# Research Papers

## Promoting School Connectedness: Evidence from the National Longitudinal Study of Adolescent Health

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**ABSTRACT:** *Increasing evidence shows that when adolescents feel cared for by people at their school and feel like a part of their school, they are less likely to use substances, engage in violence, or initiate sexual activity at an early age. However, specific strategies to increase students' connectedness to school have not been studied. This study examined the association between school connectedness and the school environment to identify ways to increase students' connectedness to school. Data from the in-school and school administrator surveys of the National Longitudinal Study of Adolescent Health (75,515 students in 127 schools) and hierarchical linear models were used to estimate the association between school characteristics and the average level of school connectedness in each school. Positive classroom management climates, participation in extracurricular activities, tolerant disciplinary policies, and small school size were associated positively with higher school connectedness.* (J Sch Health. 2002;72(4):138-146)

When adolescents feel cared for by people at their school and feel like a part of their school, they are less likely to use substances, engage in violence, or initiate sexual activity at an early age. Students who feel connected to school in this way also report higher levels of emotional well-being.[1-3] In an analysis of risk and protective factors for eight different health risk outcomes among adolescents, Resnick et al[1] identified school connectedness as the only school-related variable that was protective for every single outcome.

Intervention research suggests that the relationship may be causal: increasing students' sense of connectedness to school decreases health-risk behavior. For example, a classroom management program that increased school connectedness and promoted self-discipline found that after one year, 30%-100% fewer students were sent to the principal's office for acting out in class, fighting, or assault.[4] Variation in the decrease depended on the intensity of program implementation. The Institute of Medicine speculates that "in some situations, a healthful psychosocial environment [in school] may be as important — or even more important — than classroom health education in keeping students away from drugs, alcohol, violence, risky sexual behavior, and the rest of today's social morbidities."[5]

Why do some adolescents feel connected to school while others do not? Students enter school with a range of predispositions toward education as well as with varying levels of family encouragement to do well in school. Yet, theory and empirical evidence also suggest that schools can influence students' feelings of being cared for at school. This study adopted the stage-environment fit perspective to explore ways in which schools can enhance school connectedness.[6] Stage-environment fit theory suggests behavior, motivation, and mental health are influenced by the fit between the developmental stage of the adolescent and the characteristics of the social environment. Adolescents are not likely to feel connected to school if they are in a school that does not meet their developmental needs. Conversely, school connectedness is maximized when the social environment meets their core developmental needs. The main developmental needs of middle and high school students include steadily increasing opportunities for autonomy, opportunities to demonstrate competence, caring and support from adults, developmentally appropriate supervision, and acceptance by peers.[6-8]

The challenge for public health professionals and school leaders is to identify and promote school attributes and policies that correspond to adolescents' developmental needs. By extension, these policies should promote school connectedness. This analysis used data from a nationally representative sample of 7th-12th-grade students to test the association between connectedness and several features of schools positively linked, both theoretically and empirically, to developmental needs of adolescents.

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## METHODS

### Data

The National Longitudinal Study of Adolescent Health (Add Health) is a longitudinal, nationally representative study of adolescents in grades 7-12.[9] The primary sampling frame for the Add Health study included all high schools in the United States that included an 11th grade and at least 30 students. A stratified, random sample of 80 schools was selected, and for each sampled high school, a feeder school (typically a middle school) was selected. A confidential paper-and-pencil survey was administered to all students in each sample school during the 1994-1995 academic year. The in-school questionnaire was completed by 77% of enrolled students. School administrators also completed

self-administered questionnaires about school policies and procedures, teacher characteristics, and student body characteristics.

Add Health is uniquely applicable to understanding the effects of school context on connectedness to school. It offers the only current, nationally representative dataset that contains information on both students' feelings of connectedness and school attributes. In addition, the school-level variables were either reported by an exogenous source (school administrators) or were aggregate responses of all students in the school, assuring that the school-level measures reflect the true social structure of the school.

This analysis examined data from both the in-school and school administrator questionnaires. The sample was restricted to weighted data (83,074 students from 127 schools) to ensure national representativeness. An additional 10.9% of the sample was dropped because of missing responses to questions comprising the school connectedness scale. These questions were located at the end of the questionnaire, and not all students completed the entire questionnaire.

Students missing school connectedness scores differed from the remaining students in ways consistent with aptitude for completing self-administered questionnaires. They were younger (14.4 compared to 15.1 years), twice as likely to be old for their grade, and had lower grade point averages (2.5 compared to 2.8). Respondents missing school connectedness scores also were more likely to be male (61% compared to 51%), Latino (32% compared to 15%), and Black (24% compared to 14%). The final sample included 71,515 students in 127 schools.

