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The effects of school poverty on adolescents' sexual health knowledge

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Abstract

Using National Longitudinal Study of Adolescent Health data, hierarchical linear modeling was conducted to estimate the association of school poverty concentration to the sexual health knowledge of 6,718 adolescents. Controlling for individual socio-economic status, school poverty had modest negative effects on sexual health knowledge. Although not directly associated with sexual health knowledge, after controlling for demographic characteristics, school poverty interactions showed that sexual health knowledge was associated with higher grade point average (GPA) and age. The combination of low GPA and high-levels of school poverty was especially detrimental for students' sexual health knowledge. There are differences in the sexual health knowledge of adolescents attending low poverty and high poverty schools that can be attributed to the school environment.

Keywords

adolescents; sexual health knowledge; school poverty

The purpose of this study was to investigate whether a specific school characteristic—the school poverty concentration—influences the sexual health knowledge of high school students. Whether high school characteristics are associated with effectiveness of sexual health education efforts is important for at least two reasons. First, adolescence is a critical developmental period for public health education efforts because many adolescents are starting to engage in risky sexual behaviors known to lead to unplanned pregnancy and sexually transmitted infections (Mueller, Gavin, & Kulkarni, 2008). Second, although there are many informal sources of sexual health information (e.g., parents, peers, media) schools are one place where formal sexual health education takes place (Blum, McNeely, Rinehart, 2002; Flay, 2002). Sexual health education refers to instruction relating to sex and sexuality including anatomy, reproduction, development, and behavior. Beginning in grades five or

six almost all students in the United States begin to receive some form of sexual health education (Landry, Singh, & Darroch, 2000).

Although most children and adolescents receive sexual education in school, there is strong evidence that the effectiveness of school-based sexual health education varies across schools. This disparity is important to address because effective school-based health education curricula have been linked to reductions in the risky sexual behaviors that lead to sexually transmitted infection and unplanned pregnancy (Mueller et al., 2008). For example, Mueller and colleagues (2008) found an association between sex education and the delay of first sexual intercourse among adolescents. Additionally, Muller et al. found sex education was particularly important for populations that are historically at increased risk for early initiation of sex and for becoming infected with sexually transmitted disease at first intercourse (e.g., Black males and females living in urban areas).

Researchers and policymakers have become increasingly interested in understanding the risk taking and health damaging factors that contribute to health disparities. Although most of the findings on health disparities relate to adults, a growing number of researchers have focused on understanding how an individual's health during childhood and adolescence influences the development of health disparities (Cheng & Jenkins, 2009; Flores & Tomany-Korman, 2008). Evidence suggests that individuals who experience poor health during childhood are at increased risk of poor health during adulthood (Reilly, 2007). In addition, the behaviors associated with morbidity and mortality during adulthood, such as unhealthy dietary practices, are established during childhood and adolescence (Reilly, 2007; Story, Neumark-Sztainer & French, 2002). Of course, children and adolescents do not establish health behaviors on their own: they are greatly influenced by those they interact with in their household and neighborhood environments—family members, neighbors, peers, and schools (Dowd, Zajacova, & Aiello, 2009; Newacheck, Hung, Park, Brindis, & Irwin, Jr., 2003). Thus, understanding how social and contextual factors may contribute to health disparities is important.

Epidemiological Sociology

One theoretical approach commonly used to explore how social factors such as household, school, and neighborhood environments influence health disparities comes from epidemiological sociology, which posits that health disparities across socioeconomic levels and along racial lines are deepened when a society develops the capacity to promote, maintain, or restore health (Phelan & Link, 2005). Proponents of this approach point out that populations living in industrialized countries are expected to live healthier and longer than previous generations as the medical treatments and technology available to promote, maintain, and restore health far surpasses what was available to previous generations. Epidemiological sociologists acknowledge that given these two trends, it is tempting to believe that there exists a causal relationship between health innovations and improved health (Link, 2008). Although the availability of improved technology and treatments is essential to improved population health, Link (2008) pointed out that these technologies are not sufficient causes because a host of social factors determine the “uptake” of new technology and treatments. For example, although beta-blockers for the treatment of heart attacks have been an available treatment since the mid-1980s, the uptake of this life-saving treatment across the United States has been slow and uneven, with a far greater use in certain regions of the country (e.g., Northeastern United States) than in others (e.g., Arkansas; Link). Whenever there is public knowledge about disease prevention, health-relevant lifestyles, or the uptake of health-enhancing technical innovations, “groups who are less likely to be exposed to discrimination and who have greater access to knowledge, money, power, prestige, and beneficial social connections” are the first to benefit from the

advancement (Link, 2008, p. 374; Phelan & Link, 2005). This process is referred to as the “social shaping of disease” and is a process that sustains health disparities. One of our aims in the study was to consider how schools, through the neighborhoods they serve and the resources available to them, contribute to health disparities through the social shaping of disease.

