.49)	1.14 (0.83, 1.57)	1.15 (0.59, 2.27)
3rd quartile	1.01 (0.80, 1.28)	1.02 (0.75, 1.41)	1.08 (0.79, 1.47)	1.22 (0.79, 1.90)
4th quartile (ref)	1.00	1.00	1.00	1.00
% Female				
1st quartile	0.95 (0.69, 1.33)	0.93 (0.58, 1.50)	0.93 (0.58, 1.50)	1.00 (0.61, 1.63)
2nd quartile	1.00 (0.70, 1.42)	0.95 (0.58, 1.53)	0.94 (0.58, 1.51)	0.86 (0.51, 1.44)
3rd quartile	0.92 (0.68, 1.25)	0.88 (0.57, 1.35)	0.84 (0.55, 1.28)	1.06 (0.68, 1.67)
4th quartile (ref)	1.00	1.00	1.00	1.00
% Free School Lunch (Household Poverty)				
1st quartile (ref)	1.00	1.00	1.00	1.00
2nd quartile	0.86 (0.63, 1.16)	0.90 (0.59, 1.38)	0.91 (0.60, 1.38)	2.06 (1.23, 3.45)***
3rd quartile	0.66 (0.49, 0.87)**	0.66 (0.44, 1.01)	0.65 (0.42, 0.99)**	1.51 (0.74, 3.07)
4th quartile	0.73 (0.56, 0.94)*	0.77 (0.52, 1.14)	0.72 (0.48, 1.08)	1.27 (0.56, 2.86)
ACADEMICS				
6-year graduation				
1st quartile	0.71 (0.53, 0.95)*	0.73 (0.49, 1.10)	0.66 (0.42, 1.020	1.14 (0.66, 1.95)
2nd quartile	0.73 (0.50, 0.98)*	0.77 (0.52, 1.14)	0.69 (0.47, 1.03)	1.17 (0.74, 1.85)
3rd quartile	0.67 (0.47, 0.95)*	0.66 (0.77, 0.52)	0.64 (0.41, 0.99)**	1.29 (0.81, 2.04)
4th quartile (ref)	1.00	1.00	1.00	1.00

*p<0.05, **p<0.01, ***p<0.001

Table 4.4– Binary Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents, NYC Public High Schools, 2007-2011 (Any Contraceptive Method vs. No Method)

Variable	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]
	OR (95% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
Quality Review Score				
Underdeveloped	0.67 (0.47, 0.95)	0.66 (0.39, 1.13)	0.66 (0.38, 1.17)	0.80 (0.40, 1.58)
Developing	1.00 (0.69, 1.44)*	1.01 (0.62, 1.64)	1.04 (0.66, 1.65)	1.53 (0.86, 2.74)
Proficient	0.83 (0.66, 1.05)	0.87 (0.64, 1.18)	0.87 (0.64, 1.18)	1.24 (0.85, 1.80)
Well Developed (ref)	1.00	1.00	1.00	1.00
CONNECTEDNESS/ PROSOCIAL ACTIVITIES				
% Average Daily Attendance				
1st quartile	0.66 (0.47, 0.93)	0.63 (0.39, 1.01)	0.58 (0.37, 0.92)**	1.02 (0.44, 2.33)
2nd quartile	0.76 (0.55, 1.06)	0.75 (0.49, 1.15)	0.72 (0.48, 1.06)	0.96 (0.49, 1.88)
3rd quartile	0.82 (0.57, 1.17)	0.83 (0.51, 1.36)	0.83 (0.52, 1.33)	1.10 (0.59, 2.07)
4th quartile (ref)	1.00	1.00	1.00	1.00
Enrollment				
1st quartile (ref)	1.00	1.00	1.00	1.00
2nd quartile	1.13 (0.82, 1.56)	1.05 (0.68, 1.62)	1.01 (0.65, 1.57)	1.14 (0.55, 2.38)
3rd quartile	1.20 (0.93, 1.55)	1.15 (0.82, 1.60)	1.07 (0.78, 1.46)	1.43 (0.62, 3.30)
4th quartile	1.16 (0.86. 1.55)	1.06 (0.73, 1.54)	1.02 (0.72, 1.46)	1.35 (0.49, 3.78)
% Teachers > 2 Years at School				
1st quartile	0.69 (0.51, 0.94)*	0.75 (0.48, 1.17)	0.78 (0.50, 1.22)	1.39 (0.78, 2.48)
2nd quartile	0.95 (0.72, 1.25)	0.99 (0.67, 1.47)	1.06 (0.71, 1.59)	1.15 (0.69, 1.94)
3rd quartile	0.84 (0.65, 1.08)	0.84 (0.59, 1.19)	0.89 (0.63, 1.26)	0.70 (0.50, 0.96)**
4th quartile (ref)	1.00	1.00	1.00	1.00
% Feel Welcome at School (SA)[a]				
1st quartile	0.92 (0.67, 1.26)	0.95 (0.64, 1.41)	0.98 (0.65, 1.47)	0.72 (0.26, 2.04)
2nd quartile	0.80 (0.60, 1.07)	0.77 (0.52, 1.15)	0.77 (0.51, 1.15)	0.90 (0.39, 2.06)
3rd quartile	0.88 (0.65, 1.19)	0.85 (0.58, 1.25)	0.90 (0.63, 1.29)	1.13 (0.57, 2.24)
4th quartile (ref)	1.00	1.00	1.00	1.00
% Adults at School Look Out for Me (SA)[e]				
1st quartile	1.04 (0.78, 1.39)	1.01 (0.68, 1.51)	1.02 (0.69, 1.50)	2.38 (0.81, 7.01)
2nd quartile	1.12 (0.85, 1.48)	1.09 (0.76, 1.56)	1.07 (0.77, 1.50)	1.30 (0.54, 3.14)
3rd quartile	1.09 (0.85, 1.39)	1.03 (0.75, 1.43)	1.06 (0.79, 1.42)	1.71 (0.86, 3.39)
4th quartile (ref)	1.00	1.00	1.00	1.00

*p<0.05, **p<0.01, ***p<0.001

Table 4.4– Binary Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents, NYC Public High Schools, 2007-2011 (Any Contraceptive Method vs. No Method)

Variable	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]
	OR (95% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
Prosocial activities (SA)[f]				
1st quartile	0.79 (0.60, 1.06)	0.77 (0.53, 1.11)	0.82 (0.56, 1.18)	0.74 (0.44, 1.26)
2nd quartile	0.81 (0.61, 1.07)	0.81 (0.56, 1.16)	0.84 (0.59, 1.21)	0.65 (0.35, 1.23)
3rd quartile	1.08 (0.84, 1.41)	1.02 (0.72, 1.43)	1.03 (0.74, 1.44)	1.02 (0.69, 1.50
4th quartile (ref)	1.00	1.00	1.00	1.00
Parent Survey Response Rate				
1st quartile	0.90 (0.69, 1.17)	0.91 (0.65, 1.26)	0.87 (0.63, 1.20)	0.71 (0.46, 1.11)
2nd quartile	0.81 (0.62, 1.05)	0.77 (0.55,1.07)	0.72 (0.52, 1.00)	0.62 (0.38, 1.02)
3rd quartile	1.09 (0.83, 1.42)	1.10 (0.76, 1.59)	1.06 (0.73, 1.55)	0.74 (0.47, 1.16)
4th quartile (ref)	1.00	1.00	1.00	1.00
Teacher Survey Response Rate				
1st quartile	1.01 (0.73, 1.38)	0.93 (0.63, 1.37)	0.90 (061, 1.33)	0.92 (0.58, 1.47)
2nd quartile	0.73 (0.56, 0.94)*	0.63 (0.44, 0.88)***	0.61 (0.43, 0.86)**	0.48 (0.32, 0.72)***
3rd quartile	0.97 (0.75, 1.25)	0.91 (0.64, 1.31)	0.91 (0.65, 1.27)	0.86 (0.55, 1.32)
4th quartile (ref)	1.00	1.00	1.00	1.00
SAFETY/AMBIENT HAZARDS				
% School Crime/Violence a Problem (SA)[g]				
1st quartile (ref)	1.00	1.00	1.00	1.00
2nd quartile	0.98 (0.77, 1.23)	1.01 (0.73, 1.41)	1.01 (0.71, 1.42)	0.95 (0.66, 1.37)
3rd quartile	0.92 (0.70, 1.20)	0.87 (0.59, 1.28)	0.89 (0.61, 1.32)	0.73 (0.45, 1.19)
4th quartile	1.15 (0.88, 1.51)	1.12 (0.75, 1.66)	1.14 (0.78, 1.66)	0.84 (0.46, 1.53)
% Stay Home as Don't Feel Safe (MT)[h]				
1st quartile (ref)	1.00	1.00	1.00	1.00
2nd quartile	1.11 (0.71, 1.75)	1.17 (0.66, 2.05)	1.19 (0.71, 2.01)	1.21 (0.52, 2.77)
3rd quartile	0.91 (0.62, 1.34)	0.93 (0.56, 1.54)	0.89 (0.55, 1.44)	1.18 (0.48, 2.88)
4th quartile	0.94 (0.64, 1.38)	0.95 (0.58, 1.56)	0.93 (0.58, 1.50)	1.51 (0.60, 3.81)

*p<0.05, **p<0.01, ***p<0.001

Table 4.4– Binary Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents, NYC Public High Schools, 2007-2011 (Any Contraceptive Method vs. No Method)

Variable	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]
	OR (95% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
% Students Threaten Other Students (MT)[h]				
1st quartile (ref)	1.00	1.00	1.00	1.00
2nd quartile	0.78 (0.56, 1.08)	0.81 (0.53, 1.26)	0.80 (0.52, 1.21)	1.29 (0.63, 2.63)
3rd quartile	0.71 (0.51, 0.98)*	0.75 (0.49, 1.14)	0.73 (0.49, 1.11)	1.25 (0.54, 2.88)
4th quartile	0.98 (0.72, 1.32)	0.98 (0.65, 1.47)	0.97 (0.65, 1.44)	1.70 (0.64, 4.55)
% Students Get Into Fights (MT)[h]				
1st quartile (ref)	1.00	1.00	1.00	1.00
2nd quartile	0.82 (0.58, 1.15)	0.76 (0.49, 1.18)	0.73 (0.48, 1.12)	0.91 (0.42, 1.99)
3rd quartile	0.76 (0.55, 1.06)	0.70 (0.46, 1.07)	0.65 (0.43, 0.99)**	0.70 (0.26, 1.94)
4th quartile	0.93 (0.69, 1.26)	0.91 (0.61, 1.34)	0.88 (0.60, 1.28)	1.57 (0.53, 4.68)
% Gang Activity at School (MT)[h]				
1st quartile (ref)	1.00	1.00	1.00	1.00
2nd quartile	0.88 (0.60, 1.20)	0.84 (0.51, 1.38)	0.78 (0.49, 1.25)	0.61 (0.22, 1.73)
3rd quartile	0.78 (0.54, 1.14)	0.75 (0.46, 1.22)	0.70 (0.44, 1.13)	0.50 (0.15, 1.70)
4th quartile	0.89 (0.64, 1.23)	0.83 (0.53, 1.29)	0.79 (0.52, 1.20)	0.48 (0.14, 1.65)
% Safe in Classes (SA)[e]				
1st quartile	0.90 (0.70, 1.18)	0.93 (0.66, 1.33)	0.92 (0.65, 1.32)	0.38 (0.11, 1.29)
2nd quartile	0.80 (0.60, 1.08)	0.81 (0.55, 1.77)	0.83 (0.55, 1.24)	0.58 (0.22, 1.55)
3rd quartile	0.84 (0.61. 1.14)	0.83 (0.55, 1.24)	0.84 (0.57, 1.25)	0.70 (0.39, 1.26)
4th quartile (ref)	1.00	1.00	1.00	1.00
% Safe in School Building (SA)[e]				
1st quartile	1.03 (0.80, 1.32)	1.10 (0.77, 1.57)	1.09 (0.76, 1.56)	0.60 (0.13, 2.79)
2nd quartile	0.86 (0.66, 1.12)	0.84 (0.59, 1.19)	0.84 (0.59, 1.19)	0.69 (0.23, 2.08)
3rd quartile	0.92 (0.70, 1.22)	0.97 (0.65, 1.44)	0.98 (0.67, 1.45)	0.79 (0.33, 1.90)
4th quartile (ref)	1.00	1.00	1.00	1.00
% Safe on School Property (SA)[e]				
1st quartile	1.34 (1.02, 1.76)*	1.41 (0.97, 2.04)	1.41 (0.98, 2.01)	3.70 (1.26, 10.84)**
2nd quartile	1.03 (0.81. 1.32)	0.98 (0.70, 1.38)	1.00 (0.71, 1.41)	2.34 (0.99, 5.54)
3rd quartile	1.06 (0.80. 1.41)	1.03 (0.71, 1.51)	1.03 (0.71, 1.48)	2.07 (0.94, 4.54)
4th quartile (ref)	1.00	1.00	1.00	1.00

*p<0.05, **p<0.01, ***p<0.001

Table 4.4– Binary Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents, NYC Public High Schools, 2007-2011 (Any Contraceptive Method vs. No Method)

Variable	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]
	OR (95% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
% Suspensions				
1st quartile (ref)	1.00	1.00	1.00	1.00
2nd quartile	0.92 (0.66, 1.29)	0.91 (0.57, 1.46)	0.86 (0.56, 1.33)	0.93 (0.60, 1.47)
3rd quartile	0.76 (0.53, 1.07)	0.83 (0.51, 1.35)	0.81 (0.50, 1.30)	0.85 (0.85, 1.38)
4th quartile	0.91 (0.65, 1.28)	0.98 (0.61, 1.57)	0.92 (0.59, 1.44)	1.30 (0.68, 2.50)
School Has Permanent Metal Detector				
% Yes	0.81 (0.66, 1.00)	0.79 (0.60, 1.06)	0.79 (0.57, 1.10)	0.99 (0.57, 1.71)
% No (ref)	1.00	1.00	1.00	1.00
SCHOOL-BASED HEALTH CENTER (SBHC)				
% Yes (ref)	1.00	1.00	1.00	1.00
% No	0.81 (0.91, 1.35)	1.08 (0.84, 1.40)	1.10 (0.85. 1.44)	1.11 (0.66, 1.86)

*p<0.05, **p<0.01, ***p<0.001

[a] Model 1: Unadjusted school-level exposures - independent effects of each school-level exposure on the outcome
[b] Model 2: Model 1 + age, gender, race/ethnicity
[c] Model 3: Model 2 + remaining individual-level covariates
[d] Model 4: All individual-level variables and school-level exposures together (Full Model)
[e] Student survey SA=strongly agree
[f] Parent survey SA=strongly agree
[g] Teacher survey SA=strongly agree
[h] Student survey MT=most of the time

Table 4.5a– Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents[a] (Reference: No Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[b]	Model 2[c]	Model 3[d]	Model 4[e]	Model 5[f]	Model 6[e]
	OR (95%CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
DEMOGRAPHICS						
% Black Non-Hispanic						
1st quartile						
– Hormonal/IUD[h]	1.15 (0.71, 1.86)	1.06 (0.44, 2.52)	1.00 (0.42, 2.42)	2.60 (0.44, 15.33)	1.69 (0.57, 5.06)	1.66 (0.61, 4.51)
– Condom/ Other[h]	0.97 (0.72, 1.31)	1.04 (0.65, 1.65)	1.02 (0.66, 1.60)	2.50 (1.14, 5.49)**	1.13 (0.58, 2.20)	1.3 (0.67, 2.53)
2nd quartile						
– Hormonal/IUD	1.41 (0.88, 2.24)	1.30 (0.58, 2.92)	1.28 (0.57, 2.86)	3.30 (0.77, 14.04)	2.23 (0.83, 6.00)	2.14 (0.85, 5.37)
– Condom/ Other	0.81 (0.61, 1.09)	0.91 (0.62, 1.33)	0.93 (0.64, 1.36)	1.68 (0.90, 3.16)	1.13 (0.61, 2.11)	1.31 (0.71, 2.39)
3rd quartile						
– Hormonal/IUD	1.35 (0.84, 2.16)	1.24 (0.61, 2.49)	1.22 (0.60, 2.47)	6.01 (1.55, 23.39)***	2.13 (0.85, 5.46)	1.84 (0.73, 4.64)
– Condom/ Other	1.01 (0.73, 1.38)	1.03 (0.69, 1.52)	1.07 (0.73, 1.59)	2.16 (1.15, 4.05)**	1.40 (0.83, 2.37)	1.39 (0.83, 2.32)
4th quartile (ref)	1.00	1.00	1.00	1.00	1.00	1.00
% Hispanic						
1st quartile						
– Hormonal/IUD	1.09 (0.68, 1.75)	1.10 (0.52, 2.34)	1.12 (0.51, 2.48)	1.25 (0.31, 5.04)	1.17 (0.40, 3.45)	1.23 (0.42, 3.60)
– Condom/ Other	1.66 (1.19, 2.32)**	1.36 (0.89, 2.07)	1.45 (0.97, 2.19)	2.59 (1.09, 6.13)**	1.58 (0.77, 3.26)	1.76 (0.87, 3.57)
2nd quartile						
– Hormonal/IUD	0.85 (0.61, 1.20)	0.92 (0.56, 1.53)	0.97 (0.57, 1.63)	0.98 (0.27, 3.60)	1.13 (0.46, 2.77)	1.15 (0.46, 2.86)
– Condom/ Other	1.18 (0.90, 1.55)	1.10 (0.76, 1.59)	1.15 (0.80, 1.67)	1.22 (0.60, 2.50)	1.09 (0.55, 2.15)	1.13 (0.56, 2.28)
3rd quartile						
– Hormonal/IUD	0.86 (0.59, 1.25)	1.00 (0.62, 1.61)	1.05 (0.65, 1.71)	1.01 (0.41, 2.50)	1.15 (0.58, 2.30)	1.38 (0.68, 2.77)
– Condom/ Other	1.04 (0.82, 1.32)	1.01 (0.70, 1.46)	1.08 (0.75, 1.56)	1.12 (0.71, 1.76)	1.27 (0.78, 2.09)	1.39 (0.84, 2.29)
4th quartile (ref)	1.00	1.00	1.00	1.00	1.00	1.00

*p<0.05, **p<0.01, ***p<0.001

Table 4.5a– Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents[a] (Reference: No Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[b]	Model 2[c]	Model 3[d]	Model 4[e]	Model 5[f]	Model 6[e]
	OR (95%CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
% Female						
1st quartile						
– Hormonal/IUD	0.77 (0.46, 1.28)	0.82 (0.42, 1.59)	0.79 (0.40, 1.55)	1.33 (0.52, 3.38)		
– Condom/ Other	0.71 (0.72, 1.44)	0.94 (0.59, 1.51)	0.91 (0.58, 1.42)	1.06 (0.64, 1.77)		
2nd quartile						
– Hormonal/IUD	0.86 (0.53, 1.40)	0.79 (0.38, 1.41)	0.73 (0.39, 1.40)	1.34 (0.43, 4.20)		
– Condom/ Other	1.02 (0.72, 1.44)	0.93 (0.58, 1.49)	0.94 (0.60, 1.48)	1.02 (0.56, 1.84)		
3rd quartile						
– Hormonal/IUD	0.80 (0.48, 1.32)	0.64 (0.32, 1.26)	0.60 (0.31, 1.17)	1.41 (0.62, 3.23)		
– Condom/ Other	0.94 (0.70, 1.27)	0.84 (0.57, 1.24)	0.81 (0.57, 1.17)	1.18 (0.69, 2.0)		
4th quartile (ref)	1.00	1.00	1.00	1.00		
% Free School Lunch (Household Poverty)						
1st quartile (ref)	1.00	1.00	1.00	1.00	1.00	1.00
2nd quartile						
– Hormonal/IUD	1.10 (0.74, 1.62)	1.30 (0.66, 2.54)	1.36 (0.72, 2.56)	1.72 (0.61, 4.86)	1.74 (0.85, 3.53)	1.41 (0.67, 2.98)
– Condom/ Other	0.85 (0.61, 1.14)	0.95 (0.57, 1.58)	0.95 (0.57, 1.57)	2.26 (1.36, 3.77)***	1.54 (0.95, 2.51)	1.11 (0.67, 1.84)
3rd quartile						
– Hormonal/IUD	0.79 (0.50, 1.27)	0.86 (0.42, 1.75)	0.88 (0.44, 1.76)	0.99 (0.20, 4.98)	1.39 (0.50, 3.88)	1.27 (0.48, 3.35)
– Condom/ Other	0.64 (0.49, 0.85)**	0.71 (0.47, 1.08)	0.68 (0.44, 1.03)	2.12 (1.01, 4.43)**	1.15 (0.63, 2.10)	0.92 (0.52, 1.63)
4th quartile						
– Hormonal/IUD	0.92 (0.62, 1.36)	1.08 (0.56, 2.07)	1.09 (0.59, 2.03)	0.48 (0.10, 2.40)	1.04 (0.34, 3.17)	1.14 (0.40, 3.27)
– Condom/ Other	0.70 (0.54, 0.92)**	0.81 (0.53, 1.23)	0.75 (0.50, 1.14)	2.12 (0.99, 4.54)“	1.23 (0.63, 2.38)	0.96 (0.51, 1.80)