Schools and Health Disparities

Although schools have received less attention than individual and family-level processes as a contributor to the health behaviors of youth (Wight, Botticello, & Aneshensel, 2006), they are one of the most important institutional influences on the health behaviors that are established in school age youth in the United States and Europe (Stewart-Brown, 2006). Schools influence health in multiple ways. For example, most public schools promote health by requiring students to participate in physical education classes, and many schools offer students opportunities to engage in extracurricular recreational activities. In addition, for some children the most nutritious meal of the day is eaten at school. Finally, many schools have personnel such as school nurses who provide first aid and health surveillance and health education teachers who provide instruction on health education topics such as sexual education (Satcher, 2001).

Schools and Health Education

There is a growing body of evidence to suggest that schools differ in the amount of health education they provide to students. For example, through an analysis of a national survey of school health education policies and practices conducted by the Centers for Disease Control (CDC), Brener, Jones, Kann, and McManus (2003) found that students in poor and urban school districts received less health education than their counterparts in more affluent school districts. Although in our review of the literature we found no studies of the health knowledge of students in schools with high concentrations of low income students, there is a relationship between what students are taught in school and their knowledge. Indeed, students from urban schools with high concentrations of low-income students from minority backgrounds have lower levels of academic achievement than their peers (Bradley & Corwyn, 2002; McLoyd, 1998). The diminished learning outcomes of students from high-poverty, urban schools have been attributed to an accumulation of factors (e.g., poverty itself, English as a second language, health and safety problems), which disrupt the educational process (Bradley & Corwyn, 2002; Lippman et al., 1996).

School Effects on Health Knowledge

Although a growing number of researchers have sought to understand the role schools play in the health knowledge of students attending high-poverty, urban schools—most of whom are racial and ethnic minorities—there is a need for more of this type of research. For example, although students attending high poverty schools are more likely to disengage from school through absenteeism or dropout than their peers at low poverty schools, it is not known how this influences health knowledge (Swenson et al., 2010). Schools are an important source of health promotion and it may be that students in poor and urban schools either are not receiving or are not absorbing the same amount of health promotion resources as their counterparts in other schools. A gap in school resources may contribute in both ways to health disparities. Although most studies of the association of poor and urban schools with learning outcomes have not been focused on how these characteristics influence student health, there is some evidence that schools do influence health disparities. For example, Sellström and Bremberg (2006) reviewed 17 studies in which multilevel analysis was used to identify whether the social context of schools (e.g., high expectations of students, strong administrative leadership) influenced the health and well-being of students after controlling

for the socio-economic background of students. Based on these studies, the authors concluded that the social context of the school environment contributes to health outcomes even after accounting for the differences in socioeconomic backgrounds of the students.

Study Overview

Through secondary analysis of the National Longitudinal Study of Adolescent Health (Add Health; Harris, 2009), factors that influence the health and well-being of adolescents in the United States were explored. First, we investigated whether there are sexual health knowledge differences between adolescents from advantaged and disadvantaged environments. Hypothesis 1 was that students from low socio-economic households have lower levels of sexual health knowledge than students from more affluent households. Second, we investigated whether differences in the sexual health knowledge of adolescents could be attributed to the school socioeconomic environment. Hypothesis 2 was that school poverty would be negatively related to sexual health knowledge. Finally, we investigated the extent to which school poverty interacts with student age, verbal intelligence, and academic achievement to moderate the influence of family background on sexual health knowledge. Hypothesis 3 was that school poverty moderates the influence of household and family background variables on sexual health knowledge.

Method

Sample and Setting

The study was approved by the university's Institutional Review Board. The data used come from Wave I of the Restricted Use Data Add Health, a school-based study of youth originally in grades 7 through 12 (see Harris, 2009). All high schools in the United States that included an 11th grade and at least 30 students were eligible for inclusion in the Add Health study. A sample of 80 eligible high schools was selected. The sample was stratified by region, urbanicity (urban/suburban/rural), school type (public/private/parochial), racial/ethnic mix, and size; schools were selected with probability proportional to size (Harris, 2009).

The analyses reported here use data from the in-home and the school administrator questionnaires which were collected between September 1994 and December 1995. The Add Health study used a stratified, two-stage sampling procedure in which schools were first selected for inclusion in the study and students were subsequently sampled from these schools. Due to the nested design, the ordinary least squares regression assumption of independent observations was violated. Multilevel modeling (SAS 9.2 PROC MIXED) was used to account for similarities among students sampled from the same schools because failing to take the nested nature of the Add Health data into account can result in negatively biased standard errors and a corresponding increase in the nominal alpha rate of statistical tests (Cohen, Cohen, West, & Aiken, 2003).

We had two methodological reasons for not using the sample weights developed for the data. First, the weights were developed for the full sample of adolescent participants. In the analysis discussed in this manuscript we dropped participants who were: not 15 years of age or older; had missing data; or were not the oldest child in their family (applied to participants with siblings in study). Second, Carle (2009) found that the differences between weighted and unweighted multilevel model analyses are minimal and do not lead to different inferential conclusions. So even if using the weights is more accurate in principle (and according to Carle the differences are relatively small), the sample weights would not correspond to the actual data we used.

All Add Health respondents ($n = 20,745$) with complete data on the study measures were eligible for inclusion in the analysis; listwise deletion was used to exclude participants with missing data. Moreover, only the oldest child in each family was selected to participate in the study ($n = 17,898$) to avoid violating the statistical assumption of independence of observations. By design, participants younger than 15 years old in 1994 were not asked questions regarding sexual health knowledge. This reduced the sample size to 13,454. In addition, participants attending schools for which school free/reduced price lunch data were not available also were excluded from the analysis, reducing the sample size to 10,272. Our analytic sample size, restricted to cases with complete data on all study variables, was 6,718 from 99 different schools. The racial/ethnic composition of the sample was: 61% White, 19% Black, 1% Native American, 6% Asian, and 14% other/multiracial; 18% of the sample was of Hispanic or Latino origin. Nearly half of the sample was female (49%). There were minor differences between the analytic sample and the Add Health sample. For example, the analytic sample was slightly older (16.96), had a larger percentage of Black participants (23%) and a slightly lower GPA (6.14).

Measures

Individual socio-demographics—Participants self-reported their birth date, ethnicity (dummy variable: 0 = *Non-Hispanic*; 1 = *Hispanic*), race (dummy variables: *White* = 0; *Black*, *Asian*, *Native American*, and *other/multiracial* = 1), and gender (dummy variable: *male* = 0, *female* = 1). The highest level of education reported by the mother was used to measure parental educational level. Educational attainment ranged from 1 (*eighth grade or less*) to 9 (*professional training beyond a 4-year college or university*). The annual family income reported by a parent was used to assess the participants' economic status. Income was highly positively skewed. Therefore, we applied a logarithmic transformation to the variable to improve its distributional properties by first increasing income by a value of one (so that the minimum income value would be one instead of zero; the logarithm of zero is undefined), and subsequently computing the base 10 logarithm of the incomes scores.

School attendance—Two questions were used to assess school attendance: participants were asked to report the number of times that they missed school with an excuse (e.g., sick or out of town) 0–3 (0 = *never*; 3 = *more than 10 times*) and the number of times that they missed school without an excuse (0 – 99 times).

Academic Achievement—The grades that participants reported they received in their most recent grading period for English, Mathematics, Social Studies, and Science were averaged ($A = 4.0$; D or lower = 1.0). The self-reported GPA was slightly higher than the school reported GPA but they were highly correlated ($r = .72$). The use of the school reported GPA did not change the results, and over 2,500 participants would have had to be excluded from analyses using the school-reported GPA because it was not reported in the school data.

Intelligence—Intelligence was estimated with an abridged version of the Peabody Picture Vocabulary Test (PPVT; Halpern, Joyner, Udry, & Suchindran, 2000). The test correlates well with other measures of intelligence and is well-suited for use in field surveys (Halpern et al., 2000).

Poverty concentration in school—To assess the poverty concentration in each school the proportion of students eligible for the free lunch program under the National School Lunch Act during the 1993–94 school year was used. The proportion of students eligible for free or reduced school lunch ranged from 0% to 85%. High-poverty schools are defined as

public schools where more than 75% of the students are eligible for free or reduced school lunch (Aud et al., 2010).