*p<0.05, **p<0.01, ***p<0.001

Table 4.5a– Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents[a] (Reference: No Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[b]	Model 2[c]	Model 3[d]	Model 4[e]	Model 5[f]	Model 6[e]
	OR (95%CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
ACADEMICS						
6 Year Graduation						
1st quartile						
– Hormonal/IUD	0.76 (0.48, 1.20)	0.56 (0.29, 1.09)	0.54 (0.28, 1.05)	0.72 (0.27, 1.91)	0.57 (0.24, 1.34)	
– Condom/ Other	0.70 (0.52, 0.94)*	0.71 (0.45, 1.13)	0.62 (0.38, 1.00)*	1.03 (0.53, 2.02)	0.65 (0.34, 1.23)	
2nd quartile						
– Hormonal/IUD	0.74 (0.46, 1.19)	0.71 (0.35, 1.45)	0.70 (0.35, 1.40)	0.71 (0.29, 1.70)	0.66 (0.29, 1.48)	
– Condom/ Other	0.73 (0.55, 0.98)**	0.75 (0.46, 1.21)	0.65 (0.40, 1.05)	1.03 (0.60, 1.76)	0.66 (0.39, 1.14)	
3rd quartile						
– Hormonal/IUD	0.47 (0.26, 0.83)**	0.41 (0.18, 0.92)**	0.41 (0.18, 0.94)**	0.81 (0.32, 2.02)	0.54 (0.23, 1.26)	
– Condom/ Other	0.70 (0.50, 0.98)*	0.66 (0.43, 1.02)^	0.61 (0.40, 0.93)**	1.28 (0.69, 2.35)	0.70 (0.38, 1.26)	
4th quartile (ref)	1.00	1.00	1.00	1.00	1.00	
Quality Review Score						
Underdeveloped						
– Hormonal/IUD	0.72 (0.34, 1.49)	0.70 (0.26, 1.93)	0.73 (0.25, 2.12)	0.68 (0.16, 2.86)		
– Condom/ Other	0.67 (0.48, 0.92)*	0.68 (0.42, 1.09)	0.70 (0.43, 1.12)	0.72 (0.35, 1.46)		
Developing						
– Hormonal/IUD	1.15 (0.63, 2.08)	1.04 (0.46, 2.36)	1.19 (0.52, 2.72)	2.70 (0.77, 9.45)		
– Condom/ Other	0.98 (0.68, 1.41)	0.84 (0.49, 1.44)	0.87 (0.53, 1.45)	1.40 (0.77, 2.53)		
Proficient						
– Hormonal/IUD	0.77 (0.53, 1.10)	0.76 (0.41, 1.41)	0.76 (0.40, 1.42)	1.32 (0.52, 3.39)		
– Condom/ Other	0.84 (0.66, 1.06)	0.80 (0.55, 1.15)	0.83 (0.58, 1.21)	1.25 (0.81, 1.94)		
Well Developed (ref)	1.00	1.00	1.00	1.00		

*p<0.05, **p<0.01, ***p<0.001

Table 4.5a– Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents[a] (Reference: No Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[b]	Model 2[c]	Model 3[d]	Model 4[e]	Model 5[f]	Model 6[e]
	OR (95%CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
% Average Daily Attendance						
1st quartile						
– Hormonal/IUD	0.83 (0.49, 1.42)	0.66 (0.31, 1.44)	0.64 (0.30, 1.37)	1.69 (0.31, 9.08)	1.24 (0.42, 3.70)	
– Condom/ Other	0.64 (0.46, 0.90)**	0.62 (0.38, 1.03)	0.56 (0.35, 0.89)**	0.71 (0.28, 1.81)	0.68 (0.32, 1.43)	
2nd quartile						
– Hormonal/IUD	0.98 (0.59, 1.63)	0.75 (0.37, 1.52)	0.74 (0.38, 1.46)	1.46 (0.32, 6.73)	0.85 (0.31, 2.39)	
– Condom/ Other	0.74 (0.53, 1.03)	0.65 (0.40, 1.06)	0.61 (0.39, 0.94)**	0.62 (0.31, 1.24)	0.55 (0.26, 1.15)	
3rd quartile						
– Hormonal/IUD	1.02 (0.61, 1.72)	0.90 (0.42, 1.91)	0.91 (0.44, 1.88)	1.41 (0.40, 4.94)	1.19 (0.46, 3.05)	
– Condom/ Other	0.80 (0.56, 1.14)	0.70 (0.40, 1.24)	0.68 (0.39, 1.18)	0.67 (0.31, 1.43)	0.70 (0.37, 1.30)	
4th quartile (ref)	1.00	1.00	1.00	1.00	1.00	
Enrollment						
1st quartile (ref)	1.00	1.00	1.00	1.00		
2nd quartile						
– Hormonal/IUD	1.21 (0.74, 1.98)	1.13 (0.58, 2.18)	1.08 (0.54, 2.16)	1.10 (0.32, 3.71)		
– Condom/ Other	1.12 (0.82, 1.54)	1.18 (0.81, 1.71)	1.14 (0.79, 1.65)	0.95 (0.44, 2.05)		
3rd quartile						
– Hormonal/IUD	1.30 (0.91, 1.86)	1.30 (0.71, 2.38)	1.26 (0.68, 2.35)	1.02 (0.24, 4.30)		
– Condom/ Other	1.19 (0.91, 1.55)	1.20 (0.80, 1.79)	1.14 (0.78, 1.67)	1.46 (0.58, 3.68)		
4th quartile						
– Hormonal/IUD	1.07 (0.72, 1.57)	0.93 (0.55, 1.57)	0.91 (0.54, 1.53)	0.59 (0.12, 3.00)		
– Condom/ Other	1.17 (0.86, 1.58)	1.20 (0.80, 1.79)	1.14 (0.78, 1.67)	1.48 (0.54, 4.07)		

*p<0.05, **p<0.01, ***p<0.001

Table 4.5a– Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents[a] (Reference: No Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[b]	Model 2[c]	Model 3[d]	Model 4[e]	Model 5[f]	Model 6[e]
	OR (95%CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
% Teachers > 2 Years at School						
1st quartile						
– Hormonal/IUD	0.58 (0.36, 0.96)*	0.62 (0.31, 1.25)	0.63 (0.31, 1.29)	0.87 (0.27, 2.80)	0.83 (0.30, 2.26)	0.64 (0.27, 1.56)
– Condom/ Other	0.70 (0.52, 0.96)*	0.71 (0.47, 1.08)	0.75 (0.51, 1.10)	1.66 (0.95, 2.92)	1.04 (0.65, 1.67)	1.01 (0.65, 1.57)
2nd quartile						
– Hormonal/IUD	0.89 (0.61, 1.29)	0.75 (0.40, 1.38)	0.77 (0.41, 1.42)	0.62 (0.23, 1.68)	0.84 (0.41, 1.70)	0.81 (0.40, 1.64)
– Condom/ Other	0.95 (0.72, 1.26)	0.92 (0.59, 1.43)	0.95 (0.60, 1.49)	1.05 (0.62, 1.76)	1.18 (0.72, 1.92)	1.2 (0.73, 1.99)
3rd quartile						
– Hormonal/IUD	0.96 (0.66, 1.41)	0.86 (0.49, 1.51)	0.88 (0.51, 1.51)	0.51 (0.27, 1.00)	0.69 (0.38, 1.26)	0.86 (0.52, 1.45)
– Condom/ Other	0.82 (0.63, 1.06)	0.73 (0.50, 1.07)	0.77 (0.53, 1.12)	0.60 (0.42, 0.84)***	0.74 (0.51, 1.09)	0.8 (0.57, 1.13)
4th quartile (ref)	1.00	1.00	1.00	1.00	1.00	1.00
% Feel Welcome at School (SA)[i]						
1st quartile						
– Hormonal/IUD	0.86 (0.55, 1.34)	0.86 (0.46, 1.61)	0.93 (0.50, 1.71)	1.44 (0.13, 15.29)		
– Condom/ Other	0.93 (0.68, 1.28)	0.97 (0.64, 1.4)	1.00 (0.65. 1.54)	0.65 (0.27, 2.21)		
2nd quartile						
– Hormonal/IUD	0.63 (0.40, 0.98)*	0.64 (0.34, 1.22)	0.65 (0.34, 1.26)	1.27 (0.19, 8.48)		
– Condom/ Other	0.82 (0.61, 1.11)	0.88 (0.62, 1.26)	0.87 (0.60, 1.27)	0.78 (0.27, 2.21)		
3rd quartile						
– Hormonal/IUD	0.82 (0.56, 1.20)	0.73 (0.45, 1.19)	0.79 (0.50, 1.26)	1.30 (0.28, 6.02)		
–Condom/ Other	0.89 (0.66, 1.21)	0.82 (0.55, 1.24)	0.87 (0.59, 1.28)	0.79 (0.32, 1.95)		
4th quartile (ref)	1.00	1.00	1.00	1.00		

*p<0.05, **p<0.01, ***p<0.001

Table 4.5a– Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents[a] (Reference: No Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[b]	Model 2[c]	Model 3[d]	Model 4[e]	Model 5[f]	Model 6[e]
	OR (95%CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
% Adults at School Look Out for Me (SA)[i]						
1st quartile						
– Hormonal/IUD	0.96 (0.62, 1.50)	0.95 (0.52, 1.75)	0.92 (0.50, 1.70)	1.59 (0.23, 11.21)		
– Condom/ Other	1.06 (0.79, 1.41)	1.09 (0.73, 1.61)	1.08 (0.74, 1.58)	1.81 (0.55, 5.93)		
2nd quartile						
– Hormonal/IUD	1.07 (0.73, 1.58)	1.01 (0.55, 1.83)	1.00 (0.54, 1.83)	1.45 (0.29, 7.27)		
– Condom/ Other	1.13 (0.85, 1.50)	1.11 (0.77, 1.60)	1.08 (0.77, 1.51)	1.04 (0.38, 2.86)		
3rd quartile						
– Hormonal/IUD	1.03 (0.74, 1.45)	1.07 (0.70, 1.64)	1.07 (0.71, 1.60)	2.41 (0.68, 8.61)		
– Condom/ Other	1.10 (0.85, 1.42)	1.08 (0.73, 1.60)	1.12 (0.78, 1.61)	1.57 (0.69, 3.55)		
4th quartile (ref)	1.00	1.00	1.00	1.00		
Prosocial activities (SA)[j]						
1st quartile						
– Hormonal/IUD	0.58 (0.36, 0.94)*	0.54 (0.30, 1.00)^	0.61 (0.33, 1.13)	0.58 (0.19, 1.84)	0.58 (0.27, 1.23)	
– Condom/ Other	0.83 (0.62, 1.09)	0.87 (0.60, 1.25)	0.98 (0.68, 1.42)	0.95 (0.53, 1.71)	1.14 (0.69, 1.89)	
2nd quartile						
– Hormonal/IUD	0.65 (0.46, 0.92)*	1.10 (0.68, 1.79)	1.13 (0.69, 1.84)	0.52 (0.18, 1.56)	0.49 (0.24, 1.00)'	
– Condom/ Other	0.83 (0.63, 1.11)	1.11 (0.74, 1.66)	1.16 (0.77, 1.73)	0.75 (0.37, 1.50)	1.01 (0.64, 1.60)	
3rd quartile						
– Hormonal/IUD	0.97 (0.68, 1.38)	1.10 (0.68, 1.79)	1.13 (0.69, 1.84)	0.86 (0.42, 1.76)	0.92 (0.54, 1.57)	
– Condom/ Other	1.10 (0.84, 1.44)	1.11 (0.74, 1.66)	1.16 (0.77, 1.76)	1.20 (0.75, 1.92)	1.25 (0.80, 1.95)	
4th quartile (ref)	1.00	1.00	1.00	1.00	1.00	

*p<0.05, **p<0.01, ***p<0.001

Table 4.5a– Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents[a] (Reference: No Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[b]	Model 2[c]	Model 3[d]	Model 4[e]	Model 5[f]	Model 6[e]
	OR (95%CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
Parent Survey Response Rate						
1st quartile						
– Hormonal/IUD	0.71 (0.47, 1.05)	0.72 (0.41, 1.24)	0.67 (0.40, 1.13)	0.46 (0.17, 1.26)		
– Condom/ Other	0.93 (0.71, 1.21)	1.09 (0.77, 1.54)	1.02 (0.72, 1.46)	0.86 (0.51, 1.47)		
2nd quartile						
– Hormonal/IUD	0.81 (0.53, 1.24)	0.84 (0.49, 1.44)	0.82 (0.49, 1.38)	0.87 (0.35, 2.21)		
– Condom/ Other	0.81 (0.62, 1.04)	0.83 (0.60, 1.14)	0.77 (0.56, 1.06)	0.60 (0.34, 1.06)		
3rd quartile						
– Hormonal/IUD	0.92 (0.59, 1.43)	1.05 (0.53, 2.06)	1.02 (0.52, 2.01)	0.65 (0.25, 1.56)		
– Condom/ Other	1.11 (0.85, 1.45)	1.26 (0.83, 1.91)	1.17 (0.77, 1.79)	0.79 (0.47, 1.34)		
4th quartile (ref)	1.00	1.00	1.00	1.00		
Teacher Survey Response Rate						
1st quartile						
– Hormonal/IUD	0.99 (0.63, 1.54)	0.95 (0.55, 1.66)	0.91 (0.53, 1.56)	0.87 (0.28, 2.69)	1.03 (0.53, 2.01)	0.93 (0.47, 1.86)
– Condom/ Other	1.01 (0.73, 1.39)	1.09 (0.72, 1.64)	1.10 (0.73, 1.64)	0.99 (0.59, 1.68)	1.32 (0.82, 2.11)	1.39 (0.88, 2.22)
2nd quartile						
– Hormonal/IUD	0.70 (0.46, 1.08)	0.60 (0.55, 1.66)	0.59 (0.33, 1.03)	0.42 (0.17, 1.02)”	0.52 (0.30, 0.92)**	0.67 (0.37, 1.23)
– Condom/ Other	0.73 (0.57, 0.93)*	0.75 (0.53, 1.07)	0.75 (0.53, 1.07)	0.59 (0.38, 0.93)**	0.66 (0.42, 1.04)	0.74 (0.49, 1.11)
3rd quartile						
– Hormonal/IUD	0.70 (0.48, 1.02)	0.67 (0.36, 1.26)	0.67 (0.35, 1.26)	0.33 (0.13, 0.81)**	0.52 (0.27, 1.01)’	0.58 (0.32, 1.07)
– Condom/ Other	1.01 (0.77, 1.31)	1.11 (0.73, 1.86)	1.12 (0.77, 1.63)	0.99 (0.64, 1.54)	0.97 (0.61, 1.54)	1.03 (0.65, 1.64)
4th quartile (ref)	1.00	1.00	1.00	1.00	1.00	1.00

*p<0.05, **p<0.01, ***p<0.001

Table 4.5a– Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents[a] (Reference: No Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[b]	Model 2[c]	Model 3[d]	Model 4[e]	Model 5[f]	Model 6[e]
	OR (95%CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
SAFETY/AMBIENT HAZARDS						
% School Crime/Violence a Problem (SA)[k]						
1st quartile (ref)	1.00	1.00	1.00	1.00		
2nd quartile						
– Hormonal/IUD	0.81 (0.55, 1.21)	0.82 (0.46, 1.48)	0.84 (0.47, 1.50)	0.97 (0.43, 2.20)		
– Condom/ Other	1.00 (0.79, 1.25)	1.05 (0.76, 1.46)	1.04 (0.75, 1.44)	0.94 (0.63, 1.41)		
3rd quartile						
– Hormonal/IUD	0.89 (0.60, 1.31)	0.89 (0.53, 1.49)	0.90 (0.53, 1.53)	0.87 (0.35, 2.18)		
– Condom/ Other	0.92 (0.70, 1.22)	0.86 (0.58, 1.26)	0.84 (0.56, 1.25)	0.81 (0.48, 1.36)		
4th quartile						
– Hormonal/IUD	1.29 (0.87, 1.89)	1.08 (0.65, 1.79)	1.10 (0.66, 1.84)	0.57 (0.16, 1.99)		
–Condom/ Other	1.14 (0.86, 1.50)	1.01 (0.69, 1.48)	0.99 (0.70, 1.41)	0.88 (0.46, 1.71)		
% Stay Home as Don't Feel Safe (MT)[l]						
1st quartile (ref)	1.00	1.00	1.00	1.00		
2nd quartile						
– Hormonal/IUD	1.11 (0.63, 1.96)	1.34 (0.65, 2.27)	1.30 (0.65, 2.62)	0.73 (0.20, 2.65)		
– Condom/ Other	1.11 (0.71, 1.76)	1.28 (0.68, 2.41)	1.30 (0.72, 2.35)	1.23 (0.53, 2.89)		
3rd quartile						
– Hormonal/IUD	0.71 (0.43, 1.17)	0.80 (0.42, 1.52)	0.77 (0.41, 1.44)	0.63 (0.15, 2.68)		
– Condom/ Other	0.94 (0.63, 1.38)	1.05 (0.63, 1.77)	0.98 (0.61, 1.60)	1.08 (0.43, 2.67)		
4th quartile						
– Hormonal/IUD	0.96 (0.61, 1.50)	0.91 (0.53, 1.57)	0.89 (0.53, 1.51)	0.74 (0.16, 3.32)		
– Condom/ Other	0.94 (0.64, 1.39)	1.01 (0.662, 1.66)	0.96 (0.60, 1.55)	1.48 (0.61, 3.62)		

*p<0.05, **p<0.01, ***p<0.001

Table 4.5a– Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents[a] (Reference: No Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[b]	Model 2[c]	Model 3[d]	Model 4[e]	Model 5[f]	Model 6[e]
	OR (95%CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
% Students Threaten Other Students (MT)[l]						
1st quartile (ref)	1.00	1.00	1.00	1.00		
2nd quartile						
– Hormonal/IUD	0.72 (0.43, 1.20)	0.75 (0.38, 1.48)	0.79 (0.41, 1.51)	2.76 (0.46, 16.48)		
– Condom/ Other	0.79 (0.57, 1.09)	0.87 (0.56, 1.35)	0.84 (0.54, 1.31)	1.83 (0.71, 4.76)		
3rd quartile						
– Hormonal/IUD	0.83 (0.51, 1.34)	0.93 (0.47, 1.83)	0.98 (0.52, 1.85)	4.97 (0.54, 46.03)		
– Condom/ Other	0.69 (0.50, 0.95)*	0.73 (0.46, 1.15)	0.72 (0.45, 1.14)	1.21 (0.39, 3.75)		
4th quartile						
– Hormonal/IUD	1.01 (0.64, 1.58)	0.85 (0.44, 1.64)	0.91 (0.49, 1.70)	5.29 (0.47, 59.05)		
– Condom/ Other	0.97 (0.72, 1.31)	0.89 (0.58, 1.36)	0.86 (0.57, 1.32)	1.59 (0.45, 5.58)		
% Students Get Into Fights (MT)[l]						
1st quartile (ref)	1.00	1.00	1.00	1.00		
2nd quartile						
– Hormonal/IUD	0.95 (0.57, 1.58)	0.81 (0.43, 1.53)	0.80 (0.46, 1.54)	0.87 (0.14, 5.29)		
– Condom/ Other	0.80 (0.57, 1.13)	0.70 (0.42, 1.17)	0.68 (0.41, 1.13)	0.55 (0.20, 1.54)		
3rd quartile						
– Hormonal/IUD	0.74 (0.44, 1.25)	0.64 (0.34, 1.23)	0.66 (0.36, 1.23)	0.72 (0.09, 5.53)		
– Condom/ Other	0.77 (0.56, 1.05)	0.67 (0.44, 1.01)^	0.62 (0.41, 0.94)**	0.69 (0.22, 2.21)		
4th quartile						
– Hormonal/IUD	0.97 (0.61, 1.26)	0.79 (0.40, 1.56)	0.83 (0.44, 1.57)	2.28 (0.26, 19.88)		
– Condom/ Other	0.93 (0.69, 1.25)	0.87 (0.56, 1.37)	0.83 (0.54, 1.28)	1.50 (0.42, 5.38)		

*p<0.05, **p<0.01, ***p<0.001

Table 4.5a– Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents[a] (Reference: No Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[b]	Model 2[c]	Model 3[d]	Model 4[e]	Model 5[f]	Model 6[e]
	OR (95%CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
% Gang Activity at School (MT)[l]						
1st quartile (ref)	1.00	1.00	1.00	1.00		
2nd quartile						
– Hormonal/IUD	0.88 (0.54, 1.45)	0.96 (0.51, 1.83)	0.97 (0.53, 1.79)	0.92 (0.17, 5.01)		
–Condom/ Other	0.88 (0.60, 1.29)	0.96 (0.55, 1.67)	0.88 (0.52, 1.50)	0.80 (0.29, 2.18)		
3rd quartile						
– Hormonal/IUD	0.74 (0.44, 1.24)	0.70 (0.35, 1.40)	0.70 (0.36, 1.36)	0.52 (0.08, 3.40)		
– Condom/ Other	0.79 (0.55, 1.14)	0.80 (0.48, 1.32)	0.74 (0.46, 1.19)	0.46 (0.15, 1.41)		
4th quartile						
– Hormonal/IUD	0.87 (0.55, 1.38)	0.78 (0.42, 1.45)	0.81 (0.46, 1.43)	0.35 (0.04, 3.38)		
– Condom/ Other	0.89 (0.64, 1.24)	0.88 (0.54, 1.42)	0.82 (0.52, 1.28)	0.50 (0.16, 1.60)		
% Safe in Classes (SA)[i]						
1st quartile						
– Hormonal/IUD	0.95 (0.65, 1.39)	1.03 (0.56, 1.91)	1.06 (0.58, 1.95)	1.29 (0.14, 11.98)	1.97 (0.55, 7.07)	1.47 (0.53, 4.11)
– Condom/ Other	0.90 (0.69, 1.17)	1.00 (0.68, 1.45)	0.98 (0.67, 1.44)	0.30 (0.09, 0.99)**	0.40 (0.14, 1.10)	0.46 (0.19, 1.13)
2nd quartile						
– Hormonal/IUD	0.59 (0.39, 0.91)*	0.66 (0.39, 1.11)	0.72 (0.43, 1.18)	1.09 (0.15, 7.77)	1.66 (0.58, 4.77)	1.17 (0.54, 2.54)
– Condom/ Other	0.83 (0.61, 1.13)	0.84 (0.56, 1.27)	0.86 (0.55, 1.33)	0.56 (0.21, 1.51)	0.40 (0.20, 1.13)	0.55 (0.25, 1.19)
3rd quartile						
– Hormonal/IUD	0.86 (0.56, 1.34)	1.03 (0.59, 1.79)	1.08 (0.64, 1.84)	1.23 (0.30, 5.03)	1.62 (0.64, 4.08)	1.64 (0.87, 3.10)
– Condom/ Other	0.83 (0.61, 1.13)	0.93 (0.62, 1.39)	0.99 (0.6, 1.48)	0.97 (0.50, 1.88)	0.51 (0.26, 1.01)'	0.69 (0.38, 1.26)
4th quartile (ref)	1.00	1.00	1.00	1.00	1.00	1.00