Sexual health knowledge—The sexual health knowledge of participants was measured with a “Knowledge Quiz” which was part of the in-home Add Health questionnaire in Wave I. The quiz was comprised of 10 true or false questions on various topics about human sexuality, scored as the respondent’s total number of correct answers. For example, students were asked, “The most likely time for a woman to get pregnant is right before her period starts.” *Don’t Know* was scored as an incorrect answer, whereas scores for participants who refused to answer some of the questions (<1% of all participants) were considered missing. The total score ranged from 0 to 10 (with higher scores indicating greater knowledge).

Analysis Plan

We used a model building approach to analysis (Singer & Willett, 2003), which is conceptually similar to hierarchical regression analysis. We started with a relatively simple model containing level-1 predictors (e.g., age, gender). In the second step, we added level-2 (i.e., school-level) predictors. Finally, in the third step we added interactions among level-1 and level-2 variables. Likelihood ratio tests were used to determine whether adding a set of predictors improved model fit relative to the simple model. To estimate the amount of variance in each outcome accounted for by the set of predictors, the correlation between the model-predicted scores and the actual scores was squared. This pseudo r^2 statistic is analogous to the r^2 statistic in multiple regression and can be interpreted similarly (Singer & Willett, 2003).

Results

Descriptive statistics

Table 1 shows the means, standard deviations, and ranges for sex knowledge, age, intelligence, family income, GPA, school poverty, and school size. Most of the study sample attended schools in or near large metropolitan areas and only a small percentage of schools had high levels of school poverty.

Model Testing

We first estimated a null model without predictors that partition the sexual health knowledge into within-school and between-school variability (Snijders & Bosker, 1999). In this model, 17.2% of the variance was between schools, whereas 82.8% of the variance was between students within schools. Another interpretation of this statistic, known as the intraclass correlation coefficient (ICC), is that the expected correlation between sexual health knowledge scores of two students randomly drawn from the same school was .17. Although the majority of the variability was between students within schools, rather than between schools, it was considered desirable to predict the between school variability using school characteristics. In addition, although level-2 predictors such as school poverty can only explain level-2 variability, cross-level interactions could potentially explain variability at level-1 and level-2.

In the first substantive model, depicted in column 1 of Table 2, we investigated whether there were sexual health knowledge differences between adolescents from advantaged and disadvantaged environments, accounting for age and intelligence (Hypothesis 1). Sexual health knowledge increased with age, but this was qualified by a quadratic effect for age, such that the association between sexual health knowledge and age was steepest for younger adolescents and leveled out for older adolescents. There was a similar pattern for intelligence: PPVT scores were more strongly related to sexual knowledge scores for

children with lower scores. Sexual health knowledge was higher in females than males. Neither family income nor parental education was associated with sexual health knowledge after accounting for verbal intelligence.

In Model 2, depicted in column 2 of Table 2, we included school level concentrations of poverty to test Hypothesis 2 that school level effects would contribute to sexual health knowledge. The main effect of school poverty was unrelated to sexual health knowledge after accounting for the individual-level variables.

To determine whether school factors moderate individual-level factors (Hypothesis 3), several interactions were tested in Model 3. Specifically, we tested the interaction of school poverty with the following variables: excused and unexcused absences from school, PPVT and PPVT², age and age², and GPA. Unexcused absence was a significant predictor of sexual health knowledge (inverse relationship between unexcused absences and sexual health knowledge); however, there was no significant interaction between school poverty and attendance. Consequently, we dropped it from the model. The interactions between school poverty and PPVT were not significant, and therefore were dropped from the final model. Figure 1 shows the simple slope of GPA on sexual health knowledge for adolescents attending schools with varying levels of poverty. To more clearly illustrate the association of poverty with GPA and sexual health knowledge, we chose to show the estimates for schools with no poverty (0%), the sample mean for school poverty (21%), and an estimate for so-called high poverty schools (75%). GPA had less of an effect at low poverty schools than at high poverty schools.

Figure 2 shows an analogous figure for the Age $\times$ Age $\times$ School Poverty interaction. Although students attending low poverty and high poverty schools start and end at similar levels of sexual health knowledge, in mid-adolescence there is a knowledge gap between these students. Specifically, students attending low poverty schools show an early, rapid increase in sexual health knowledge that is delayed in students attending high poverty schools.

The model containing these interactions fit significantly better than the main effects model. Although the increment in r^2 was small, this increase was the change in prediction while controlling for the individual-level predictors.

Discussion

Adolescence is the period during which risky behaviors leading to social and public health problems such as unplanned pregnancy and sexually transmitted infections start or peak. Consonant with previous studies and our hypothesis, adolescents from lower socio-economic backgrounds had lower levels of sexual health knowledge than their more affluent peers. This is an important finding as there is evidence that disparities in health literacy, such as sexual health knowledge, are associated with sexual risk taking (Berkman et al., 2011).

The key finding in this study is that the school environment exerts an effect, beyond individual socio-economic status, on the sexual health knowledge of adolescents. However, contrary to our hypothesis, school poverty was not directly associated with sexual health knowledge after controlling for individual characteristics. We viewed school poverty as a proxy for overall school resources and expected to see a main effect of school poverty. Instead, school poverty interacted with individual predictors of sexual health knowledge. As we hypothesized, students with poor academic outcomes were especially likely to have low levels of sexual health knowledge in the context of low-income schools. The effect of poor academic achievement on sexual health knowledge was muted in low poverty schools. As

shown in Model 3 and Figure 2, there was a significant interaction between school poverty and age; and as shown in Figure 1, there was a significant interaction between school poverty and GPA. The interaction plotted in Figure 2 indicates that, compared to their counterparts, adolescents in high-poverty schools take longer to increase their sexual health knowledge. This suggests that during middle adolescence, when many adolescents are beginning to engage in risky sexual behaviors known to lead to unplanned pregnancy and sexually transmitted infections, those in high-poverty schools have less knowledge to guide behavior than their peers in schools with lower levels of poverty. The interaction plotted in Figure 1 shows that the students in high-poverty schools with the lowest GPAs had significantly lower levels of sexual health knowledge than their counterparts in average and low poverty schools. This finding is of concern given that there is strong evidence to suggest an association between academic performance and sexual risk taking (Halpern et al., 2000; Kirby, 2002). Although further investigation is required to better understand how schools with a low income student body influence the sexual health knowledge and other health related outcomes of the students who attend those schools, the findings do indicate that interventions to improve the health of adolescents and reduce health disparities should include a focus on resources available in the school environment.

The factors that may explain the association between sexual health knowledge and school environment can be divided into two categories—resources of the school and needs of the students. The resources of schools serving students in high poverty schools—which tend to be urban—do not compare favorably to the resources of affluent schools. For examples, teachers in high poverty schools are less likely to have a master's degree and regular professional certification than teachers working in low-poverty schools (Aud et al., 2010). In addition, up to 30% of new teachers in large urban schools leave their positions within the first 3 years of teaching indicating high teacher turnover (Chittooran & Chittooran, 2010).

The student factors influencing the sexual health knowledge of students in high poverty schools include the fact that they come to school with a higher level of need than their affluent counterparts in low poverty schools (Aud et al., 2010; Chittooran & Chittooran, 2010). Compared to their affluent counterparts, students in high poverty schools are more likely to speak English as a second language, be homeless, and have unmet health care needs. Moreover, they are more likely to live in homes where there is less supervision and in neighborhoods where there are higher rates of crime (Aud et al., 2010; Lippman et al., 1996). These environmental characteristics adversely influence the learning environment, as there is an increased likelihood that students will not be able to actively engage with what is being taught in the classroom (Chittooran & Chittooran, 2010).

Our findings extend the understanding of how disadvantages in the lives of children and adolescents influence health disparities. Racial and ethnic minorities are more likely than their White counterparts to live in high poverty urban communities and to experience poorer health than their White counterparts in less distressed communities (Villaruel, 2004). To account for this health disparity most researchers have focused on the differences between these populations in terms of access to healthcare resources and health-related behaviors such as engagement in health-compromising behaviors (e.g., unprotected sexual intercourse, drug use). The results of this study signal that this focus should be broadened to include exploration of how the socio-economic environment of schools influences health (Ompad, Galea, Caiaffa, & Vlahov, 2007). As the findings suggest, this environment plays a role in the social shaping of disease.

Our results support policies that aim to increase the resources of high-poverty schools with increased funding (Basch, 2010). Without increased funding, students in these schools face a double burden due to correlated individual and school level incomes. Moreover, developing

policies to improve the outcomes for students attending high-poverty schools will become increasingly important as the number of students attending high-poverty schools is growing. According to the most recent Condition of Education report, one in six students now attends a high-poverty school (Aud et al., 2010).