*p<0.05, **p<0.01, ***p<0.001

Table 4.5a– Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents[a] (Reference: No Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[b]	Model 2[c]	Model 3[d]	Model 4[e]	Model 5[f]	Model 6[e]
	OR (95%CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
% Safe in School Building (SA)[i]						
1st quartile						
– Hormonal/IUD	0.93 (0.66, 1.32)	0.96 (0.52, 1.76)	0.98 (0.54, 1.77)	0.05 (0.00, 0.62)**	0.23 (0.07, 0.78)**	0.24 (0.08, 0.77)**
– Condom/ Other	1.04 (0.80, 1.35)	1.13 (0.75, 1.70)	1.10 (0.74, 1.64)	1.17 (0.23, 5.80)	2.06 (0.61, 6.89)	1.36 (0.51, 3.68)
2nd quartile						
– Hormonal/IUD	0.55 (0.38, 0.81)*	0.58 (0.37, 0.93)**	0.61 (0.40, 0.95)**	0.17 (0.03, 0.92)**	0.55 (0.18, 1.68)	0.42 (0.15, 1.20)
– Condom/ Other	0.91 (0.69, 1.19)	0.86 (0.58, 1.29)	0.85 (0.57, 1.26)	1.40 (0.40, 4.95)	1.69 (0.59, 4.85)	1.18 (0.49, 2.87)
3rd quartile						
– Hormonal/IUD	0.79 (0.52, 1.20)	0.95 (0.53, 1.71)	0.98 (0.56, 1.72)	0.37 (0.07, 1.92)	1.08 (0.29, 3.97)	0.74 (0.27, 2.03)
– Condom/ Other	0.94 (0.71, 1.25)	1.01 (0.67, 1.54)	1.03 (0.69, 1.53)	1.29 (0.44, 3.81)	1.74 (0.72, 4.20)	1.27 (0.62, 2.59)
4th quartile (ref)	1.00	1.00	1.00	1.00	1.00	1.00
% Safe on School Property (SA)[i]						
1st quartile						
– Hormonal/IUD	1.40 (0.96, 2.02)	1.48 (0.87, 2.51)	1.56 (0.94, 2.58)	27.73 (5.47, 140.44)***	5.72 (1.93, 16.94)***	5.07 (2.04, 12.60)***
– Condom/ Other	1.33 (1.0, 1.77)*	1.46 (0.96, 2.21)	1.42 (0.95, 2.12)	3.59 (1.20, 10.72)**	2.01 (0.88, 4.62)	2.04 (0.98, 4.25)
2nd quartile						
– Hormonal/IUD	0.73 (0.51, 1.03)	0.64 (0.37, 1.09)	0.68 (0.40, 1.16)	3.31 (0.88, 12.43)	1.36 (0.43, 4.22)	1.89 (0.75, 4.76)
– Condom/ Other	1.08 (0.83, 1.39)	0.99 (0.67, 1.46)	1.00 (0.67, 1.49)	1.90 (0.73, 4.99)	1.34 (0.60, 3.00)	1.48 (0.78, 2.78)
3rd quartile						
– Hormonal/IUD	0.85 (0.55, 1.32)	0.82 (0.48, 1.40)	0.87 (0.52, 1.45)	3.34 (0.92, 12.05)	0.92 (0.28, 3.04)	1.24 (0.50, 3.07)
– Condom/ Other	1.09 (0.82, 1.45)	1.04 (0.71, 1.53)	1.04 (0.72, 1.52)	1.35 (0.53, 3.42)	1.20 (0.53, 2.72)	1.19 (0.61, 2.30)
4th quartile (ref)	1.00	1.00	1.00	1.00	1.00	1 .00

*p<0.05, **p<0.01, ***p<0.001

Table 4.5a– Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents[a] (Reference: No Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[b]	Model 2[c]	Model 3[d]	Model 4[e]	Model 5[f]	Model 6[e]
	OR (95%CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
% Suspensions						
1st quartile (ref)	1.00	1.00	1.00	1.00		
2nd quartile					1.00	1.00
– Hormonal/IUD	0.52 (0.33, 0.82)*	0.51 (0.27, 1.00)^	0.49 (0.26, 0.93)**	0.37 (0.14, 1.01)”	0.48 (0.20, 1.19)	0.48 (0.22, 1.02)’
– Condom/ Other	0.98 (0.70, 1.39)	0.97 (0.55, 1.71)	0.90 (0.53, 1.54)	0.87 (0.49, 1.54)	1.01 (0.50, 2.04)	0.97 (0.57, 1.65)
3rd quartile						
– Hormonal/IUD	0.52 (0.31, 0.86)*	0.57 (0.22, 1.22)	0.58 (0.28, 1.21)	0.39 (0.15, 1.00)	0.58 (0.27, 1.22)	0.54 (0.26, 1.13)
– Condom/ Other	0.79 (0.56, 1.13)	0.88 (0.52, 1.52)	0.86 (0.51, 1.47)	0.76 (0.42, 1.37)	1.00 (0.51, 1.95)	0.94 (0.55, 1.62)
4th quartile						
– Hormonal/IUD	0.73 (0.45, 1.18)	0.60 (0.26, 1.35)	0.58 (0.26, 1.30)	0.37 (0.10, 1.36)	0.75 (0.24, 2.32)	0.54 (0.20, 1.46)
– Condom/ Other	0.94 (0.67, 1.33)	0.92 (0.53, 1.6)	0.86 (0.51, 1.45)	1.12 (0.54, 2.31)	1.06 (0.48, 2.35)	0.98 (0.54, 1.80)
School Has Permanent Metal Detector						
% Yes						
– Hormonal/IUD	0.82 (0.59, 1.13)	0.68 (0.40, 1.17)	0.67 (0.39, 1.14)	1.45 (0.48, 4.38)		
– Condom/ Other	0.81 (0.65, 1.01)	0.83 (0.60, 1.13)	0.82 (0.59, 1.14)	1.18 (0.68, 2.06)		
% No (ref)	1.00	1.00	1.00	1.00		
SCHOOL-BASED HEALTH CENTER (SBHC)						
% Yes (ref)	1.00	1.00	1.00	1.00		
% No						
– Hormonal/IUD	0.75 (0.56, 1.00) *	0.73 (0.46, 1.18)	0.73 (0.45, 1.17)~	0.67 (0.33, 1.38)		
– Condom/ Other	1.17 (0.96, 1.43)	1.13 (0.84, 1.52)	1.18 (0.88, 1.59)	1.32 (0.82, 2.13)		

*p<0.05, **p<0.01, ***p<0.001

Table 4.5a– Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents[a] (Reference: No Method), NYC Public High Schools, 2007-2011

[a] Sexually active is defined as had sexual intercourse at least once in the past three months
[b] Model 1: Unadjusted school-level exposures - independent effects of each school-level exposure on the outcome
[c] Model 2: Model 1 + age, gender, race/ethnicity
[d] Model 3: Model 2 + remaining individual-level covariates
[e] Model 4: All individual-level variables and school-level exposures together (Full Model)
[f] Model 5: Includes 12 school-level variables – Black, Hispanic, Poverty, Teachers Survey RR, Teacher > 2 years, Safe In classes, Safe in vey RR, Teacher > 2 years, Safe In classes, Safe in building, Safe on School Property, % Suspensions, 6 Year HS Graduation, Average Daily Attendance, Prosocial Parent
[g] Model 6: Includes 9 school-level variables –Black, Hispanic, Poverty, Teacher Survey RR, Teacher > 2 Years, Safe in Building, Safe on School Property, % Suspensions
[h] Hormonal/IUD = a hormonal contraceptive method (oral contraceptive pills, injection, patch, vaginal ring, implant, hormonal IUD, emergency contraceptive pills) or copper IUD. Condom/Other = condom, withdrawal, or other method. No method = no method or not sure
[i] Student survey SA=strongly agree
[j] Parent survey SA=strongly agree
[k] Teacher survey SA=strongly agree
[l] Student survey MT=most of the time

Borderline p-values

^ MODEL 2: 6 year HS Graduation – Q3Condom: p=0.0149
^ MODEL 2: Prosocial Activities – Q1Hormonal: p=0.0101
^ MODEL 2: % Students Get into Fights – Q3Condom: p=0.0120
^ MODEL 2: Suspensions – Q2Hormonal: p=0.0099
~ MODEL 3: SBHC – Hormonal: p=0.0839
“ MODEL 4: Teacher Survey Resp – Q2Hormonal: p=0.0121
“ MODEL 4: Suspensions – Q2Hormonal: p=0.0109
“ MODEL 4: School lunch – Q4Condom: p=0.0110
‘ MODEL 5: Prosocial Activities – Q2Hormonal: p=0.0103
‘ MODEL 5: Teacher Survey Resp – Q3Hormonal: p=0.0110
‘ MODEL 5: Safe Classes – Q3Condom: p=0.0112
‘ MODEL 6: Suspensions_Q2Hormonal: p=0.0116

Table 4.5b – Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents (Reference: Condoms/Withdrawal/Other Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]	Model 5[e]	Model 6[f]
	OR (95% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
DEMOGRAPHICS						
% Black Non-Hispanic						
1st quartile						
– Hormonal/IUD	1.18 (0.81, 1.72)	1.02 (0.47, 2.21)	0.98 (0.45, 2.15)	1.04 (0.21, 5.13)	1.88 (0.63, 5.64)	1.57 (0.57, 4.35)
– No Method	1.03 (0.76, 1.39)	0.96 (0.61, 1.53)	0.98 (0.63, 1.52)	0.40 (0.18, 0.88)**	0.98 (0.48, 1.96)	1.00 (0.51, 1.97)
2nd quartile						
– Hormonal/IUD	1.73 (1.26, 2.37)***	1.43 (0.76, 2.83)	1.30 (0.71, 2.66)	1.96 (0.51, 7.55)	2.08 (0.83, 5.25)	1.79 (0.74, 4.32)
– No Method	1.23 (0.92, 1.64)	1.10 (0.75, 1.61)	1.07 (0.73, 1.57)	0.49 (0.32, 1.11)	0.92 (0.50, 1.67)	0.89 (0.50, 1.59)
3rd quartile						
– Hormonal/IUD	1.34 (0.94, 1.91)	1.21 (0.68, 2.15)	1.14 (0.64, 2.02)	2.78 (0.79, 9.76)	2.21 (0.87, 5.57)	1.88 (0.78, 4.51)
– No Method	0.99 (0.73, 1.36)	0.97 (0.66, 1.44)	0.93 (0.63, 1.38)	0.46 (0.25, 0.87)**	0.79 (0.45, 1.39)	0.80 (0.46, 1.40)
4th quartile (ref)	1.00	1.00	1.00	1.00	1.00	1.00
% Hispanic						
1st quartile						
– Hormonal/IUD	0.66 (0.46, 0.94)*	0.81 (0.42, 1.56)	0.77 (0.40, 1.49)	0.49 (0.12, 1.89)	1.07 (0.36, 3.20)	1.03 (0.36, 2.97)
– No Method	0.60 (0.43, 0.84)*	0.74 (0.48, 1.12)	0.69 (0.46, 1.03)	0.39 (0.16, 0.92)**	0.74 (0.33, 1.62)	0.70 (0.35, 1.43)
2nd quartile						
– Hormonal/IUD	0.72 (0.48, 1.07)	0.84 (0.46, 1.55)	0.84 (0.45, 1.55)	0.80 (0.23, 2.75)	1.46 (0.58, 3.64)	1.47 (0.60, 3.61)
– No Method	0.84 (0.64, 1.11)	0.91 (0.63, 1.32)	0.87 (0.60, 1.25)	0.82 (0.40, 1.66)	1.05 (0.50, 2.21)	1.06 (0.54, 2.10)
3rd quartile						
– Hormonal/IUD	0.82 (0.57, 1.18)	0.99 (0.60, 1.62)	0.97 (0.59, 1.61)	0.90 (0.37, 2.18)	1.02 (0.51, 2.05)	1.00 (0.49, 2.04)
– No Method	0.96 (0.76, 1.23)	0.99 (0.68, 1.43)	0.92 (0.64, 1.33)	0.89 (0.57, 1.40)	0.82 (0.50, 1.37)	0.83 (0.53, 1.30)
4th quartile (ref)	1.00	1.00	1.00	1.00	1.00	1.00

*p<0.05, **p<0.01, ***p<0.001

Table 4.5b – Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents (Reference: Condoms/Withdrawal/Other Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]	Model 5[e]	Model 6[f]
	OR (95% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
% Female						
1st quartile						
– Hormonal/IUD	0.78 (0.55, 1.12)	0.87 (0.50, 1.48)	0.87 (0.50, 1.51)	1.25 (0.54, 2.88)		
– No Method	1.02 (0.74, 1.40)	1.06 (0.66, 1.70)	1.10 (0.70, 1.72)	0.94 (0.57, 1.56)		
2nd quartile						
– Hormonal/IUD	0.84 (0.60, 1.19)	0.79 (0.47, 1.35)	0.78 (0.46, 1.32)	1.32 (0.48, 3.59)		
– No Method	0.98 (0.69, 1.39)	1.08 (0.67, 1.73)	1.06 (0.68, 1.67)	0.99 (0.54, 1.78)		
3rd quartile						
– Hormonal/IUD	0.85 (0.58, 1.23)	0.76 (0.44, 1.33)	0.73 (0.43, 1.24)	1.20 (0.57, 2.54)		
– No Method	1.06 (0.79, 1.42)	1.20 (0.81. 1.77)	1.23 (0.85, 1.76)	0.85 (0.50, 1.44)		
4th quartile (ref)	1.00	1.00	1.00	1.00		
% Free School Lunch (Household Poverty)						
1st quartile (ref)	1.00	1.00	1.00	1.00	1.00	1.00
2nd quartile						
– Hormonal/IUD	1.31 (0.96, 1.81)	1.37 (0.81, 2.32)	1.43 (0.89, 2.31)	0.76 (0.30, 1.92)	1.09 (0.59, 2.00)	1.19 (0.67, 2.10)
– No Method	1.20 (0.88, 1.64)	1.05 (0.63, 1.75)	1.06 (0.64, 1.75)	0.44 (0.27, 0.74)***	0.68 (0.41, 1.11)	0.78 (0.48, 1.28)
3rd quartile						
– Hormonal/IUD	1.24 (0.87, 1.75)	1.20 (0.68, 2.14)	1.30 (0.78, 2.18)	0.47 (0.12, 1.87)	0.87 (0.32, 2.32)	0.98 (0.39, 2.45)
– No Method	1.56 (1.18, 2.06)**	1.41 (0.93, 2.13)	1.48 (0.97, 2.26)	0.47 (0.23, 0.99)**	0.87 (0.48, 1.56)	0.90 (0.52, 1.55)
4th quartile						
– Hormonal/IUD	1.31 (0.95, 1.80)	1.34 (0.75, 2.38)	1.45 (0.78, 2.18)	0.23 (0.05, 0.94)**	0.78 (0.28, 2.21)	0.94 (0.35, 2.57)
– No Method	1.42 (1.09, 1.85)**	1.24 (0.81, 1.89)	1.33 (0.87, 2.02)	0.47 (0.22, 1.01)”	0.87 (0.44, 1.70)	0.93 (0.49, 1.75)

*p<0.05, **p<0.01, ***p<0.001

Table 4.5b – Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents (Reference: Condoms/Withdrawal/Other Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]	Model 5[e]	Model 6[f]
	OR (95% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
ACADEMICS						
6 Year Graduation						
1st quartile						
– Hormonal/IUD	1.08 (0.76, 1.55)	0.79 (0.44, 1.43)	0.88 (0.49, 1.55)	0.70 (0.27, 1.86)	0.77 (0.34, 1.72)	
– No Method	1.43 (1.06, 1.91)*	1.40 (0.89, 2.22)	1.62 (1.00, 2.64) ~	0.97 (0.49, 1.90)	1.53 (0.81, 2.89)	
2nd quartile						
– Hormonal/IUD	1.01 (0.69, 1.47)	0.95 (0.52, 1.72)	1.08 (0.61, 1.89)	0.69 (0.29, 1.61)	0.88 (0.42, 1.85)	
– No Method	1.36 (1.02, 1.91)*	1.34 (0.83, 2.16)	1.55 (0.95, 2.52)	0.97 (0.57, 1.67)	1.50 (0.87, 2.59)	
3rd quartile						
– Hormonal/IUD	0.67 (0.45, 1.00)^	0.61 (0.31, 1.21)	0.68 (0.35, 1.30)	0.63 (0.26, 1.52)	0.68 (0.31, 1.49)	
– No Method	1.43 (1.02, 2.00)*	1.50 (0.98, 2.32)	1.63 (1.07, 2.48) **	0.78 (0.42, 1.45)	1.43 (0.80, 2.55)	
4th quartile (ref)	1.00	1.00	1.00	1.00	1.00	
Quality Review Score						
Underdeveloped						
– Hormonal/IUD	1.08 (0.60, 1.92)	1.03 (0.40, 2.67)	1.05 (0.40, 2.75)	0.95 (0.27, 3.35)		
– No Method	1.50 (1.09, 2.07)*	1.47 (0.92, 2.36)	1.44 (0.89, 2.30)	1.39 (0.69, 2.84)		
Developing						
– Hormonal/IUD	1.17 (0.71, 1.92)	1.25 (0.59, 2.64)	1.37 (0.65, 2.86)	1.93 (0.60, 6.18)		
– No Method	1.02 (0.71, 1.47)	1.20 (0.70, 2.06)	1.15 (0.69, 1.90)	0.72 (0.40, 1.30)		
Proficient						
– Hormonal/IUD	0.92 (0.66, 1.28)	0.95 (0.54, 1.66)	0.91 (0.51, 1.61)	1.06 (0.47, 2.39)		
– No Method	1.19 (0.94, 1.51)	1.26 (0.87, 1.81)	1.20 (0.83, 1.74)	0.80 (0.52, 1.24)		
Well Developed (ref)	1.00	1.00	1.00	1.00		

*p<0.05, **p<0.01, ***p<0.001

Table 4.5b – Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents (Reference: Condoms/Withdrawal/Other Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]	Model 5[e]	Model 6[f]
	OR (95% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
CONNECTEDNESS/ PRO SOCIAL ACTIVITIES						
% Average Daily Attendance						
1st quartile						
– Hormonal/IUD	1.30 (0.86, 1.97)	1.06 (0.54, 2.13)	1.15 (0.63, 2.12)	2.37 (0.59, 9.51)	1.89 (0.75, 4.75)	1.38 (0.65, 2.94)
– No Method	1.56 (1.11, 2.19)**	1.60 (0.97, 2.65)	1.79 (1.13, 2.85) **	1.41 (0.55, 3.58)	1.48 (0.70, 3.14)	1.77 (0.93, 3.37)
2nd quartile						
– Hormonal/IUD	1.33 (0.89, 2.00)	1.15 (0.60, 2.20)	1.23 (0.67, 2.25)	2.34 (0.60, 9.17)	1.89 (0.81, 4.40)	1.48 (0.78, 2.81)
– No Method	1.36 (0.97, 1.89)	1.54 (0.94, 2.52)	1.65 (1.07, 2.55) **	1.60 (0.81, 3.18)	1.74 (0.83., 3.65)	1.91 (1.04, 3.49)**
3rd quartile						
– Hormonal/IUD	1.28 (0.85, 1.93)	1.28 (0.69, 2.37)	1.35 (0.77, 2.36)	2.10 (0.85, 2.24)	1.89 (1.00, 3.58)'	1.65 (0.94, 2.90)
– No Method	1.25 (0.87, 1.79)	1.42 (0.81, 2.51)	1.47 (0.85, 2.56)	1.49 (0.70, 3.19)	1.40 (0.75, 2.63)	1.47 (0.84, 2.58)
4th quartile (ref)	1.00	1.00	1.00	1.00	1.00	1.00
Enrollment						
1st quartile (ref)	1.00	1.00	1.00	1.00		
2nd quartile						
– Hormonal/IUD	1.08 (0.73, 1.59)	0.60 (0.52, 1.76)	0.94 (0.53, 1.68)	1.15 (0.36, 3.70)		
– No Method	0.89 (0.65, 1.23)	0.85 (0.58, 1.24)	0.88 (0.61, 1.27)	1.05 (0.49, 2.28)		
3rd quartile						
– Hormonal/IUD	1.09 (0.78, 1.53)	1.03 (0.59, 1.80)	1.08 (0.63, 1.87)	0.71 (0.16, 2.99)		
– No Method	0.84 (0.65, 1.10)	0.79 (0.54, 1.15)	0.86 (0.60, 1.22)	0.68 (0.27, 1.73)		
4th quartile						
– Hormonal/IUD	0.91 (0.64, 1.30)	0.77 (0.47, 1.26)	0.79 (0.49, 1.28)	0.40 (0.08, 1.94)		
– No Method	0.86 (0.63, 1.16)	0.84 (0.56, 1.25)	0.88 (0.60, 1.28)	0.68 (0.25, 1.86)		

*p<0.05, **p<0.01, ***p<0.001

Table 4.5b – Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents (Reference: Condoms/Withdrawal/Other Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]	Model 5[e]	Model 6[f]
	OR (95% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
% Teachers > 2 Years at School						
1st quartile						
– Hormonal/IUD	0.83 (0.57, 1.21)	0.88 (0.47, 1.62)	0.84 (0.46, 1.54)	0.48 (0.17, 1.41)	0.79 (0.31, 1.43)	0.57 (0.25, 1.28)
– No Method	1.42 (1.04, 1.93)*	1.41 (0.92, 2.14)	1.33 (0.91, 1.95)	0.60 (0.34, 1.06)	0.98 (0.61, 1.57)	1.05 (0.68, 1.62)
2nd quartile						
– Hormonal/IUD	0.94 (0.68, 1.29)	0.82 (0.48, 1.40)	0.81 (0.46, 1.43)	0.59 (0.22, 1.59)	0.52 (0.25, 1.08)	0.49 (0.23, 1.05)
– No Method	1.05 (0.79, 1.39)	1.09 (0.70, 1.70)	1.06 (0.67, 1.65)	0.96 (0.57, 1.61)	0.83 (0.50, 1.39)	0.82 (0.49, 1.36)
3rd quartile						
– Hormonal/IUD	1.17 (0.86, 1.59)	1.18 (0.77, 1.83)	1.14 (0.74, 1.77)	0.87 (0.45, 1.68)	0.80 (0.49, 1.31)	0.88 (0.56, 1.38)
– No Method	1.22 (0.94, 1.58)	1.37 (0.94, 2.02)	1.30 (0.90, 1.88)	1.67 (1.19, 2.35)***	1.31 (0.89, 1.92)	1.27 (0.90, 1.78)
4th quartile (ref)	1.00	1.00	1.00	1.00	1.00	1.00
% Feel Welcome at School (SA)[g]						
1st quartile						
– Hormonal/IUD	0.92 (0.65, 1.32)	0.89 (0.53, 1.52)	0.93 (0.56, 1.54)	2.21 (0.28, 17.47)		
– No Method	1.07 (0.78, 1.47)	1.03 (0.68, 1.57)	1.00 (0.65, 1.55)	1.54 (0.43, 5.56)		
2nd quartile						
– Hormonal/IUD	0.76 (0.53, 1.09)	0.73 (0.40, 1.31)	0.75 (0.42, 1.32)	1.63 (0.32, 8.38)		
– No Method	1.21 (0.90, 1.63)	1.14 (0.80, 1.63)	1.15 (0.79, 1.67)	1.29 (0.45, 3.66)		
3rd quartile						
– Hormonal/IUD	0.92 (0.66, 1.27)	0.89 (0.56, 1.41)	0.91 (0.61, 1.38)	1.65 (0.46, 5.95)		
– No Method	1.12 (0.82, 1.53)	1.22 (0.81, 1.83)	1.15 (0.78, 1.69)	0.27 (0.51, 3.15)		
4th quartile (ref)	1.00	1.00	1.00	1.00		

*p<0.05, **p<0.01, ***p<0.001

Table 4.5b – Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents (Reference: Condoms/Withdrawal/Other Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]	Model 5[e]	Model 6[f]
	OR (95% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
% Adults at School Look Out for Me (SA)[i]						
1st quartile						
– Hormonal/IUD	0.91 (0.63, 1.32)	0.87 (0.51, 1.49)	0.85 (0.50, 1.44)	0.88 (0.18, 4.27)		
– No Method	0.95 (0.71, 1.27)	0.92 (0.62, 1.37)	0.92 (0.63, 1.35)	0.55 (0.17, 1.81)		
2nd quartile						
– Hormonal/IUD	0.95 (0.68, 1.34)	0.91 (0.52, 1.60)	0.93 (0.53, 1.62)	1.40 (0.36, 5.44)		
– No Method	0.89 (0.67, 1.18)	0.90 (0.63, 1.30)	0.93 (0.66, 1.30)	0.96 (0.35, 2.64)		
3rd quartile						
– Hormonal/IUD	0.94 (0.67, 1.33)	0.99 (0.61, 1.62)	0.95 (0.62, 1.47)	1.54 (0.51, 4.63)		
– No Method	0.91 (0.70, 1.18)	0.93 (0.63, 1.37)	0.89 (0.62, 1.29)	0.64 (0.28, 1.45)		
4th quartile (ref)	1.00	1.00	1.00	1.00		
Prosocial activities (SA)[h]						
1st quartile						
– Hormonal/IUD	0.71 (0.49, 1.03)	0.63 (0.36, 1.08)	0.62 (0.63, 1.08)	0.62 (0.22, 1.72)		
– No Method	1.21 (0.91, 1.60)	0.66 (0.40, 1.09)	1.02 (0.70, 1.47)	1.05 (0.59, 1.89)		
2nd quartile						
– Hormonal/IUD	0.78 (0.59, 1.03)	0.81 (0.54, 1.22)	0.77 (0.51, 1.17)	0.70 (0.27, 1.80)		
– No Method	1.20 (0.90, 1.59)	1.01 (0.60, 1.69)	1.04 (0.70, 1.54)	1.34 (0.67, 2.68)		
3rd quartile						
– Hormonal/IUD	0.88 (0.64, 1.22)	0.99 (0.63, 1.56)	0.97 (0.61, 1.55)	0.72 (0.39, 1.33)		
–Condom/ Other	0.91 (0.69, 1.19)	0.83 (0.46, 1.51)	0.86 (0.58, 1.29)	0.84 (0.52, 1.34)		
– No Method	1.00	1.00	1.00	1.00		

*p<0.05, **p<0.01, ***p<0.001

Table 4.5b – Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents (Reference: Condoms/Withdrawal/Other Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]	Model 5[e]	Model 6[f]
	OR (95% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
Parent Survey Response Rate						
1st quartile						
– Hormonal/IUD	0.76 (0.55, 1.06)	0.66 (0.40, 1.09)	0.65 (0.40, 1.06)	0.54 (0.22, 1.29)		
– No Method	1.08 (0.83, 1.41)	0.92 (0.65, 1.30)	0.98 (0.69, 1.39)	1.16 (0.68, 1.97)		
2nd quartile						
– Hormonal/IUD	1.01 (0.71, 1.43)	1.01 (0.60, 1.69)	1.06 (0.65, 1.72)	1.46 (0.67, 3.20)		
– No Method	1.24 (0.96, 1.61)	1.20 (0.87, 1.66)	1.30 (0.94, 1.78)	1.67 (0.95, 2.95)		
3rd quartile						
– Hormonal/IUD	0.83 (0.56, 1.22)	0.83 (0.46, 1.51)	0.87 (0.49, 1.53)	0.78 (0.37, 1.66)		
– No Method	0.90 (0.96, 1.18)	0.80 (0.52, 1.21)	0.85 (0.56, 1.30)	1.26 (0.74, 2.14)		
4th quartile (ref)	1.00	1.00	1.00	1.00		
Teacher Survey Resp Rate						
1st quartile						
– Hormonal/IUD	0.98 (0.67, 1.42)	0.88 (0.52, 1.48)	0.83 (0.50, 1.38)	0.88 (0.33, 2.34)	0.84 (0.49, 1.43)	0.90 (0.53, 1.52)
– No Method	0.99 (0.72, 1.37)	0.92 (0.61, 1.39)	0.91 (0.61, 1.37)	1.01 (0.59, 1.71)	0.77 (0.48, 1.24)	0.73 (0.47, 1.15)
2nd quartile						
– Hormonal/IUD	0.96 (0.68, 1.36)	0.80 (0.48, 1.32)	0.78 (0.47, 1.30)	0.70 (0.34, 1.46)	0.83 (0.48, 1.45)	1.02 (0.61, .70)
– No Method	1.37 (1.06, 1.76)	1.33 (0.93, 1.90)	1.33 (0.94, 1.90)	1.69 (1.07, 2.65)**	1.51 (0.97, 2.33)	1.40 (0.94, 2.07)
3rd quartile						
– Hormonal/IUD	0.69 (0.50, 0.96)*	0.61 (0.36, 1.02)	0.60 (0.35, 1.01)	0.33 (0.14, 0.77)***	0.55 (0.29, 1.05)	0.64 (0.35, 1.17)
– No Method	0.99 (0.76, 1.30)	0.90 (0.59, 1.37)	0.90 (0.61, 1.31)	1.01 (0.65, 1.57)	1.04 (0.65, 1.65)	1.02 (0.65, 1.59)
4th quartile (ref)	1.00	1.00	1.00	1.00	1.00	1.00

*p<0.05, **p<0.01, ***p<0.001

Table 4.5b – Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents (Reference: Condoms/Withdrawal/Other Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]	Model 5[e]	Model 6[f]
	OR (95% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
SAFETY/AMBIENT HAZARDS						
% School Crime/Violence a Problem (SA)[i]						
1st quartile (ref)	1.00	1.00	1.00	1.00		
2nd quartile						
– Hormonal/IUD	0.82 (0.60, 1.11)	0.78 (0.48, 1.27)	0.81 (0.50, 1.30)	1.03 (0.49, 2.19)		
– No Method	1.00 (0.80, 1.26)	0.95 (0.69, 1.31)	0.96 (0.69, 1.34)	1.06 (0.71, 1.60)		
3rd quartile						
– Hormonal/IUD	0.96 (0.66, 1.39)	1.03 (0.62, 1.71)	1.08 (0.66, 1.75)	1.08 (0.48, 2.44)		
– No Method	1.08 (0.82, 1.43)	1.17 (0.79, 1.71)	1.20 (0.80, 1.78)	1.24 (0.74, 2.10)		
4th quartile						
– Hormonal/IUD	1.13 (0.80, 1.61)	1.07 (0.65, 1.77)	1.11 (0.68, 1.83)	0.65 (0.20, 2.08)		
– No Method	0.88 (0.67, 1.16)	0.99 (0.67, 1.46)	1.01 (0.71, 1.44)	1.13 (0.59, 2.19)		
% Stay Home as Don't Feel Safe (MT)[j]						
1st quartile (ref)	1.00	1.00	1.00	1.00		
2nd quartile						
– Hormonal/IUD	1.00 (0.67, 1.49)	1.05 (0.61, 1.79)	1.00 (0.59, 1.70)	0.59 (0.24, 1.48)		
– No Method	0.90 (0.57, 1.42)	0.78 (0.41, 1.48)	0.77 (0.43, 1.39)	0.81 (0.35, 1.90)		
3rd quartile						
– Hormonal/IUD	0.76 (0.52, 1.09)	0.76 (0.45, 1.27)	0.78 (0.47, 1.30)	0.58 (0.18, 1.86)		
– No Method	1.07 (0.72, 1.58)	0.95 (0.57, 1.59)	1.02 (0.63, 1.65)	0.93 (0.37, 2.31)		
4th quartile						
– Hormonal/IUD	1.02 (0.73, 1.43)	0.90 (0.56, 1.46)	0.93 (0.57, 1.52)	0.50 (0.15, 1.66)		
– No Method	1.06 (0.72, 1.57)	0.99 (0.60, 1.62)	1.04 (0.65, 1.67)	0.68 (0.28, 1.65)		

*p<0.05, **p<0.01, ***p<0.001

Table 4.5b – Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents (Reference: Condoms/Withdrawal/Other Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]	Model 5[e]	Model 6[f]
	OR (95% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
% Students Threaten Other Students (MT)[j]						
1st quartile (ref)	1.00	1.00	1.00	1.00		
2nd quartile						
– Hormonal/IUD	0.92 (0.61, 1.37)	0.86 (0.47, 1.56)	0.93 (0.55, 1.58)	1.50 (0.38, 5.91)		
– No Method	1.27 (0.92, 1.76)	1.15 (0.74, 1.78)	1.19 (0.76, 1.86)	0.55 (0.21, 1.42)		
3rd quartile						
– Hormonal/IUD	1.19 (0.83, 1.72)	1.28 (0.73, 2.22)	1.37 (0.85, 2.21)	4.12 (0.74, 22.94)		
–Condom/ Other	1.44 (1.05, 1.98)*	1.38 (0.87, 2.19)	1.40 (0.88, 2.21)	0.83 (0.27, 2.57)		
4th quartile						
– Hormonal/IUD	1.03 (0.73, 1.46)	0.96 (0.54, 1.71)	1.05 (0.63, 1.75)	3.32 (0.49, 22.60)		
– No Method	1.03 (0.76, 1.38)	1.13 (0.74, 1.73)	1.16 (0.76, 1.77)	0.63 (0.18, 2.20)		
% Students Get Into Fights (MT)[j]						
1st quartile (ref)	1.00	1.00	1.00	1.00		
2nd quartile						
– Hormonal/IUD	1.18 (0.77, 1.80)	1.16 (0.65, 2.05)	1.24 (0.74, 2.06)	1.58 (0.39, 6.39)		
– No Method	1.24 (0.88, 1.75)	1.43 (0.86, 2.38)	1.46 (0.88, 2.42)	1.82 (0.65, 5.12)		
3rd quartile						
– Hormonal/IUD	0.97 (0.67, 1.40)	0.90 (0.54, 1.72)	1.07 (0.64, 1.77)	1.03 (0.23, 4.66)		
– No Method	1.31 (0.95, 1.79)	1.50 (0.99, 2.27)	1.60 (1.06, 2.43) **	1.44 (0.45, 4.62)		
4th quartile						
– Hormonal/IUD	1.05 (0.74, 1.49)	0.90 (0.50, 1.61)	1.00 (0.61, 1.65)	1.53 (0.33, 7.03)		
– No Method	1.08 (0.80, 1.45)	1.14 (0.73, 1.80)	1.21 (0.78, 1.87)	0.67 (0.19, 2.40)		

*p<0.05, **p<0.01, ***p<0.001

Table 4.5b – Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents (Reference: Condoms/Withdrawal/Other Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]	Model 5[e]	Model 6[f]
	OR (95% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
% Gang Activity at School (MT)[j]						
1st quartile (ref)	1.00	1.00	1.00	1.00		
2nd quartile						
– Hormonal/IUD	1.00 (0.68, 1.48)	1.00 (0.58, 1.73)	1.10 (0.68, 1.78)	1.15 (0.32, 4.14)		
– No Method	1.14 (0.77, 1.68)	1.04 (0.60, 1.83)	1.13 (0.67, 1.93)	1.25 (0.46, 3.39)		
3rd quartile						
– Hormonal/IUD	0.93 (0.65, 1.34)	0.88 (0.49, 1.57)	0.95 (0.57, 1.58)	1.12 (0.22, 5.81)		
– No Method	1.27 (0.87, 1.83)	1.26 (0.76, 2.09)	1.35 (0.84, 2.18)	2.18 (0.71, 6.69)		
4th quartile						
– Hormonal/IUD	0.98 (0.69, 1.39)	0.89 (0.51, 1.57)	0.99 (0.62, 1.60)	0.69 (0.09, 5.16)		
– No Method	1.12 (0.81, 1.56)	1.14 (0.71, 1.84)	1.23 (0.78, 1.92)	1.99 (0.63, 6.31)		
% Safe in Classes (SA)[g]						
1st quartile						
– Hormonal/IUD	1.06 (0.78, 1.45)	1.03 (0.62, 1.74)	1.08 (0.68, 1.73)	4.35 (0.56, 33.7)	4.72 (1.01, 22.1)**	4.42 (1.11, 17.59)**
– No Method	1.11 (0.85, 1.45)	1.00 (0.69, 1.46)	1.02 (0.69, 1.49)	3.37 (1.01, 11.2)**	2.74 (1.00, 7.47)	2.54 (0.99, 6.49)'
2nd quartile						
– Hormonal/IUD	0.71 (0.48, 1.06)	0.78 (0.44, 1.39)	0.84 (0.49, 1.44)	1.95 (0.34, 11.22)	2.79 (0.95, 8.19)	2.41 (0.95, 6.10)
– No Method	1.20 (0.89, 1.63)	1.19 (0.79, 1.78)	1.17 (0.75, 1.81)	1.78 (0.66, 4.80)	2.23 (0.96, 5.20)	1.95 (0.89, 4.26)
3rd quartile						
– Hormonal/IUD	1.04 (0.74, 1.45)	1.10 (0.68, 1.79)	1.10 (0.72, 1.67)	1.27 (0.36, 4.53)	2.65 (1.16, 6.05)**	2.54 (1.27, 5.10)***
– No Method	1.20 (0.88, 1.63)	1.07 (0.72, 1.60)	1.01 (0.68, 1.50)	1.03 (0.53, 2.00)	2.01 (1.03, 3.92)**	1.61 (0.85, 3.04)
4th quartile (ref)	1.00	1.00	1.00	1.00	1.00	1.00

*p<0.05, **p<0.01, ***p<0.001

Table 4.5b – Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents (Reference: Condoms/Withdrawal/Other Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]	Model 5[e]	Model 6[f]
	OR (95% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
% Safe in School Bld (SA)[g]						
1st quartile (ref)						
2nd quartile	0.90 (0.66, 1.22)	0.85 (0.51, 1.43)	0.89 (0.55, 1.45)	0.05 (0.01, 0.40)**	0.11 (0.02, 0.52)***	0.11 (0.03, 0.46)***
– Hormonal/IUD	0.96 (0.74, 1.25)	0.89 (0.59, 1.33)	0.91 (0.61, 1.36)	0.86 (0.17, 4.27)	0.49 (0.15, 1.65)	0.63 (0.22, 1.82)
– No Method						
3rd quartile	0.61 (0.43, 0.86)**	0.67 (0.41, 1.11)	0.73 (0.46, 1.14)	0.12 (0.03, 0.53)***	0.34 (0.13, 0.92)**	0.29 (0.11, 0.74)***
– Hormonal/IUD	1.10 (0.84, 1.45)	1.16 (0.78, 1.72)	1.18 (0.80, 1.75)	0.71 (0.20, 2.51)	0.58 (0.20, 1.66)	0.72 (0.29, 1.81)
– No Method						
4th quartile	0.84 (0.60, 1.19)	0.94 (0.55, 1.60)	0.95 (0.59, 1.53)	0.29 (0.07, 1.21)	0.62 (0.26, 1.46)	0.52 (0.25, 1.09)
– Hormonal/IUD	1.06 (0.80, 1.41)	0.99 (0.65, 1.49)	0.98 (0.65, 1.46)	0.78 (0.26, 2.30)	0.56 (0.22, 1.42)	0.68 (0.31, 1.45)
– No Method	1.00	1.00	1.00	1.00	1.00	1.00
% Safe on School Property (SA)[g]						
1st quartile						
– Hormonal/IUD	1.05 (0.75, 1.47)	1.01 (0.62, 1.65)	1.10 (0.71, 1.70)	7.73 (1.72, 34.79)***	1.97 (0.86, 4.55)	1.96 (0.83, 4.65)
– No Method	0.75 (0.57, 1.00)	0.69 (0.45, 1.04)	0.70 (0.47, 1.05)	0.28 (0.09, 0.83)**	0.44 (0.19, 1.03)	0.38 (0.19, 0.77)***
2nd quartile						
– Hormonal/IUD	0.67 (0.48, 0.94)*	0.65 (0.38, 1.08)	0.68 (0.41, 1.11)	1.74 (0.57, 5.27)	0.92 (0.44, 1.91)	1.00 (0.45, 2.20)
– No Method	0.93 (0.72, 1.20)	1.01 (0.69, 1.48)	1.00 (0.67, 1.49)	0.53 (0.20, 1.38)	0.68 (0.30, 1.53)	0.60 (0.31, 1.16)
3rd quartile						
– Hormonal/IUD	0.78 (0.55, 1.10)	0.78 (0.48, 1.28)	0.83 (0.54, 1.29)	2.48 (0.87, 7.03)	0.76 (0.37, 1.57)	0.87 (0.47, 1.63)
– No Method	0.92 (0.69, 1.22)	0.96 (0.65, 1.40)	0.96 (0.66, 1.40)	0.74 (0.29, 1.88)	0.78 (0.34, 1.79)	0.72 (0.36, 1.43)
4th quartile (ref)	1.00	1.00	1.00	1.00	1.00	1.00

*p<0.05, **p<0.01, ***p<0.001

Table 4.5b – Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents (Reference: Condoms/Withdrawal/Other Method), NYC Public High Schools, 2007-2011