There are several limitations of this study. First, although as for most researchers, we have used free or reduced school lunch eligibility to understand how school context influences child and adolescent outcomes, there are other school influences on adolescent sexual health knowledge that we did not investigate. Second, very few of the students in our study sample (1.5%) attended schools that would be defined as high-poverty schools (greater than 75% of students eligible for school lunch). Another limitation is that because high school students are likely not to declare their eligibility for free or reduced school lunch (Gleason, 1995) we may have underestimated the extent of school poverty. Future studies using multidimensional tools to quantify school poverty may improve our understanding of how school poverty influences health outcomes.

Conclusions

High school students from low socio-economic communities are less knowledgeable about sexual health than their peers from more affluent communities. This disparity in health information may be associated with future health disparities. If this association proves to be causal, improving the health knowledge of students attending schools with high concentrations of students from low-income households may be an effective means to reduce health disparities.

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Figure 1.
The interaction of GPA and school poverty on sexual health knowledge

Figure 2.
The interaction of age and school poverty on sexual health knowledge

Table 1

Descriptive Statistics for Participants and Schools

	Minimum	Maximum	Mean	SD
Sex Knowledge	0.00	10.00	6.14	1.94
Age (years)	14.97	21.27	16.96	1.10
PPVT (Intelligence)	14.00	130.00	100.73	13.89
Family Income	0.00	6.89	3.51	0.84
GPA	1.00	4.00	2.69	0.77
School Poverty (%)	0.00	85.00	21.10	16.07
School Size	100.00	3,550.00	1,420.00	938.00
Student-Teacher Ratio	9.00	29.00	19.60	4.41

Note. Peabody Picture Vocabulary Test (PPVT).

Table 2

Hierarchical Linear Models Predicting Sexual Health Knowledge.

	Model 1		Model 2		Model 3	
	<i>b</i>	<i>t</i>	<i>b</i>	<i>t</i>	<i>b</i>	<i>t</i>
Level-1 Predictors						
Intercept	6.00		5.99		5.98	
Age	0.26	12.42 ***	0.26	12.36 ***	0.25	11.20 ***
Age × Age	-0.04	-2.57 *	-0.04	-2.53 *	-0.03	-1.68
PPVT	0.03	16.02 ***	0.03	15.97 ***	0.03	15.97 ***
PPVT × PPVT	-0.00	-3.37 ***	-0.00	-3.39 ***	-0.00	-3.27 **
Female	0.18	4.02 ***	0.18	4.01 ***	0.17	3.92 ***
Latino	-0.08	-0.90	-0.07	-0.87	-0.08	-0.95
African-American	0.09	1.16	0.10	1.29	0.09	1.25
Asian	0.40	1.66	0.41	1.68	0.44	1.80
Native American	-0.11	-0.99	-0.11	-0.97	-0.12	-1.01
Other Race/Multiracial	0.22	2.91 **	0.22	2.92 **	0.22	2.89 **
Family Income	-0.00	-0.03	-0.00	-0.10	-0.00	-0.09
Parent Education	0.02	1.49	0.02	1.46	0.02	1.48
GPA	-0.01	-0.25	-0.01	-0.27	0.03	0.86
Level-2 Predictors						
School Poverty			-0.01	-1.26	-0.01	-1.93
Cross-Level Interactions						
School Poverty × Age					-0.00	-1.29
School Poverty × Age × Age					0.00	2.30 *
School Poverty × GPA					0.01	3.23 **
Random Effects						
	σ	<i>z</i>	σ	<i>z</i>	σ	<i>z</i>
School	0.501	4.72 ***	0.483	4.65 ***	0.490	4.67 ***
Residual	0.319	57.46 ***	3.187	57.46 ***	3.180	57.56 ***

	Model 1		Model 2		Model 3	
	<i>b</i>	<i>t</i>	<i>b</i>	<i>t</i>	<i>b</i>	<i>t</i>
−2 Log Likelihood	27,034.6		27,033.1		27,016.2	
Nested Model Comparison			$\chi^2(1) = 1.5, ns$		$\chi^2(3) = 16.9, p < .001$	
Pseudo r^2	9.03%		9.36%		9.52%	

Note.

 $p < .001$,

**
 $p < .01$,

*
 $p < .05$. Peabody Picture Vocabulary Test (PPVT).