SCHOOL-LEVEL EXPOSURES	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]	Model 5[e]	Model 6[f]
	OR (95% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)	OR (99% CI)
% Suspensions						
1st quartile (ref)	1.00	1.00	1.00	1.00	1.00	1.00
2nd quartile						
– Hormonal/IUD	0.53 (0.36, 0.79)**	0.53 (0.30, 0.93)**	0.54 (0.31, 0.94)	0.43 (0.18, 1.01)"	0.39 (0.21, 0.74)***	0.47 (0.27, 0.83)***
– No Method	1.02 (0.72, 1.43)	1.03 (0.58, 1.80)	1.11 (0.65, 1.89)	1.15 (0.65, 2.02)	1.04 (0.52, 2.07)	0.96 (0.56, 1.65)
3rd quartile						
– Hormonal/IUD	0.65 (0.43, 0.97)*	0.65 (0.34, 1.24)	0.67 (0.36, 1.25)	0.51 (0.22, 1.16)	0.62 (0.33, 1.15)	0.67 (0.38, 1.18)
– No Method	1.26 (0.89, 1.79)	1.13 (0.66, 1.94)	1.16 (0.68, 1.97)	1.31 (0.73, 2.36)	1.06 (0.53, 2.11)	0.99 (0.55, 1.78)
4th quartile						
– Hormonal/IUD	0.77 (0.51, 1.16)	0.65 (0.32, 1.31)	0.68 (0.34, 1.33)	0.33 (0.11, 0.99)**	0.72 (0.29, 1.75)	0.72 (0.34, 1.53)
– No Method	1.05 (0.75, 1.50)	1.08 (0.62, 1.89)	1.17 (0.69, 1.97)	0.89 (0.43, 1.85)	1.01 (0.45, 2.25)	0.91 (0.47, 1.77)
School Has Permanent Metal Detector						
% Yes						
– Hormonal/IUD	1.01 (0.72, 1.40)	0.83 (0.46, 1.47)	0.82 (0.45, 1.49)	1.23 (0.43, 3.50)		
– No Method	1.23 (0.99, 1.54)	1.21 (0.88, 1.66)	1.22 (0.88, 1.69)	0.85 (0.48, 1.48)		
% No (ref)	1.00	1.00	1.00	1.00		
SCHOOL-BASED HEALTH CENTER (SBHC)						
% Yes (ref)	1.00	1.00	1.00	1.00	1.00	1.00
% No						
– Hormonal/IUD	0.63 (0.49, 0.82)***	0.65 (0.42, 1.00)^	0.62 (0.40, 0.95) **	0.51 (0.26, 1.00)"	0.42 (0.24, 0.74)***	0.45 (0.26, 0.77)***
– No Method	0.85 (0.70, 1.04)	0.88 (0.66, 1.19)	0.85 (0.63, 1.14)	0.76 (0.47, 1.22)	0.80 (0.52, 1.25)	0.80 (0.53, 1.22)

*p<0.05, **p<0.01, ***p<0.001

Table 4.5b – Multinomial Logistic Regression Models Predicting School-Level Factors Associated with Contraceptive Use at Last Sex Among Sexually Active Adolescents (Reference: Condoms/Withdrawal/Other Method), NYC Public High Schools, 2007-2011

[a] Model 1: Unadjusted school-level exposures - independent effects of each school-level exposure on the outcome
[b] Model 2: Model 1 + age, gender, race/ethnicity
[c] Model 3: Model 2 + remaining individual-level covariates
[d] Model 4: All individual-level variables and school-level exposures together (Full Model)
[e] Model 5: Includes 12 school-level variables – Black, Hispanic, Poverty, Teachers Survey RR, Teacher > 2 years, Safe In classes, Safe in vey RR, Teacher > 2 years, Safe In classes, Safe in building, Safe on School Property, % Suspensions, 6 Year HS Graduation, Average Daily Attendance, Prosocial Parent
[f] Model 6: Includes 9 school-level variables –Black, Hispanic, Poverty, Teacher Survey RR, Teacher > 2 Years, Safe in Building, Safe on School Property, % Suspensions
[g] Student survey SA=strongly agree
[h] Parent survey SA=strongly agree
[i] Teacher survey SA=strongly agree
[j] Student survey MT=most of the time

Borderline p-values:
^ MODEL 1 – 6 yr HS Graduation – Q3hormonal: p=0.0524
^ MODEL 2 – SBHC – hormonal: p=0.0103
~ MODEL 3 – 6 yr HS Graduation – Q1nomethod: p=0.0105
“ MODEL 4 – Suspensions – Q2hormonal: p=0.0110
“ MODEL 4 – SBHC - hormonal: p=0.0103
“ MODEL 4 – Free lunch – Q4nomethod: p=0.0110
‘ MODEL 5 – Attendance – Q3hormonal: p=0.0105
‘ MODEL 6 – Safe Classes – Q1Nomethod: p=0.0108

Table 4.6 Adjusted Odds Ratios for Significant School-Level Interactions Stratified by Race/Ethnicity, 2007-2011, NYC

Hormonal Contraception vs. No Method

School-level exposure	Black (99%CI)	Hispanic (99%CI)	White (99%CI)
% Free School Lunch			
1st quartile (REF)	1.00	1.00	1.00
2nd quartile	1.56 (0.44, 5.51)	2.00 (0.84, 4.74)	0.22 (0.05, 1.00)
3rd quartile	0.47 (0.13, 1.68)	1.86 (0.80, 4.36)	3.21 (0.28, 36.63)
4th quartile	1.46 (0.48, 4.46)	1.24 (0.52, 2.95)	21.5 (0.09, 4967.0)
% safe in classes (SA)*			
1st quartile	0.86 (0.31, 2.42)	1.20 (0.58, 2.49)	0.64 (0.08, 5.31)
2nd quartile	0.43 (0.13, 1.40)	1.25 (0.66, 2.37)	0.20 (0.03, 1.40)
3rd quartile	0.78 (0.22, 2.79)	1.53 (0.83, 2.81)	0.61 (0.18, 2.10)
4th quartile (REF)	1.00	1.00	1.00
% safe on school property (SA)			
1st quartile	1.55 (0.54, 4.42)	1.37 (0.72, 2.60)	0.78 (0.11, 5.86)
2nd quartile	0.71 (0.25, 2.03)	0.74 (0.37, 1.50)	0.33 (0.07, 1.57)
3rd quartile	0.77 (0.22, 2.74)	0.88 (0.48, 1.61)	1.00 (0.20, 5.10)
4th quartile (REF)	1.00	1.00	1.00

Condoms vs. No Method

School-level exposure	Black (99%CI)	Hispanic (99%CI)	White (99%CI)
% Free School Lunch			
1st quartile (REF)	1.00	1.00	1.00
2nd quartile	0.92 (0.42, 2.01)	1.00 (0.57, 1.78)	0.61 (0.23, 1.64)
3rd quartile	0.56 (0.28, 1.13)	0.81 (0.45, 1.46)	1.04 (0.10, 10.28)
4th quartile	0.89 (0.44, 1.78)	0.72 (0.44, 1.21)	1.89 (0.03, 109.1)
% safe in classes (SA)			
1st quartile	1.23 (0.66, 2.31)	0.87 (0.54. 1.42)	0.27 (0.06, 1.21)
2nd quartile	0.83 (0.42, 1.64)	0.90 (0.53. 1.53)	0.92 (0.26, 3.17)
3rd quartile	0.94 (0.46, 1.90)	1.19 (0.71, 1.99)	0.53 (0.22, 1.24)
4th quartile	1.00	1.00	1.00
% safe on school property (SA)			
1st quartile	1.84 (0.92, 3.66)	1.40 (0.87, 2.26)	0.44 (0.09, 2.08)
2nd quartile	1.60 (0.85, 3.02)	0.74 (0.47, 1.15)	0.57 (0.20, 1.61)
3rd quartile	1.18 (0.58, 2.41)	1.05 (0.64, 1.73)	0.73 (0.25, 2.17)
4th quartile	1.00	1.00	1.00

**p<0.01, ***p<0.001 *SA=strongly agree

Table 4.6 Adjusted Odds Ratios[1] for Significant School-Level Interactions Stratified by Race/Ethnicity, 2007-2011, NYC

Hormonal Method vs. Condoms

School-level exposure	Black (99%CI)	Hispanic (99%CI)	White (99%CI)
% free school lunch			
1st quartile (REF)	1.00	1.00	1.00
2nd quartile	1.69 (0.64, 4.46)	1.99 (0.88, 4.51)	0.36 (0.11, 1.23)
3rd quartile	0.83 (0.31, 2.20)	2.30 (1.10, 4.80)**	3.09 (0.82, 11.71)
4th quartile	1.65 (0.70, 3.87)	1.72 (0.77, 3.81)	11.40 (0.83. 157.4)
% safe in classes (SA)			
1st quartile	0.70 (0.33, 1.47)	1.37 (0.73, 2.56)	2.39 (0.57, 10.00)
2nd quartile	0.52 (0.20, 1.34)	1.39 (0.72, 2.71)	0.22 (0.06, 0.84)**
3rd quartile	0.83 (0.32, 2.13)	1.29 (0.68, 2.42)	1.15 (0.49, 2.69)
4th quartile (REF)	1.00	1.00	1.00
% safe on school property (SA)			
1st quartile	0.84 (0.40, 1.79)	0.97 (0.54, 1.75)	1.79 (0.43, 7.41)
2nd quartile	0.45 (0.20, 0.98)**	1.00 (0.54, 1.87)	0.59 (0.21, 1.63)
3rd quartile	0.65 (0.25, 1.75)	0.83 (0.45, 1.54)	1.37 (0.47, 3.94)
4th quartile (REF)	1.00	1.00	1.00

**p<0.01, ***p<0.001 *SA=strongly agree

Figure 4.1 Significant Results in Binary (B) and Multinomial (M) Logistic Regressions with Fully Adjusted Models, 2007-2011, NYC

CONTRACEPTIVE METHOD USED AT LAST SEX	SIGNIFICANT RESULTS (SCHOOL-LEVEL CONSTRUCT)
Any Method vs. No Method (B)	↑ Lower % black non-Hispanic students (Demographics) ↑ Lower % Hispanic students (Demographics) ↑ Higher % students qualifying for free school lunch (Demographics) ↑ Lower % students feel safe on school property (Safety) --- ↓ Lower teacher survey response rate (Connectedness) ↓ Lower % teachers at school for < 2 years (Connectedness)
Hormonal Method vs. No Method (M)	↑ Lower % black non-Hispanic students (Demographics ↑ Lower % students feel safe on school property (Safety) --- ↓ Lower teacher survey response rate (Connectedness) ↓ Lower % students feel safe in the school building (Safety)
Condom vs. No Method (M)	↑ Lower % black non-Hispanic students (Demographics) ↑ Lower % Hispanic students (Demographics) ↑ Higher % students qualifying for free school lunch (Demographics) ↑ Lower % students feel safe on school property (Safety) --- ↓ Lower teacher survey response rate (Connectedness) ↓ Lower % teachers at school for < 2 years (Connectedness) ↓ Lower % students feel safe in the school building (Safety)
Hormonal Method vs. Condom (M)	↑ Lower % students feel safe in classes (Safety) ↑ Lower % students feel safe on school property (Safety) ↑ School-Based Health Center --- ↓ Higher % students qualifying for free school lunch (Demographics) ↓ Lower teacher survey response rate (Connectedness) ↓ Lower % students feel safe in the school building (Safety) ↓ Higher % suspensions (Safety)
No Method vs. Condoms	↑ Higher attendance rate (Connectedness)*

↑ = increased likelihood of using a contraceptive method vs. no method, or hormonal method vs. condom
↓ = decreased likelihood of using a contraceptive method vs. no method, or hormonal method vs. condom

* This significant association was only found when the reference group was 'condoms', and only in Model 6. This difference with the same comparison (condoms vs. no method) when the reference group was 'no method' is because Model 6 included different variables when 'condoms' were the reference group. With the exception of attendance, there were no other significant differences in findings based on which group ('condoms' or 'no method') was the reference group.

CHAPTER 5 – DISCUSSION

The results of this study provide support for the research hypotheses that school-level connectedness, safety and attending a school with a SBHC are positively associated with contraceptive use by sexually active teenagers in a large urban setting. Consistent with previous studies on school and neighborhood factors and sexual risk behaviors,(30-32, 34-41, 58-60) this study found that safety is a powerful environmental factor that influences whether or not a sexually active teen uses contraception. Several measures of school safety - students feeling safe in their classroom, the school building and on school property, and the school suspension rate - were positively associated with contraceptive use. While this finding cannot explain the mechanism by which school safety influences contraceptive use, it strongly suggests that how young people experience their school environment matters a great deal, and significantly impacts whether or not they engage in sexual risk behaviors that could result in pregnancy and/or sexually transmitted infections. It is of great concern that a significant percent of students do not feel safe in their school buildings or classrooms.

Previous studies have considered safety a component of connectedness.(38) I hypothesize that not feeling safe is interpreted by students as not being cared for or protected, and that the adults don't feel they are important or worthy of protection. This could then translate into a sense of low expectations from adults leading to lower motivation to achieve academically, and greater likelihood of engaging in risk behaviors such as unprotected sex.

While several measures of school connectedness were included in this study, the two that remained positively associated with contraceptive use are teacher longevity and teacher

response rate to an annual school survey. I hypothesize that both these measures are important because they reflect a more stable community of adults. This may also indicate that teachers in these schools are more engaged and invested in their school, and that this in turn changes students' experience of school. While these measures were included to operationalize connectedness, it is possible that they are measures of a well-organized school, and are not specific to connectedness per se. It is compelling that the only measures included in the analysis concerning teachers were both significant, which may speak to the strong influence of teachers in young people's lives. Further research, both quantitative and qualitative, will be needed to better understand these findings.

Two school-level measures of academics - six-year high school graduation and attendance rate - were significant in the unadjusted and partially adjusted models, and attendance rate was significant in the fully adjusted model when the reference group was 'condoms,' with students at high schools with a higher attendance rate more likely to use condoms than no method. Attending school is a fundamental way to participate in and demonstrate connectedness to school, and it is likely that low attendance reflects low student engagement in school and greater opportunity for students to engage in high-risk behaviors. Students who frequently miss school do not benefit from the potential protective benefits of school; this can be a vicious cycle as students are in essence voting with their feet by not attending school if it is not experienced as a protective, engaging place to be. I postulate that a school with low attendance rates has been unsuccessful in creating an environment where it is normative to engage in prosocial, supportive relationships and activities. The fact that high school graduation did not remain a significant factor associated with contraceptive use in fully

adjusted models suggests that while it is an important factor associated with contraceptive use, after adjusting for other school-level factors in the study, its role became less important.

The variable Quality Review Score was not significant in any analyses. This suggests that this variable is either not a good measure of school academic quality, and/or that school academic quality is not a good predictor of contraceptive use. I believe that the more likely explanation is that this was not a good measure of school-level academic factors that influence whether or not a student engages in health risk behaviors. I hypothesize that many school-level factors are interrelated and must co-exist in order for a school to maintain a health promoting environment. Thus, for a school to protect students from health risk behaviors it must be of high academic quality, in conjunction with an environment where students feel connected to and safe at the school. As with several of the measures used to operationalize these constructs, I worked with what data were available, and identified variables in existing datasets that seemed to measure constructs that were significant in previous studies.

Students attending schools where a higher percent of students strongly agreed they felt welcome and parents strongly agreed that their child's school had prosocial activities, were more likely to use hormonal contraception than no method in unadjusted multivariable models. This finding suggests that these variables are getting at measures of school connectedness but that they are not the best measures of this construct. The lack of any association between enrollment and contraceptive use in any analysis is interesting given empirical findings on the positive association between small schools and favorable academic outcomes.(92-94) This finding suggests that school size has less of an effect on health risk behaviors than on academic outcomes. The variables measuring connectedness/prosocial activities that were not significant

in most of the unadjusted and all of the full adjusted models included all the survey questions for students, teachers and parents, plus school enrollment.

While several of the school-level measures of connectedness, safety and academics were either not significant at all or only significant in partially adjusted models, there appears to be some, albeit inconsistent, effect of these constructs on contraceptive use. It is possible that the specified models were not the best models to examine the association between these constructs and contraceptive use by sexually active teens. Further research that includes variables with significant associations that were used in previous studies may better approximate the relationship between these constructs and contraceptive use.

The significant findings related to school racial/ethnic composition are consistent with previous empirical findings on the association between neighborhood racial composition and sexual risk behavior.(30, 31) I hypothesize that an inequitable distribution of family and school resources makes school racial composition more a measure of inequity and limited opportunity that in turn influences individual behaviors.

The finding that students in schools with a higher percent of poor students (less than 100% of the federal poverty level) are more likely to use condoms than any method or a hormonal method amplifies the complex dynamic relationship between race/ethnicity and poverty. This relationship is difficult to tease out, particularly since these findings are from a cross-sectional study. Increased condom use is likely due at least in part to the widespread access to condoms in NYC schools, and HIV education efforts including a long-standing mandated HIV/AIDS education program that have made condom use more normative. In addition, SBHCs are purposely located in schools serving the poorest students with the least

access to services, and while this study did not find a positive association between attending a school with a SBHC and an increased likelihood of using hormonal contraceptive when compared to no method, access to hormonal contraception in schools is relatively new and uptake is still relatively low. In addition, SBHCs are competing with family and community norms that influence sexual behavior, including limited exposure to positive role models and support for delaying sexual activity and pregnancy.

The fact that a positive relationship was not found between SBHCs and overall contraceptive use is not surprising due to the limitations of the dataset used in this study. With a relatively small number of participants in the YRBS sample who were sexually active and used hormonal contraception, it was not possible to analyze each survey year separately. The hypothesized effect on contraceptive use resulting from previously described improvements in delivery of contraceptive services at NYC high school SBHCs from 2008-2011 could thus not be examined. In addition, the dataset included a representative sample of students in schools with and without SBHCs, and combined all sexually active students whether or not they used the SBHC. This set a high bar for a SBHC effect, measuring whether there was a school-wide effect of merely having a SBHC on contraceptive use, whether or not a student actually used the SBHC for reproductive or any health care services. While it makes sense theoretically that a positive association could have been identified, the study design and sample size made it difficult to detect an association if one did exist. Nevertheless, the fact that there was a positive association with hormonal contraception compared to condoms suggests that SBHCs do indeed have an effect on student's sexual behavior. This finding also raises the concern of whether there may be a substitution effect when SBHCs provide onsite hormonal contraception and

IUDs, in that students may "switch" to these methods and discontinue use of condoms, reducing their risk of pregnancy while simultaneously increasing their risk of sexually transmitted infections. While this is certainly not the intent, and SBHC procedures, staff training, and student educational materials and counseling are designed to emphasize the importance of dual protection (hormonal or IUD contraception and condoms), this could be an unintended consequence of providing onsite contraception. This finding can be used to support continued and expanded resources for SBHCs as well as a stronger focus on dual protection to prevent pregnancy and sexually transmitted infections.

The demographic variable "percent female" was not significant in binary or multivariate logistic regression analyses of unadjusted and adjusted models. This may be because there was very little variability among schools, with 50% of schools in the sample having 44-58% females (see Appendix 1). This differs from individual-level findings in the bivariate analysis, with gender significantly associated with contraceptive use among teens who ever had sex and who were sexually active. In the bivariate analysis, a greater proportion of females used a hormonal method, while a greater proportion of males used condoms the last time they had sex.

Variation in Study Findings by Race/Ethnicity

This study hypothesized that the association between school-level factors and contraceptive use would vary by race/ethnicity. Interactions between race/ethnicity and school-level factors were tested with the 12 school-level variables that were either significant in the fully adjusted models or in two previous models. There were no significant interactions in binary logistic regression models. There were significant interactions with just three of the school-level variables in multinomial logistic regression models: *percent of students qualifying*

for free school lunch, *percent of students who strongly agreed that they were safe in their classes*, and *percent of students who strongly agreed that they were safe on school property*. When these variables were stratified by race, there were only significant associations when the reference group was condoms. In contrast to comparing students who used either condoms or hormonal contraception with students who did not use any method, comparing students who used some method of protection at last sex is likely comparing students who are more similar to each other, making differences by race/ethnicity less meaningful.

The study hypothesis on the variation of results by race/ethnicity is only partially supported by these findings. With only three significant interactions, and significant associations when models were stratified by race/ethnicity only when comparing students using hormonal contraception to students using condoms (e.g. excluding students who did not use any method), the differences by race/ethnicity are minimal. Based on these findings, the emphasis of the discussion and recommendations are for all students attending public high schools in NYC.

Implications of Findings – The Key Role of Environmental Change in Schools in Increasing Contraceptive Use by Sexually Active Teens

This study provides further support to previous research findings that school-level factors, in particular school connectedness, safety, academics, and an onsite SBHC, have a powerful effect on student's behaviors. While the analysis focused on one specific outcome, contraceptive use by sexually active teens, it is likely that there is a school-level effect on other health-promoting and health-risk behaviors. Children and most adolescents get a strong "dose" of the "school exposure" – at least 5 hours a day, 5 days a week, 180 days a year for 12-13

years. For students with serious medical conditions or who drop out of school at some point in high school this exposure is less, but school inarguably provides a powerful long-term opportunity to influence and protect children and help assure they have a healthy and academically fruitful life. Essentially, with the exception of time spent at home, there is no other place where such an intense and long-term exposure exists for children and adolescents.

The findings of this study suggest that a focus on the school environment is a promising approach to improve health outcomes.(114) Much of the research and focus in this area has been at the neighborhood level. There has been little effort to make structural changes to support healthy sexual decision making at the school-level, despite proven strategies and programs that not only improve sexual health but also academic outcomes including high school graduation. Unfortunately, school-level interventions at the local, state and national levels have for the most part had a very narrow focus on academic achievement through high stakes testing and punitive disciplinary measures.(136)

There are policy changes at the school level that would help assure that all teens at schools where these changes are made are exposed to factors found in this dissertation research to be associated with increased contraceptive use. Most obvious and basic is assuring a physical school environment where students feel safe in classes, hallways and on school property. This could include elimination of metal detectors that students at some schools have to go through when entering their school, and standardization of requirements for school space so that all schools are welcoming and cheerful. The study findings on the positive association between attending a safe school building and contraceptive use suggest that a school

environment that provides students with a sense of safety may be a critical factor in efforts to increase contraceptive use.

There are empirical findings that suggest that the condition and appearance of neighborhood structures influence behaviors ("Broken Windows Theory"), and a run-down neighborhood can imply that no one cares and that certain rules do not apply, encouraging behaviors that are deleterious to health.(112) While many public high schools are in old buildings and in need of basic repairs, when physical appearance is prioritized a school building can create a warm and supportive environment that conveys the message that adults care about the young people in the school and expect certain behaviors. Knowing that students' perception of school safety can influence behavior is important and can help drive policies and other efforts to make improvements, perhaps with involvement of young people, to create a more welcoming, safer physical environment.

What are the social environments that can help teens feel more connected to their school, exposing sexually active teens to school-level factors that increase their use of contraception? School connectedness is perhaps the most powerful manifestation of a health promoting social structure for youth, given the empirical evidence on its impact on health and educational outcomes, and the findings of my dissertation research on the association between teacher longevity and teacher survey response rate and contraceptive use. To establish a school environment where students feel a strong sense of connectedness and belonging, there must be not only a recognition that school connectedness is important, but it must become a core role for the schools that is embedded in the school culture or ethos, and measured as a criterion of successful schools. Study findings on the positive association between teacher

stability and engagement and contraceptive use highlight the importance of this component of the school environment in supporting healthy behaviors. These findings further suggest that teachers can have a substantial role in influencing young people's behavior.

Another key component of school connectedness is the existence of prosocial activities. A measure of prosocial activity in this study - parents strongly agreeing that there are prosocial activities at their child's school - was positively associated with hormonal contraceptive use in the unadjusted model, and was of borderline significance in a fully adjusted model. Schools can implement policies that require incorporation of prosocial activities as a component of the school curriculum, and offer prosocial activities after school when parents and other caregivers may be at work and young people without anything to do will likely be unsupervised at home.(137)

While this study did not explicitly measure norms, the measures on safety, connectedness and SBHC may in fact be mediating social norms by exposing students to a warm, comfortable, safe environment, making health care seeking normative by the presence of a SBHC, and providing an engaged stable community of teachers. As such, norm changing is a key component of the work to promote positive sexual and reproductive health outcomes for teenagers. Young people are bombarded with mixed and confusing messages on sexuality. These include degrading and shaming messages that exaggerate the effect of teen pregnancy, excessive advertising that uses sex to sell products and continued gender inequality with females still believing they need to hide and/or be ashamed of their sexual feelings, to name a few. In addition, exposure to intimate partner violence and forced sex, which affects 17% of sexually active teens in public high schools, contributes to the problem. We need to engage

teen-friendly social media and other creative approaches to disseminate the message that thinking and talking about sexuality is a healthy and normal thing to do, that delaying initiation of sex is the surest way to prevent pregnancy and sexually transmitted infections (STIs), and that if one is having sex, hormonal or IUD contraception and condoms are most effective at preventing pregnancy and STIs, respectively.

Other strategies to create a school environment that makes it normative for sexually active teens to use contraception include easy availability of contraception and sex education. Schools are an excellent place to make hormonal contraceptives and condoms available through SBHCs and other school-based clinical and educational programs. Onsite provision of these services assures easy access and conveys a message that it is normative to use contraception if you are having sex.[12] In NYC, condoms are not only available at SBHCs, but also at Health Resource Rooms that are in place in every public high school. While there has been substantial improvement in public high school condom availability programs over the past decade (over 95% meet NYS requirements), many are only open for limited hours, are not well publicized, and do not connect students to more comprehensive services. New York City schools have a long way to go to assure "ubiquitous condom availability," an example given by Frieden of a structural change that could help "make the healthy decision the easy decision."(138) There has been evidence for some years that schools that truly remove barriers to condom availability, including making them available in baskets that do not require asking for

[12] Findings from numerous studies have made it clear, despite many unsubstantiated arguments to the contrary, that making contraception easily available, and without requiring parental consent, does not encourage teens to have sex24. Kirby D. Emerging Answers 2007: Research Findings on Programs to Reduce Teen Pregnancy and Sexually Transmitted Diseases. Washington DC: National Campaign to Prevent Teen and Unplanned Pregnancy; 2007.

them from an adult, and providing condom demonstrations in the classroom as part of comprehensive sex education sessions, significantly increase the number of condoms distributed per student.(139, 140) The finding from this study on the positive association between SBHCs and hormonal contraceptive use compared to condom use supports this concept by suggesting that having hormonal contraception at schools increases the likelihood that it will be used.

As described earlier, there are curriculum-based sex education and youth development programs that have been implemented in schools and demonstrated increased contraceptive use and increases in other health promoting behaviors. While even the best of these programs had fairly modest effects on sexual risk behaviors, it is plausible that the effects were not larger in part because they were not embedded in the school structure so that every student was exposed to these programs starting in sixth grade, in the same way that every student is exposed to a math or English class every year from 6^{th} - 12^{th} grade. While some resources are required for teacher training and classroom materials, these programs could be conducted by classroom teachers as part of a school-wide curriculum. This could be an effective way for evidence-based programs to make it normative to discuss sex as part of a broader discussion about health and development, and promote contraceptive use for teens who are having sex.

In 2011, a question was added to the NYC YRBS on receipt of birth control instruction in the classroom. While almost two-thirds (65.5%) of all students received this instruction, among students who ever had sex, only about one-half (51.5%) had received this instruction in 9^{th} grade.(11) There is certainly room for improvement here, given that research suggests that evidence-based sex education, including instruction on contraception, is most effective in

delaying initiation of sex and increasing contraceptive use if it is received *before* teens become sexually active.(24, 141, 142)

What If?

What if every middle and high school student attended a school with a School-Based Health Center, or had other school-based reproductive health services or a strong linkage to a community health center with all contraceptive methods available on site? What if every student had at least one adult at the school who looked out for and encouraged them and believed that they could succeed? What if schools had a stable body of engaged, committed teachers, and the majority of them were at the school for more than two years? What if the school physical environment was clean and cheerful, and both projected and assured safety, order and caring? What if schools were places where students always felt safe?

I posit that my research results make the case that if we assure that every school provides a health-promoting environment where students feel safe and connected to their teachers and where one or more adults believe in them and have hope for their future, a greater proportion of sexually-active students will use contraception and avoid unintended pregnancy.

A particular contribution of this research is to identify factors at the school level that are amenable to change and could have a population impact on contraceptive use by young people in school. While individual and clinical interventions are important parts of a strategy to increase contraceptive use and reduce unintended pregnancy, it is well known that environmental changes have the potential for a far greater impact on an entire population, in this case teens in schools.(111, 114, 138)

Strengths and Limitations

Strengths – This is the first known study that linked a school-level dataset to a YRBS dataset, allowing new analyses of school-level factors on individual behaviors that have not been possible before and creating a new dataset that can be used for other studies. The multi-level analytic approach made the study findings more robust by taking into account the contextual (i.e. school) factors that potentially have an impact on teen sexual behavior and contraceptive use. The sample was large, which provided statistical conclusion validity and allowed for sub-group analyses. The sample was racially and ethnically diverse, and was a representative sample of a large urban public high school population. The individual-level data source, the NYC YRBS, has been shown to have good validity and reliability.(115-118)

The study hypotheses are grounded in established theoretical frameworks that have been previously used to examine teen sexual behaviors.(25, 143) The cross-sectional design of this study meant that the threats to internal validity typically associated with longitudinal study designs (such as maturation, testing conditioning, instrumentation and differential program dropout) did not exist.

A particular strength of this study is that the findings can directly inform high school policy in New York City. It provides compelling new evidence on the possible direct effect of school-level factors on contraceptive use by sexually active teens, with specific recommendations from these findings that build on previous empirical evidence.

Limitations - There are several limitations to this study. The cross-sectional survey design means it is not possible to make strong causal claims. In addition, not all the YRBS questions

were asked in every year included in the merged dataset. This required exclusion of individual-level measures of connectedness, sex education and health care seeking that may have influenced findings, possibly resulting in an underestimation of school-level effects.

Missing data from all of the YRBS sexual behavior questions, including the outcome variable contraceptive use at last sex, ranged from 10-20%. This reduced the overall sample size and contributed to the unstable estimates in the multinomial regression analyses. This could have led to an under- or over-estimation of individual-level sexual behaviors and school-level effects on contraceptive use. For example, it is possible that male and female students did not respond to these questions due to the private nature of sexual behavior and particular discomfort answering these questions. It is also possible that traditional gender norms regarding sexual behavior led female students to underestimate and male students to overestimate sexual activity. Further analysis comparing the students who completed the sexual behavior questions to students who did not complete these questions could further understanding of the effect of the missing responses.

Since the YRBS is administered in a classroom setting, it does not include out-of-school or absent youth. One study found students that were absent on the day of survey administration were more likely to engage in health risk behaviors.(51) It is possible that the YRBS results underestimated sexual behavior and other individual-level factors included in this dissertation analysis.

While there are strong empirical findings on the association of contextual factors with teenagers' sexual behaviors including contraceptive use, the school-level variables included in this analysis have not been tested for how validly they measure the associated constructs. For

example, the only variable identified to measure prosocial activities was in the parent survey. There were no relevant variables in the student survey, and no administrative measures identified that described the extent of prosocial activities at a school. This may have led to an underestimation of the effect of school-level connectedness on contraceptive use.

There were many school-level variables (25) included in this study. This resulted from a thorough search for relevant variables from a wide range of data sources that required some degree of "trial and error" since the study involved secondary data analysis with variables that had not been previously used in multilevel models. Thus, the multiple comparisons necessitated use of a more stringent 99% confidence interval in all adjusted regression analyses, and possibly caused an underestimation of the hypothesized relationships. Despite this limitation, my research identified several measures of the key constructs that were associated with sexual risk behavior. This was accomplished through a comprehensive search of available data sources, making use of what data was already available.

Further Research

This study is an excellent starting point for using a linked dataset to examine school-level factors associated with contraceptive use. Future research could confirm, strengthen and expand on these findings through primary data collection and analyses that use already existing measures that have been tested for validity and reliability, and/or develop and test new measures of school connectedness/prosocial activities, school safety/ambient hazards, and academics. There are several areas where further research would add to our understanding of

the role of school-level factors on sexual behaviors and potential school-wide policy changes and other interventions that could reduce sexual risk behaviors.

A multilevel and mixed methods study using primary data collection of school-level variables operationalizing school connectedness, safety and academics would help assure a best fit model to examine the association between these school-level constructs and contraceptive use by sexually active teens. This research would involve the development of a student survey which, to the degree possible, uses questions that have already been validated in other similar populations. Quantitative school-level data from administrative datasets could still be used to control for demographic factors including race/ethnicity, gender and poverty. In addition, a possible rich source of quantitative information would be data on particular school environments that may increase student safety and/or connectedness, with identification and grouping of specific characteristics such as the degree to which a school provides prosocial activities, comprehensive sex education and other programs that could increase school safety and connectedness. One new data source which will be available at the NYC Health Department in the next year and could be included in a quantitative analysis is a dataset that links birth data with student data and will make it possible to determine school-level birth rates, a factor that may influence school norms on sexual behavior.

As discussed previously, while it is noteworthy that the two school-level measures for teachers in my dissertation research were both significantly associated with contraceptive use in the fully adjusted models, it is not certain what this means or what the variables included in the analysis are measuring. It would be helpful to conduct research that includes interviews with students, teachers, and school administrators on the meaning of these findings and what

other measures of the role of teachers or other school faculty would be important to include to better understand this construct and its association with contraceptive use.

Another step could be to conduct further research with the linked dataset created for this dissertation study, using a more parsimonious model that includes only variables significant in the fully adjusted models. With such a model, the risk of finding a significant result due to chance would be minimized, and the standard 95% confidence interval could be used.

With the known clustering of risk behaviors among teens, teens who are sexually active and not using contraception are also more likely to engage in other sexual risk behaviors, use alcohol or other substances, and be exposed to substantial health risks such as forced sex. Research examining the association between school-level factors and other risk behaviors and outcomes could provide further evidence to support the findings in this study and strengthen the case for the importance of changing the school environment to protect the health and well-being of young people.

Many teens have already had sex when they begin high school. In this dissertation study almost four in every ten high school students (37.7%) reported having sex before age 14. Despite this fact, there continues to be strong resistance to providing reproductive health services, including contraception, in middle schools, and to even discussing contraception with this age group. Research on sex education demonstrates that it is more effective at both delaying initiation of sex and increasing contraceptive use among sexually active teens if provided in middle school before teens become sexually active.(24) Further research is needed to understand the role of school-level factors on sexual risk behaviors among middle school

students. This will help inform school-level policy and program recommendations for middle schools.

A longitudinal study on the association between school-level factors and contraceptive use could examine potential causal links between school-level factors and contraceptive use, as well as being able to quantify the effect of each significant association. This would provide greater confidence in the results from this study and help prioritize and provide a stronger rationale for policy recommendations. In addition, research on the impact of implementing school-level policy changes on contraceptive use by sexually active teens would test the hypothesis that policy changes designed to increase school connectedness and safety will result in an increase in contraceptive use.

Finally, an important area of research is to add to the fairly limited empirical findings on the association between health and academic outcomes. This research could examine the association between school-level factors and both contraceptive use and high school graduation. Research findings could help make the case that changes in the school environment will impact both health and academic outcomes, and assist advocacy efforts to prioritize changes in the school environment.

CHAPTER 6 – CONCLUSION

This study asked the following questions:

- What is the effect of school-level factors on contraceptive use among sexually active adolescents in NYC public high schools, before and after controlling for individual-level factors?
- Does the association between school-level factors and contraceptive use vary by race/ethnicity?
- What are the policy implications of research findings on the effect of school-level factors on contraceptive use among sexually active adolescents in public high schools?

The study hypotheses were that school-level constructs that operationalized factors in the school environment – lower poverty rates, connectedness/prosocial activities, safety, a positive academic environment and having a SBHC – would be associated with higher rates of contraceptive use among sexually active adolescents, before and after controlling for individual level factors, and that these associations would vary with race/ethnicity.

When compared to students who had never had sex, a higher and concerning percent of sexually active students engaged in sexual risk behaviors and reported violence, depression, and/or not feeling safe at school. A high proportion of sexually active students attended schools with low graduation and attendance rates, and inexperienced teachers. A small proportion of these students used effective (hormonal or IUD) contraception,

Key findings from multivariable regression analyses included the following:

- When comparing use of any contraceptive method to no method, attending schools with lower teacher engagement (as measured by the percent of teachers completing the annual teacher survey) was associated with decreased contraceptive use.
- When comparing hormonal contraceptive use to no method, attending schools where fewer students felt safe in the school building was associated with decreased contraceptive use.
- When comparing condom use to no method, attending schools with lower percent non-Hispanic black or Hispanic students was associated with increased condom use.
- When comparing hormonal contraceptive use to condom use, students in schools with a School-Based Health Center were more likely to use hormonal contraception than condoms.

The study hypothesis that results would vary by race/ethnicity was only partially supported by the findings. Out of 12 interactions, only three were significant and the meaning of this could not be determined by this study.

The findings from this dissertation research give further evidence of the strong effect the school environment can have on contraceptive use by sexually active adolescents. This research makes an important contribution to our understanding of the factors associated with contraceptive use among adolescents, and in particular school-level factors that may influence this behavior. There is a large body of literature on studies, summarized by Kirby, which have examined and found significant associations between individual level factors and sexual behaviors including contraceptive use among sexually active teens.(24) While many studies

have found neighborhood and school-level associations with sexual behavior in adolescents, most have examined associations with the outcome of initiation of sex to estimate associations between contextual factors and sexual risk behaviors, and very few have estimated associations with contraceptive use as the outcome. Before this study, there were no known studies that had conducted multivariable analysis examining school-level associations by whether or not any contraceptive method was used and with distinctions by method type. In addition, there are no known studies that examined these questions in a linked dataset with a representative sample of public high school students.

There are individual and contextual factors that influence whether or not adolescents are sexually active and, if they are sexually active, whether or not they use contraception. My research findings suggest that assuring a safe, supportive school environment is an important strategy to increase contraceptive use and reduce unintended pregnancy in adolescents. Advocating for policies that change the school environment and supporting research that strengthens the case for prioritizing these policies should be a focus of future efforts to increase contraceptive use by sexually active adolescents.

Risk behaviors by teens do not occur in a vacuum. I hypothesized that teens who are in a supportive school environment – where they feel safe, academically motivated and supported, connected to one or more adults, and have access to sexual and reproductive health services – are more likely to use contraception. My study findings support this hypothesis and my recommendations for policy change and further research help chart a path forward.

APPENDIX I - School-level Variables Cut Points by Year*

2007

Race Black

Quartile 1: If 0<=Race_Black__<0.157901

Quartile 2: If 0.15790<=Race_Black__<0.30459

Quartile 3: If 0.30459<=Race_Black__<0.42895

Quartile 4: If Race_Black__>=0.42895

Race Hispanic

Quartile 1: If 0<=Race_Hisp__<0.21474

Quartile 2: If 0.21474<=Race_Hisp__<0.46846

Quartile 3: If 0.46846<=Race_Hisp__<0.61403

Quartile 4: If Race_Hisp__>=0.61403 T

Race White

Quartile 1: If 0<=Race_White__<0.00795

Quartile 2: If 0.00795<=Race_White__<0.02445

Quartile 3: If 0.02445<=Race_White__<0.15287

Quartile 4: If Race_White__>=0.15297

Race Asian

Quartile 1: If 0<=Race_ASIAN__<0.011115

Quartile 2: If 0.011115<=Race_Asian__<0.035082

Quartile 3: If 0.035082<=Race_Asian__<0.18529

Quartile 4: If Race_Asian__>=0.18529

Race other

Quartile 1: If 0<=Race_other__<0.003134

Quartile 2: If 0.003134<=Race_other__<0.00647

Quartile 3: If 0.00647<=Race_other__<0.013714

Quartile 4: If Race_other__>=0.013714

Percent Female

Quartile 1: If 0<=Fem__<0.47316

Quartile 2: If 0.47316<=Fem__<0.50510

Quartile 3: If 0.50510<=Fem__<0.54579

Quartile 4: If Fem__>=0.54579

Household income ≤100% Federal Poverty Level (FPL)_Percent

Quartile 1: If 0.0123043<= MC_Free_HRA__ <0.14520

Quartile 2: If 0.14520<= MC_Free_HRA__<0.25372

Quartile 3: If 0.25372<= MC_Free_HRA__<0.36749

Quartile 4: If MC_Free_HRA__>=0.36749

Household ≤130% FPL Percent

Quartile 1: If 0<= MC_Free_Non_HRA__ <0.11825

Quartile 2: If 0.11825<= MC_Free_Non_HRA__<0.28360

Quartile 3: If 0.28360<= MC_Free_Non_HRA__<0.38433

Quartile 4: If MC_Free_Non_HRA__>=0.38433

Household income >131-185% FPL Percent

Quartile 1: If 0<= If MC_Redu_ced_N>=161.5 __ <0.015977

Quartile 2: If 0.015977<= MC_Redu_ced__<0.065896

Quartile 3: If 0.065896<= MC_Redu_ced__<0.10238

Quartile 4: If MC_Redu_ced__>=0.10238

Household income > 185% FPL Percent

Quartile 1: If 0<= MC_Full__ <0.018055

Quartile 2: If 0.018055<= MC_Full__<0.12327

Quartile 3: If 0.12327<= MC_Full__<0.22669

Quartile 4: If MC_Full__>=0.22669

4-year graduation

Quartile 1: If 0<= yr_Diploma_Rate_4Y<0.503

Quartile 2: If 0.503<=yr_Diploma_Rate_4Y<0.6185

Quartile 3: If 0.6185<=yr_Diploma_Rate_4Y<0.735

Quartile 4: If yr_Diploma_Rate_4Y>=0.735

6-year graduation

Quartile 1: If 0<= yr_Diploma_Rate_6Y<0.66

Quartile 2: If 0.66<=yr_Diploma_Rate_6Y<0.7725

Quartile 3: If 0.7725<=yr_Diploma_Rate_6Y<0.875

Quartile 4: If yr_Diploma_Rate_6Y>=0.875

Connected to school (strongly agree)

Quartile 1: If 8<=s_q2a_1<13

Quartile 2: If 13<=s_q2a_1<17

Quartile 3: If 17<=s_q2a_1<28

Quartile 4: If s_q2a_1>=28

Connected to school (agree)

Quartile 1: If 33<=s_q2a_2<59

Quartile 2: If 59<=s_q2a_2<63

Quartile 3: If 63<=s_q2a_2<67

Quartile 4: If s_q2a_2>=67

Connected to school (disagree)

Quartile 1: If 0<= s_q2a_3 <7

Quartile 2: If 7<= s_q2a_3<12

Quartile 3: If 12<= s_q2a_3<18

Quartile 4: If s_q2a_3 >=18

Adults at school look out for me (strongly agree)

Quartile 1: If 4<=s_q2c_1<9

Quartile 2: If 9<=s_q2c_1<12

Quartile 3: If 12<=s_q2c_1<18

Quartile 4: If s_q2c_1>=18

Adults at school look out for me (agree)

Quartile 1: If 39<=s_q2c_2<47

Quartile 2: If 47<=s_q2c_2<54

Quartile 3: If 54<=s_q2c_2<58

Quartile 4: If s_q2c_2>=58

Adults at school look out for me (disagree)

Quartile 1: If 7<= s_q2c_3 <19

Quartile 2: If 19<= s_q2c_3<25

Quartile 3: If 25<= s_q2c_3<31

Quartile 4: If s_q2c_3 >=31

Prosocial activities (strongly agree)

Quartile 1: If 8<=p_q10_1<18

Quartile 2: If 18<=p_q10_1<22

Quartile 3: If 22<=p_q10_1<29

Quartile 4: If p_q10_1>=29

Prosocial activities (agree)

Quartile 1: If 16<=p_q10_2<40

Quartile 2: If 40<=p_q10_2<46

Quartile 3: If 46<=p_q10_2<50

Quartile 4: If p_q10_2>=50

Prosocial activities (disagree)

Quartile 1: If 3<= p_q10_3 <12

Quartile 2: If 12<= p_q10_3<15

Quartile 3: If 15<= p_q10_3<20

Quartile 4: If p_q10_3 >=20

Student survey response rate

Quartile 1: If 12<=rr_s<49

Quartile 2: If 49<=rr_s<63

Quartile 3: If 63<=rr_s<76

Quartile 4: If rr_s>=76

Teacher survey response rate

Quartile 1: If 0<=rr_t<0.29630

Quartile 2: If 0.29630<=rr_t<0.38462

Quartile 3: If 0.38462<=rr_t<0.51

Quartile 4: If rr_t>=0.51

Parent survey response rate

Quartile 1: If 0<=rr_p<0.12245

Quartile 2: If 0.12245<=rr_p<0.15193

Quartile 3: If 0.15193<=rr_p<0.19433

Quartile 4: If rr_p>=0.19433

Average daily attendance

Quartile 1: If 0.651<= Attendance_Rate__PR_<0.814

Quartile 2: If 0.814<=Attendance_Rate__PR_<0.849

Quartile 3: If 0.849<=Attendance_Rate__PR_<0.89

Quartile 4: If Attendance_Rate__PR_>=0.89

Enrollment

Quartile 1: If 102<= Total_Enrollment <365

Quartile 2: If 365<= Total_Enrollment<962.5

Quartile 3: If 962.5<=Total_Enrollment<2478

Quartile 4: If Total_Enrollment>=2478

Teacher > 2 years at school

Quartile 1: If 0<=TEACHERQUAL5<52.8

Quartile 2: If 52.8<=TEACHERQUAL2<69.3

Quartile 3: If 69.3<=TEACHERQUAL2<77.8

Quartile 4: If TEACHERQUAL2>=77.8

Teacher >5 years at school

Quartile 1: If 6.3<=TEACHERQUAL5<42.1

Quartile 2: If 42.1<=TEACHERQUAL5<56.1

Quartile 3: If 56.1<=TEACHERQUAL5<66.7

Quartile 4: If TEACHERQUAL5>=66.7

Stay home as don't feel safe (never)

Quartile 1: If 76<=s_q13b_1<83

Quartile 2: If 83<=s_q13b_1<87

Quartile 3: If 87<=s_q13b_1<92

Quartile 4: If s_q13b_1>=92

Stay home as don't feel safe (some of the time)

Quartile 1: If 0<=s_q13b_2<5

Quartile 2: If 5<=s_q13b_2<9

Quartile 3: If 9<=s_q13b_2<12

Quartile 4: If s_q13b_2>=12

Stay home as don't feel safe (most of the time)

Quartile 1: If 0<=s_q13b_3<1

Quartile 2: If 1<=s_q13b_3<2

Quartile 3: If 2<=s_q13b_3<3

Quartile 4: If s_q13b_3>=3

Stay home as don't feel safe (all of the time)

Quartile 1: If 0<=s_q13b_4<1

Quartile 2: If 1<=s_q13b_4<2

Quartile 3: If 2<=s_q13b_4<3

Quartile 4: If s_q13b_4>=3

Students threaten other students (never)

Quartile 1: If 13<=s_q13c_1<19

Quartile 2: If 19<=s_q13c_1<25

Quartile 3: If 25<=s_q13c_1<37

Quartile 4: If s_q13c_1>=37

Students threaten other students (some of the time)

Quartile 1: If 18<=s_q13c_2<44

Quartile 2: If 44<=s_q13c_2<47

Quartile 3: If 47<=s_q13c_2<51

Quartile 4: If s_q13c_2>=51

Students threaten other students (most of the time)

Quartile 1: If 1<=s_q13c_3<8

Quartile 2: If 8<=s_q13c<13

Quartile 3: If 13<=s_q13c_3<18

Quartile 4: If s_q13c_3>=18

Students threaten other students (all of the time)

Quartile 1: If 0<=s_q13c_4<5

Quartile 2: If 5<=s_q13c_4<10

Quartile 3: If 10<=s_q13c_4<16

Quartile 4: If s_q13c_4>=16

Students get into fights (never)

Quartile 1: If 2<=s_q13d_1<5

Quartile 2: If 5<=s_q13d_1<8

Quartile 3: If 8<=s_q13d_1<19

Quartile 4: If s_q13d_1>=19

Students get into fights (some of the time)

Quartile 1: If 9<=s_q13d_2<45

Quartile 2: If 45<=s_q13d_2<55

Quartile 3: If 55<=s_q13d_2<65

Quartile 4: If s_q13d_2>=65

Students get into fights (most of the time)

Quartile 1: If 0<=s_q13d_3<9

Quartile 2: If 9<=s_q13d_3<17

Quartile 3: If 17<=s_q13d_3<24

Quartile 4: If s_q13d_3>=24

Students get into fights (all of the time)

Quartile 1: If 0<=s_q13d_4<5

Quartile 2: If 5<=s_q13d_4<13

Quartile 3: If 13<=s_q13d_4<21

Quartile 4: If s_q13d_4>=21

Gang activity at school (never)

Quartile 1: If 13<=s_q13h_1<23

Quartile 2: If 23<=s_q13h_1<38

Quartile 3: If 38<=s_q13h_1<60

Quartile 4: If s_q13h_1>=60

Gang activity at school (some of the time)

Quartile 1: If 3<=s_q13h_2<25

Quartile 2: If 25<=s_q13h_2<32

Quartile 3: If 32<=s_q13h_2<36

Quartile 4: If s_q13h_2>=36

Gang activity at school (most of the time)

Quartile 1: If 0<=s_q13h_3<6

Quartile 2: If 6<=s_q13h_3<11

Quartile 3: If 11<=s_q13h_3<15

Quartile 4: If s_q13h_3>=15

Gang activity at school (all of the time)

Quartile 1: If 0<=s_q13h_4<7

Quartile 2: If 7<=s_q13h_4<15

Quartile 3: If 15<=s_q13h_4<26

Quartile 4: If s_q13h_4>=26

Safe in classes (strongly agree)

Quartile 1: If 10<=s_q14c_1<17

Quartile 2: If 17<=s_q14c_1<22

Quartile 3: If 22<=s_q14c_1<32

Quartile 4: If s_q14c_1>=32

Safe in classes (agree)

Quartile 1: If 30<=s_q14c_2<54

Quartile 2: If 54<=s_q14c_2<58

Quartile 3: If 58<=s_q14c_2<62

Quartile 4: If s_q14c_2>=62

Safe in classes (disagree)

Quartile 1: If 1<= s_q14c_3 <7

Quartile 2: If 7<= s_q14c_3<12

Quartile 3: If 12<= s_q14c_3<18

Quartile 4: If s_q14c_3 >=18

Safe in school building (strongly agree)

Quartile 1: If 7<=s_q14d_1<12

Quartile 2: If 12<=s_q14d_1<17

Quartile 3: If 17<=s_q14d_1<29

Quartile 4: If s_q14d_1>=29

Safe in school building (agree)

Quartile 1: If 49<=s_q14d_2<55 29<=s_q14d_2<44

Quartile 2: If 49<=s_q14d_2<55 44<=s_q14d_2<49

Quartile 3: If 49<=s_q14d_2<55

Quartile 4: If s_q14d_2>=55

Safe in school building (disagree)

Quartile 1: If 1<= s_q14d_3 <13

Quartile 2: If 13<= s_q14d_3<21

Quartile 3: If 21<= s_q14d_3<28

Quartile 4: If s_q14d_3 >=28

Safe on school property (strongly agree)

Quartile 1: If 6<=s_q14e_1<10

Quartile 2: If 10<=s_q14e_1<14

Quartile 3: If 14<=s_q14e_1<21

Quartile 4: If s_q14e_1>=21

Safe on school property (agree)

Quartile 1: If 31<=s_q14e_2<40

Quartile 2: If 40<=s_q14e_2<46

Quartile 3: If 46<=s_q14e_2<53

Quartile 4: If s_q14e_2>=53

Safe on school property (disagree)

Quartile 1: If 4<= s_q14e_3 <20

Quartile 2: If 20<= s_q14e_3<27

Quartile 3: If 27<= s_q14e_3<33

Quartile 4: If s_q14e_3 >=33

School crime and violence a problem (strongly agree)

Quartile 1: If 0<=t_q15d_1<4

Quartile 2: t_q15d_1>=4

School crime and violence a problem (agree)

Quartile 1: If 0<=t_q15d_2<6

Quartile 2: If 6<=t_q15d_2<20

Quartile 3: If 20<=t_q15d_2<32

Quartile 4: If t_q15d_2>=32

School crime and violence a problem (disagree)

Quartile 1: If 6<=t_q15d_3<38

Quartile 2: If 38<=t_q15d_3<49

Quartile 3: If 49<=t_q15d_3<54

Quartile 4: If t_q15d_3>=54

School crime and violence a problem (strongly disagree)

Quartile 1: If 0<=t_q15d_4<10

Quartile 2: If 10<=t_q15d_4<19

Quartile 3: If 19<=t_q15d_4<40

Quartile 4: If t_q15d_4>=40

Suspensions (number)

Quartile 1: If 0<= __of_suspensions <22

Quartile 2: If 22<= __of_suspensions<78

Quartile 3: If 78<= __of_suspensions<153

Quartile 4: If __of_suspensions>=153

Suspensions (percent)

Quartile 1: If 0<= SUSPEN_SIONS__ <3

Quartile 2: If 3<= SUSPEN_SIONS__<6

Quartile 3: If 6<= SUSPEN_SIONS__<10

Quartile 4: If SUSPEN_SIONS__>=10

Superintendent suspensions

Quartile 1: If 0<=Superintendent_Suspensions<8

Quartile 2: If 8<=Superintendent_Suspensions<19

Quartile 3: If 19<=Superintendent_Suspensions<40

Quartile 4: If 19<=Superintendent_Suspensions<40

Most of the teachers, counselors, school leaders and other adults I see at school every day know my name or who I am (strongly agree).

Quartile 1: If 8<=s_q2b_1<13

Quartile 2: If 13<=s_q2b_1<18

Quartile 3: If 18<=s_q2b_1<36

Quartile 4: If s_q2b_1>=36

Most of the teachers, counselors, school leaders and other adults I see at school every day know my name or who I am (agree).

Quartile 1: If 27<=s_q2b_2<39

Quartile 2: If 39<=s_q2b_2<43

Quartile 3: If 43<=s_q2b_2<48

Quartile 4: If s_q2b_2>=48

Most of the teachers, counselors, school leaders and other adults I see at school every day know my name or who I am (agree).

Quartile 1: If 3<= s_q2b_3 <13

Quartile 2: If 13<= s_q2b_3<29

Quartile 3: If 29<= s_q2b_3<37

Quartile 4: If s_q2b_3 >=37

2009

Race Black

Quartile 1: If 0.0178187<=Race_Black__<0.19577

Quartile 2: If 0.19577<=Race_Black__<0.33983

Quartile 3: If 0.33983<=Race_Black__<0.50276

Quartile 4: If Race_Black__>=0.50276

Race Hispanic

Quartile 1: If 0.0288786<=Race_Hisp__<0.18835

Quartile 2: If 0.18835<=Race_Hisp__<0.39316

Quartile 3: If 0.39316<=Race_Hisp__<0.60959

Quartile 4: If Race_Hisp__>=0.60959

Race White

Quartile 1: If 0<=Race_White__<0.007042254

Quartile 2: If 0.007042254<=Race_White__<0.020057

Quartile 3: If 0.020057<=Race_White__<0.14866

Quartile 4: If Race_White__>=0.14866

Race Asian

Quartile 1: If 0<=Race_ASIAN__<0.012658

Quartile 2: If 0.012658<=Race_Asian__<0.033411

Quartile 3: If 0.033411<=Race_Asian__<0.11180

Quartile 4: If Race_Asian__>=0.11180

Race other

Quartile 1: If 0<=Race_other__<0.001964637

Quartile 2: If 0.001964637<=Race_other__<0.00550747

Quartile 3: If 0.005507474<=Race_other__<0.011638

Quartile 4: If Race_other__>=0.011638

Female

Quartile 1: If 0.0883191<=Fem__<0.44233

Quartile 2: If 0.44233<=Fem__<0.5

Quartile 3: If 0.5<=Fem__<0.57489

Quartile 4: If Fem__>=0.57489

Household income ≤100% Federal Poverty Level (FPL)_(percent)

Quartile 1: If 0.0267592<= MC_Free_HRA__ <0.20438

Quartile 2: If 0.20438<= MC_Free_HRA__<0.34307

Quartile 3: If 0.34307<= MC_Free_HRA__<0.43454

Quartile 4: If MC_Free_HRA__>=0.43454

Household ≤130% FPL (percent)

Quartile 1: If 0.0016313<= MC_Free_Non_HRA__ <0.22131

Quartile 2: If 0.22131<= MC_Free_Non_HRA__<0.28873

Quartile 3: If 0.28873<= MC_Free_Non_HRA__<0.35736

Quartile 4: If MC_Free_Non_HRA__>=0.35736

Household income >131-185% FPL (percent)

Quartile 1: If 0<= MC_Full__ <0.17417

Quartile 2: If 0.17417<= MC_Full__<0.29032

Quartile 3: If 0.29032<= MC_Full__<0.47712

Quartile 4: If MC_Full__>=0.47712

Household income >131-185% FPL (percent)

Quartile 1: If 0<= MC_Redu_ced__ <0.038361

Quartile 2: If 0.0383617<= MC_Redu_ced__<0.078295

Quartile 3: If 0.078295<= MC_Redu_ced__<0.10997

Quartile 4: If MC_Redu_ced__>=0.10997

4-year graduation

Quartile 1: If 0.436<= yr_Diploma_Rate_4Y<0.601

Quartile 2: If 0.601<=yr_Diploma_Rate_4Y<0.71

Quartile 3: If 0.71<=yr_Diploma_Rate_4Y<0.852

Quartile 4: If yr_Diploma_Rate_4Y>=0.852

6-year graduation

Quartile 1: If 0.463<= yr_Diploma_Rate_6Y<0.63

Quartile 2: If 0.63<=yr_Diploma_Rate_6Y<0.761

Quartile 3: If 0.761<=yr_Diploma_Rate_6Y<0.87

Quartile 4: If yr_Diploma_Rate_6Y>=0.878

Connected to school (strongly agree)

Quartile 1: If 10<=s_q2a_1<19

Quartile 2: If 19<=s_q2a_1<24

Quartile 3: If 24<=s_q2a_1<32

Quartile 4: If 24<=s_q2a_1<32

Connected to school (agree)

Quartile 1: If 20<=s_q2a_2<55

Quartile 2: If 55<=s_q2a_2<60

Quartile 3: If 60<=s_q2a_2<63

Quartile 4: If s_q2a_2>=63

Connected to school (disagree)

Quartile 1: If 0<= s_q2a_3 <7

Quartile 2: If 7<= s_q2a_3<10

Quartile 3: If 10<= s_q2a_3<13

Quartile 4: If s_q2a_3 >=13

Adults at school look out for me (strongly agree)

Quartile 1: If 7<=s_q2c_1<13

Quartile 2: If 13<=s_q2c_1<18

Quartile 3: If 18<=s_q2c_1<24

Quartile 4: If s_q2c_1>=24

Adults at school look out for me (agree)

Quartile 1: If 14<=s_q2c_2<52

Quartile 2: If 52<=s_q2c_2<56

Quartile 3: If 56<=s_q2c_2<60

Quartile 4: If s_q2c_2>=60

Adults at school look out for me (disagree)

Quartile 1: If 0<= s_q2c_3 <14

Quartile 2: If 14<= s_q2c_3<20

Quartile 3: If 20<= s_q2c_3<24

Quartile 4: If s_q2c_3 >=24

Prosocial activities (strongly agree)

Quartile 1: If 13<=p_q10_1<25

Quartile 2: If 25<=p_q10_1<30

Quartile 3: If 30<=p_q10_1<37

Quartile 4: If p_q10_1>=37

Prosocial activities (agree)

Quartile 1: If 12<=p_q10_2<46

Quartile 2: If 46<=p_q10_2<50

Quartile 3: If 50<=p_q10_2<53

Quartile 4: If p_q10_2>=53

Prosocial activities (disagree)

Quartile 1: If 0<= p_q10_3 <7

Quartile 2: If 7<= p_q10_3<10

Quartile 3: If 10<= p_q10_3<14

Quartile 4: If p_q10_3 >=14

Student survey response rate

Quartile 1: If 31<=rr_s<71

Quartile 2: If 71<=rr_s<80

Quartile 3: If 80<=rr_s<89

Quartile 4: If rr_s>=89

Teacher survey response rate

Quartile 1: If 23<=rr_t<72

Quartile 2: If 72<=rr_t<84

Quartile 3: If 84<=rr_t<94

Quartile 4: If rr_t>=94

Parent survey response rate

Quartile 1: If 5<=rr_p<23

Quartile 2: If 23<=rr_p<30

Quartile 3: If 30<=rr_p<38

Quartile 4: If rr_p>=38

Average daily attendance

Quartile 1: If 0.686<= Attendance_Rate__PR_<0.819

Quartile 2: If 0.819<=Attendance_Rate__PR_<0.864

Quartile 3: If 0.864<=Attendance_Rate__PR_<0.9035

Quartile 4: If Attendance_Rate__PR_>=0.9035

Enrollment

Quartile 1: If 23<= Total_Enrollment <371

Quartile 2: If 371<= Total_Enrollment<580

Quartile 3: If 580<=Total_Enrollment<1975

Quartile 4: If Total_Enrollment>=197

Teacher > 2 years at school

Quartile 1: If 0<=TEACHERQUAL2<54.8

Quartile 2: If 54.8<=TEACHERQUAL2<73.7

Quartile 3: If 73.7<=TEACHERQUAL2<82.1

Quartile 4: If TEACHERQUAL2>=82.1

Teacher >5 years at school

Quartile 1: 15.4<=TEACHERQUAL5<40.5

Quartile 2: If 40.5<=TEACHERQUAL5<61.8

Quartile 3: If 61.8<=TEACHERQUAL5<70

Quartile 4: If TEACHERQUAL5>=70

Stay home as don't feel safe (never)

Quartile 1: If 63<=s_q13b_1<77

Quartile 2: If 77<=s_q13b_1<81

Quartile 3: If 81<=s_q13b_1<87

Quartile 4: If s_q13b_1>=87

Stay home as don't feel safe (some of the time)

Quartile 1: If 0<=s_q13b_2<9

Quartile 2: If 9<=s_q13b_2<13

Quartile 3: If 13<=s_q13b_2<15

Quartile 4: If s_q13b_2>=15

Stay home as don't feel safe (most of the time)

Quartile 1: If 0<=s_q13b_3<2

Quartile 2: If 2<=s_q13b_3<3

Quartile 3: If 3<=s_q13b_3<5

Quartile 4: If s_q13b_3>=5

Stay home as don't feel safe (all of the time)

Quartile 1: If 0<=s_q13b_4<2

Quartile 2: If 2<=s_q13b_4<3

Quartile 3: If 3<=s_q13b_4<4

Quartile 4: If s_q13b_4>=4

Students threaten other students (never)

Quartile 1: If 15<=s_q13c_1<24

Quartile 2: If 24<=s_q13c_1<29

Quartile 3: If 29<=s_q13c_1<38

Quartile 4: If s_q13c_1>=38

Students threaten other students (some of the time)

Quartile 1: If 19<=s_q13c_2<46

Quartile 2: If 46<=s_q13c_2<49

Quartile 3: If 49<=s_q13c_2<53

Quartile 4: If s_q13c_2>=53

Students threaten other students (most of the time)

Quartile 1: If 0<=s_q13c_3<9

Quartile 2: If 9<=s_q13c_3<12

Quartile 3: If 12<=s_q13c_3<15

Quartile 4: If 12<=s_q13c_3<15

Students threaten other students (all of the time)

Quartile 1: If 0<=s_q13c_4<5

Quartile 2: If 5<=s_q13c_4<8

Quartile 3: If 8<=s_q13c_4<11

Quartile 4: If s_q13c_4>=11

Students get into fights (never)

Quartile 1: If 5<=s_q13d_1<9

Quartile 2: If 9<=s_q13d_1<13

Quartile 3: If 13<=s_q13d_1<23

Quartile 4: If s_q13d_1>=23

Students get into fights (some of the time)

Quartile 1: If 5<=s_q13d_2<50

Quartile 2: If 50<=s_q13d_2<56

Quartile 3: If 56<=s_q13d_2<64

Quartile 4: If s_q13d_2>=64

Students get into fights (most of the time)

Quartile 1: If 1<=s_q13d_3<9

Quartile 2: If 9<=s_q13d_3<17

Quartile 3: If 17<=s_q13d_3<21

Quartile 4: If s_q13d_3>=21

Students get into fights (all of the time)

Quartile 1: If 0<=s_q13d_4<4

Quartile 2: If 4<=s_q13d_4<10

Quartile 3: If 10<=s_q13d_4<16

Quartile 4: If s_q13d_4>=16

Gang activity at school (never)

Quartile 1: If 22<=s_q13h_1<37

Quartile 2: If 37<=s_q13h_1<50

Quartile 3: If 50<=s_q13h_1<65

Quartile 4: If s_q13h_1>=65

Gang activity at school (some of the time)

Quartile 1: If 3<=s_q13h_2<23

Quartile 2: If 23<=s_q13h_2<30

Quartile 3: If 30<=s_q13h_2<34

Quartile 4: If s_q13h_2>=34

Gang activity at school (most of the time)

Quartile 1: If 0<=s_q13h_3<6

Quartile 2: If 6<=s_q13h_3<9

Quartile 3: If 9<=s_q13h_3<12

Quartile 4: If s_q13h_3>=12

Gang activity at school (all of the time)

Quartile 1: If 0<=s_q13h_4<5

Quartile 2: If 5<=s_q13h_4<10

Quartile 3: If 10<=s_q13h_4<16

Quartile 4: If s_q13h_4>=16

Safe in classes (strongly agree)

Quartile 1: If 12<=s_q14c_1<25

Quartile 2: If 25<=s_q14c_1<30

Quartile 3: If 30<=s_q14c_1<38

Quartile 4: If s_q14c_1>=38

Safe in classes (agree)

Quartile 1: If 22<=s_q14c_2<49

Quartile 2: If 49<=s_q14c_2<54

Quartile 3: If 54<=s_q14c_2<58

Quartile 4: If s_q14c_2>=58

Safe in classes (disagree)

Quartile 1: If 0<= s_q14c_3 <6

Quartile 2: If 6<= s_q14c_3<10

Quartile 3: If 10<= s_q14c_3<13

Quartile 4: If s_q14c_3 >=13

Safe in school building (strongly agree)

Quartile 1: If 10<=s_q14d_1<20

Quartile 2: If 20<=s_q14d_1<25

Quartile 3: If 25<=s_q14d_1<32

Quartile 4: If s_q14d_1>=32

Safe in school building (agree)

Quartile 1: If 28<=s_q14d_2<46

Quartile 2: If 46<=s_q14d_2<50

Quartile 3: If 50<=s_q14d_2<55

Quartile 4: If s_q14d_2>=55

Safe in school building (disagree)

Quartile 1: If 0<= s_q14d_3 <10

Quartile 2: If 10<= s_q14d_3<16

Quartile 3: If 16<= s_q14d_3<20

Quartile 4: If s_q14d_3 >=20

Safe on school property (strongly agree)

Quartile 1: If 8<=s_q14e_1<16

Quartile 2: If 16<=s_q14e_1<21

Quartile 3: If 21<=s_q14e_1<25

Quartile 4: If s_q14e_1>=25

Safe on school property (agree)

Quartile 1: If 32<=s_q14e_2<42

Quartile 2: If 42<=s_q14e_2<48

Quartile 3: If 48<=s_q14e_2<52

Quartile 4: If s_q14e_2>=52

Safe on school property (disagree)

Quartile 1: If 3<= s_q14e_3 <15

Quartile 2: If 15<= s_q14e_3<21

Quartile 3: If 21<= s_q14e_3<25

Quartile 4: If 21<= s_q14e_3<25

School crime and violence a problem (strongly agree)

Quartile 1: If 0<=t_q15d_1<3

Quartile 2: If 3<=t_q15d_1<5

Quartile 3: If 5<=t_q15d_1<8

Quartile 4: If t_q15d_1>=8

School crime and violence a problem (agree)

Quartile 1: If 0<=t_q15d_2<5

Quartile 2: If 5<=t_q15d_2<11

Quartile 3: If 11<=t_q15d_2<25

Quartile 4: If t_q15d_2>=25

School crime and violence a problem (disagree)

Quartile 1: If 0<=t_q15d_3<32

Quartile 2: If 32<=t_q15d_3<43

Quartile 3: If 43<=t_q15d_3<53

Quartile 4: If 43<=t_q15d_3<53

School crime and violence a problem (strongly disagree)

Quartile 1: If 0<=t_q15d_4<16

Quartile 2: If 16<=t_q15d_4<32

Quartile 3: If 32<=t_q15d_4<57

Quartile 4: If t_q15d_4>=57

Suspensions (number)

Quartile 1: If 0<= __of_suspensions <27

Quartile 2: If 27<= __of_suspensions<63

Quartile 3: If 63<= __of_suspensions<118

Quartile 4: If __of_suspensions>=118

Suspensions (percent)

Quartile 1: If 0<=SUSPEN_SIONS__ <3

Quartile 2: If 3<=SUSPEN_SIONS__<6

Quartile 3: If 6<SUSPEN_SIONS__<13

Quartile 4: If SUSPEN_SIONS__>=13

Superintendent suspensions

Quartile 1: If 0<=Superintendent_Suspensions<7

Quartile 2: If 7<=Superintendent_Suspensions<15

Quartile 3: If 15<=Superintendent_Suspensions<33

Quartile 4: If Superintendent_Suspensions>=33

Most of the teachers, counselors, school leaders and other adults I see at school every day know my name or who I am (strongly agree)

Quartile 1: If 13<=s_q2b_1<21

Quartile 2: If 21<=s_q2b_1<31

Quartile 3: If 31<=s_q2b_1<39

Quartile 4: If s_q2b_1>=39

Most of the teachers, counselors, school leaders and other adults I see at school every day know my name or who I am (agree)

Quartile 1: If 6<=s_q2b_2<46

Quartile 2: If 46<=s_q2b_2<48

Quartile 3: If 48<=s_q2b_2<51

Quartile 4: If s_q2b_2>=51

Most of the teachers, counselors, school leaders and other adults I see at school every day know my name or who I am (disagree).

Quartile 1: If 0<= s_q2b_3 <11

Quartile 2: If 11<= s_q2b_3<16

Quartile 3: If 16<= s_q2b_3<22

Quartile 4: If s_q2b_3 >=22

2011

Race Black

Quartile 1: If 0.0136476<=Race_Black__<0.16244

Quartile 2: If 0.16244<=Race_Black__<0.33122

Quartile 3: If 0.33122<=Race_Black__<0.48601

Quartile 4: If Race_Black__>=0.48601

Race Hispanic

Quartile 1: If 0.0545906<=Race_Hisp__<0.22581

Quartile 2: If 0.22581<=Race_Hisp__<0.40361

Quartile 3: If 0.40361<=Race_Hisp__<0.5975

Quartile 4: If Race_Hisp__>=0.5975

Race White

Quartile 1: If 0<=Race_White__<0.00967118

Quartile 2: If 0.00967118<=Race_White__<0.024590

Quartile 3: If 0.024590<=Race_White__<0.18064

Quartile 4: If Race_White__>=0.18064

Race Asian

Quartile 1: If 0<=Race_ASIAN__<0.012987

Quartile 2: If 0.012987<=Race_Asian__<0.038194

Quartile 3: If 0.038194<=Race_Asian__<0.10029

Quartile 4: If Race_Asian__>=0.10028

Race other

Quartile 1: If 0<=Race_other__<0.002352941

Quartile 2: If 0.002352941<=Race_other__<0.004891304

Quartile 3: If 0.004891304<=Race_other__<0. 00764526

Quartile 4: If Race_other__>=0.00764526

Percent Female

Quartile 1: If 0.0060241<=Fem__<0.44972

Quartile 2: If 0.44972<=Fem__<0.50415

Quartile 3: If 0.50415<=Fem__<0.57817

Quartile 4: If Fem__>=0.57817

Household income ≤100% Federal Poverty Level (FPL) (percent)

Quartile 1: If 0.0372208<= MC_Free_HRA__ <0.31325

Quartile 2: If 0.31325<= MC_Free_HRA__<0.42773

Quartile 3: If 0.42773<= MC_Free_HRA__<0.51703

Quartile 4: If MC_Free_HRA__>=0.51703

Household ≤130% FPL (percent)

Quartile 1: If 0<= MC_Free_Non_HRA__ <0.14907

Quartile 2: If 0.14907<= MC_Free_Non_HRA__<0.23656

Quartile 3: If 0.23656<= MC_Free_Non_HRA__<0.28788

Quartile 4: If MC_Free_Non_HRA__>=0.28788

Household income >131-185% FPL (percent)

Quartile 1: If 0<= MC_Redu_ced__ <0.034349

Quartile 2: If 0.034349<= MC_Redu_ced__<0.06211

Quartile 3: If 0.062112<= MC_Redu_ced__<0.086747

Quartile 4: If MC_Redu_ced__>=0.086747

Household income > 185% FPL (percent)

Quartile 1: If 0.0371622<= MC_Full__ <0.17490

Quartile 2: If 0.17490<= MC_Full__<0.28243

Quartile 3: If 0.28243<= MC_Full__<0.46440

Quartile 4: If MC_Full__>=0.46440

4-year graduation

Quartile 1: If 0.425<= yr_Diploma_Rate_4Y<0.64

Quartile 2: If 0.64<=yr_Diploma_Rate_4Y<0.7475

Quartile 3: If 0.7475<=yr_Diploma_Rate_4Y<0.8575

Quartile 4: If yr_Diploma_Rate_4Y>=0.8575

6-year graduation

Quartile 1: If 0.504<= yr_Diploma_Rate_6Y<0.71

Quartile 2: If 0.71<=yr_Diploma_Rate_6Y<0.8075

Quartile 3: If 0.8075<=yr_Diploma_Rate_6Y<0.897

Quartile 4: If yr_Diploma_Rate_6Y>=0.897

Connected to school (strongly agree)

Quartile 1: If 10<=s_q2a_1<20

Quartile 2: If 20<=s_q2a_1<26

Quartile 3: If 26<=s_q2a_1<34

Quartile 4: If s_q2a_1>=34

Connected to school (agree)

Quartile 1: If 24<=s_q2a_2<56

Quartile 2: If 56<=s_q2a_2<60

Quartile 3: If 60<=s_q2a_2<64

Quartile 4: If s_q2a_2>=64

Connected to school (disagree)

Quartile 1: If 1<= s_q2a_3 <6

Quartile 2: If 6<= s_q2a_3<9

Quartile 3: If 9<= s_q2a_3<13

Quartile 4: If s_q2a_3 >=13

Adults at school look out for me (strongly agree)

Quartile 1: If 9<=s_q2c_1<14

Quartile 2: If 14<=s_q2c_1<19

Quartile 3: If 19<=s_q2c_1<25

Quartile 4: If s_q2c_1>=25

Adults at school look out for me (agree)

Quartile 1: If 28<=s_q2c_2<54

Quartile 2: If 54<=s_q2c_2<58

Quartile 3: If 58<=s_q2c_2<60

Quartile 4: If s_q2c_2>=60

Adults at school look out for me (disagree)

Quartile 1: If 5<= s_q2c_3 <12

Quartile 2: If 12<= s_q2c_3<17

Quartile 3: If 17<= s_q2c_3<22

Quartile 4: If s_q2c_3 >=22

Prosocial activities (strongly agree)

Quartile 1: If 9<=p_q10_1<24

Quartile 2: If 24<=p_q10_1<29

Quartile 3: If 29<=p_q10_1<37

Quartile 4: If p_q10_1>=37

Prosocial activities (agree)

Quartile 1: If 23<=p_q10_2<44

Quartile 2: If 44<=p_q10_2<50

Quartile 3: If 50<=p_q10_2<55

Quartile 4: If p_q10_2>=55

Prosocial activities (disagree)

Quartile 1: If 2<= p_q10_3 <7

Quartile 2: If 7<= p_q10_3<10

Quartile 3: If 10<= p_q10_3<14

Quartile 4: If p_q10_3 >=14

Student survey response rate

Quartile 1: If 14<=rr_s<71

Quartile 2: If 71<=rr_s<81

Quartile 3: If 81<=rr_s<89

Quartile 4: If rr_s>=89

Teacher survey response rate

Quartile 1: If 33<=rr_t<72

Quartile 2: If 72<=rr_t<85

Quartile 3: If 85<=rr_t<94

Quartile 4: If rr_t>=94

Parent survey response rate

Quartile 1: If 7<=rr_p<21

Quartile 2: If 21<=rr_p<33

Quartile 3: If 33<=rr_p<47

Quartile 4: If rr_p>=47

Average daily attendance

Quartile 1: If 0.727<= Attendance_Rate__PR_<0.819

Quartile 2: If 0.819<=Attendance_Rate__PR_<0.86

Quartile 3: If 0.86<=Attendance_Rate__PR_<0.905

Quartile 4: If Attendance_Rate__PR_>=0.905

Enrollment

Quartile 1: If 77<= Total_Enrollment <310

Quartile 2: If 310<= Total_Enrollment<415

Quartile 3: If 415<=Total_Enrollment<1419

Quartile 4: If Total_Enrollment>=1419

Teacher > 2 years at school

Quartile 1: If 0<=TEACHERQUAL2<55

Quartile 2: If 55<=TEACHERQUAL2<74.405

Quartile 3: If 74.405<=TEACHERQUAL2<86.635

Quartile 4: If TEACHERQUAL2>=86.635

Teacher >5 years at school

Quartile 1: If 0<=TEACHERQUAL5<39.645

Quartile 2: If 39.645<=TEACHERQUAL5<64.36

Quartile 3: If 64.36<=TEACHERQUAL5<77.25

Quartile 4: If TEACHERQUAL5>=77.25

Stay at home as don't feel safe (never)

Quartile 1: 61<=s_q13b_1<78

Quartile 2: If 78<=s_q13b_1<84

Quartile 3: If 84<=s_q13b_1<87

Quartile 4: If s_q13b_1>=87

Stay at home as don't feel safe (some of the time)

Quartile 1: If 1<=s_q13b_2<8

Quartile 2: If 8<=s_q13b_2<11

Quartile 3: If 11<=s_q13b_2<15

Quartile 4: If s_q13b_2>=15

Stay at home as don't feel safe (most of the time)

Quartile 1: If 0<=s_q13b_3<2

Quartile 2: If 2<=s_q13b_3<3

Quartile 3: If 3<=s_q13b_3<4

Quartile 4: If s_q13b_3>=4

Stay at home as don't feel safe (all the time)

Quartile 1: If 0<=s_q13b_4<2

Quartile 2: If 2=<s_q13b_4<3

Quartile 3: If s_q13b_4>=3

*Tertile

Students threaten other students (never)

Quartile 1: If 12<=s_q13c_1<26

Quartile 2: If 26<=s_q13c_1<31

Quartile 3: If 31<=s_q13c_1<39

Quartile 4: If s_q13c_1>=39

Students threaten other students (some of the time)

Quartile 1: If 21<=s_q13c_2<46

Quartile 2: If 46<=s_q13c_2<49

Quartile 3: If 49<=s_q13c_2<52

Quartile 4: If s_q13c_2>=52

Students threaten other students (most of the time)

Quartile 1: If 1<=s_q13c_3<7

Quartile 2: If 7<=s_q13c_3<11

Quartile 3: If 11<=s_q13c_3<13

Quartile 4: If s_q13c_3>=13

Students threaten other students (all the time)

Quartile 1: If 1<=s_q13c_4<4

Quartile 2: If 4<=s_q13c_4<7

Quartile 3: If 7<=s_q13c_4<11

Quartile 4: If s_q13c_4>=11

Students get into fights (never)

Quartile 1: If 3<=s_q13d_1<8

Quartile 2: If 8<=s_q13d_1<13

Quartile 3: If 13<=s_q13d_1<21

Quartile 4: If s_q13d_1>=21

Students get into fights (some of the time)

Quartile 1: If 8<=s_q13d_2<48

Quartile 2: If 48<=s_q13d_2<59

Quartile 3: If 59<=s_q13d_2<65

Quartile 4: If s_q13d_2>=65

Students get into fights (most of the time)

Quartile 1: If 0<=s_q13d_3<9

Quartile 2: If 9<=s_q13d_3<14

Quartile 3: If 14<=s_q13d_3<21

Quartile 4: If s_q13d_3>=21

Students get into fights (all the time)

Quartile 1: If 1<=s_q13d_4<5

Quartile 2: If 5<=s_q13d_4<8

Quartile 3: If 8<=s_q13d_4<14

Quartile 4: If s_q13d_4>=14

Gang activity at school (never)

Quartile 1: If 17<=s_q13h_1<43

Quartile 2: If 43<=s_q13h_1<57

Quartile 3: If 57<=s_q13h_1<72

Quartile 4: If s_q13h_1>=72

Gang activity at school (some of the time)

Quartile 1: If 2<=s_q13h_2<18

Quartile 2: If 18<=s_q13h_2<27

Quartile 3: If 27<=s_q13h_2<31

Quartile 4: If s_q13h_2>=31

Gang activity at school (most of the time)

Quartile 1: If 0<=s_q13h_3<5

Quartile 2: If 5<=s_q13h_3<7

Quartile 3: If 7<=s_q13h_3<10

Quartile 4: If s_q13h_3>=10

Gang activity at school (all of the time)

Quartile 1: If 0<=s_q13h_4<5

Quartile 2: If 5<=s_q13h_4<7

Quartile 3: If 7<=s_q13h_4<13

Quartile 4: If s_q13h_4>=13

Safe in classes (strongly agree)

Quartile 1: If 10<=s_q14c_1<25

Quartile 2: If 25<=s_q14c_1<32

Quartile 3: If 32<=s_q14c_1<40

Quartile 4: If s_q14c_1>=40

Safe in classes (agree)

Quartile 1: If 18<=s_q14c_2<49

Quartile 2: If 49<=s_q14c_2<55

Quartile 3: If 55<=s_q14c_2<59

Quartile 4: If s_q14c_2>=59

Safe in classes (DA)

Quartile 1: If 1<= s_q14c_3 <5

Quartile 2: If 5<= s_q14c_3<9

Quartile 3: If 9<= s_q14c_3<12

Quartile 4: If s_q14c_3 >=12

Safe in school building (strongly agree)

Quartile 1: If 9<=s_q14d_1<21

Quartile 2: If 21<=s_q14d_1<8

Quartile 3: If 28<=s_q14d_1<34

Quartile 4: If s_q14d_1>=34

Safe in school building (agree)

Quartile 1: If 20<=s_q14d_2<48

Quartile 2: If 48<=s_q14d_2<52

Quartile 3: If 52<=s_q14d_2<56

Quartile 4: If s_q14d_2>=56

Safe in school building (disagree)

Quartile 1: If 1<= s_q14d_3 <9

Quartile 2: If 9<= s_q14d_3<14

Quartile 3: If 14<= s_q14d_3<19

Quartile 4: If s_q14d_3 >=19

Safe on school property (strongly agree)

Quartile 1: If 4<=s_q14e_1<18

Quartile 2: If 18<=s_q14e_1<21

Quartile 3: If 21<=s_q14e_1<29

Quartile 4: If s_q14e_1>=29

Safe on school property (agree)

Quartile 1: If 20<=s_q14e_2<44

Quartile 2: If 44<=s_q14e_2<51

Quartile 3: If 51<=s_q14e_2<53

Quartile 4: If s_q14e_2>=53

Safe on school property (disagree)

Quartile 1: If 1<= s_q14e_3 <14

Quartile 2: If 14<= s_q14e_3<20

Quartile 3: If 20<= s_q14e_3<23

Quartile 4: If s_q14e_3 >=23

School crime and violence a problem (strongly agree)

Quartile 1: If 0<=t_q15d_1<1

Quartile 2: If 1<=t_q15d_1<4

Quartile 3: If 4<=t_q15d_1<7

Quartile 4: If t_q15d_1>=7

School crime and violence a problem (agree)

Quartile 1: 0<=t_q15d_2<6

Quartile 2: If 6<=t_q15d_2<13

Quartile 3: If 13<=t_q15d_2<22

Quartile 4: If t_q15d_2>=22

School crime and violence a problem (disagree)

Quartile 1: If 0<=t_q15d_3<32

Quartile 2: If 32<=t_q15d_3<47

Quartile 3: If 47<=t_q15d_3<53

Quartile 4: If t_q15d_3>=53

School crime and violence a problem (strongly disagree)

Quartile 1: If 4<=t_q15d_4<15

Quartile 2: If 15<=t_q15d_4<31

Quartile 3: If 31<=t_q15d_4<50

Quartile 4: If t_q15d_4>=50

Suspensions (percent)

Quartile 1: If 0<= SUSPEN_SIONS__ <2

Quartile 2: If 2<= SUSPEN_SIONS__<6

Quartile 3: If 6<= SUSPEN_SIONS__<11

Quartile 4: If SUSPEN_SIONS__>=11

Superintendent suspensions

Quartile 1: If 0<=Superintendent_Suspensions<6

Quartile 2: If 6<=Superintendent_Suspensions<13

Quartile 3: If 13<=Superintendent_Suspensions<27

Quartile 4: If Superintendent_Suspensions>=27

Most of the teachers, counselors, school leaders and other adults I see at school every day know my name or who I am (strongly agree).

Quartile 1: If 13<=s_q2b_1<24

Quartile 2: If 24<=s_q2b_1<31

Quartile 3: If 31<=s_q2b_1<40

Quartile 4: If s_q2b_1>=40

Most of the teachers, counselors, school leaders and other adults I see at school every day know my name or who I am (agree).

Quartile 1: If 24<=s_q2b_2<47

Quartile 2: If 47<=s_q2b_2<49

Quartile 3: If 49<=s_q2b_2<52

Quartile 4: If s_q2b_2>=52

Most of the teachers, counselors, school leaders and other adults I see at school every day know my name or who I am (disagree).

Quartile 1: If 2<= s_q2b_3 <9

Quartile 2: If 9<= s_q2b_3<14

Quartile 3: If 14<= s_q2b_3<20

Quartile 4: If s_q2b_3 >=20

* All variables in the school-level dataset are included in this Appendix (including variables not included in the analysis)

Appendix II – P-values Associated with the Interaction between Race/Ethnicity and Selected School-Level Variables in the Three Regression Models Predicting Contraceptive Use at Last Sex, NYC, 2007-2011

School-Level Exposure	Binary LR	Multinomial LR
% black students	0.9208	0.1800
% Hispanic students	0.6449	0.6615
% <100% federal poverty level	0.0670	0.0016**
Average daily attendance	0.8787	0.1930
Teacher survey response rate	0.9472	0.3104
% Teachers > 2 years at school	0.2094	0.2249
Parents strongly agree school has prosocial activities	0.0976	0.0456
% strongly agree safe classes	0.0118	0.0001***
% strongly agree safe building	0.2867	0.6534
% strongly agree safe property	0.0179	0.0067**
% Suspension	0.7942	0.0941
School-Based Health Center	0.2456	0.1032

**p<0.01, ***p<0.001

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