## Measures

***Outcome Variable.*** The outcome variable, school connectedness, was constructed from responses to five statements: "I feel close to people at this school," "I feel

Table 1
**Exploratory Hypotheses About the Association Between School Characteristics and School Connectedness**

| | |
|---|---|
| **Demographic Composition** | |
| Percent Black<br>Percent Latino | When schools are more desegregated, peer networks within schools are more segregated and connection to school decreases.[16] |
| Percent two-parent families | There will be no differences across schools above and beyond the individual-level effect of living in a two-parent household. |
| **Teacher Qualifications** | |
| Percent of teachers in their first year of teaching at the school | Inexperienced teachers have, on average, lower self-efficacy and poorer classroom management skills.[6] Hence, students in schools with a high percentage of first-year teachers may feel less connected to school. A high percentage of first-year teachers may also be a proxy for school turmoil and transition. |
| Percent of teachers with a master's degree | Teachers who are more knowledgeable in their subject matter have higher self-efficacy. Students feel more connected in schools with high teacher self-efficacy.[6] |
| **Discipline Policies** | |
| Students receive out-of-school suspension or expulsion the first time they are caught cheating (1 = yes, 0 = no)<br><br>Students receive out-of-school suspension or expulsion the first time they are caught smoking (1 = yes, 0 = no)<br><br>A 10-item scale ($\alpha$ = .78) consisting of the mean discipline policy for possessing alcohol, drinking alcohol, possessing an illegal drug, using an illegal drug, destroying school property, verbally abusing a teacher, fighting, injuring another student, carrying a weapon, and injuring a teacher. The scale is divided into four categories of policies: harsh (6.5 or higher), modal (6.0 to 6.5), moderate (5.5 to 6.0) and lenient (< 5.4).<br><br>(All discipline variables based on school administrator responses to the question, "In your school, what happens to a student who is caught:" Responses are a Likert-type scale, which ranges from 1 (no policy) to 7 (expulsion). A value of 6 represents out-of-school suspension and 5 represents in-school suspension.) | Harsh consequences for the first violation of school policy creates an authoritarian environment in which students feel less connected.[26] |

like I am part of this school," "I am happy to be at this school," "The teachers at this school treat students fairly," and "I feel safe in my school." Response options for each statement used five-point, Likert-type scales ranging from "strongly agree" to "strongly disagree." Responses to the five items were summed, and the scale was reverse-coded so a higher score reflected greater connectedness. The scale produced good internal consistency ($\alpha = .79$).

***School-level Variables.*** This paper focuses on structural and environmental features of schools linked theoretically and empirically to the developmental needs of adolescents. These school variables are classified in five categories. Table 1 contains school measures and the hypothesized relationships with school connectedness. *Demographic composition* of the school is measured by the school's racial/ethnic composition and the percent of two-parent families. Due to the biomodal distribution of percent Latino, this variable was treated as a categorical variable, and high percent Latino (more than 80%) was compared to lower categories. Two indicators of *teacher qualifications* included percent of teachers in their first year of teaching at the school, and percent of teachers with a master's degree.

*Discipline policies* of the school capture severity of punishment for the first occurrence of an infraction. Policies range from relatively common, nonviolent infractions (cheating and smoking) to severe offenses such as injuring another student or carrying a weapon. Three measures of discipline severity included 1) whether students receive out-of-school suspension or expulsion the first time they are caught cheating, 2) whether students

Table 1 *(continued)*
**Exploratory Hypotheses About the Association Between School Characteristics and School Connectedness**

| | |
|---|---|
| **Structural School Characteristics** | |
| School size (measured in 100s) | 1) *Direct effect.* As schools grow, they become more bureaucratic. Connections between individuals become less personal, and both students and staff feel less connected to school.[6,19]<br>2) *Indirect effect.* In larger schools, students have fewer opportunities to participate in extracurricular activities. Participation in extracurricular activities is positively associated with student connectedness.<br>3) *Indirect effect.* Larger schools have larger class sizes, and larger classes make personal connections between students and teachers more difficult. |
| Class size | Personal connections between students and teachers are more difficult in larger classes. |
| Public schools (dummy variable: 1 = public, 0 = private) | Parents and students self select into private schools. Connectedness will be higher in private schools because families have chosen those environments and invest in them heavily relative to public schools.[27] |
| Urbanicity<br>(dummy variables for rural and suburban; urban is the referent category) | There will be no differences across schools based on location because the determinants of connectedness are more proximal to the school environment than is urbanicity. |
| **Student Participation and Classroom Management** | |
| Percent of students who participate in no extracurricular activities (based on a list of 33 activities including sports, academic clubs, music, newspaper, and yearbook) | Extracurricular activities provide support and supervision from prosocial adults, positive peer relationships and opportunities to develop and demonstrate competence. As the percentage of students involved in nonacademic activities in their school increases, the average level of connection to school also increases.[28,29] |
| Classroom management climate<br>A four-item scale ($\alpha = .83$) based on responses to the questions, "Since school started this year, how often have you had trouble: Getting along with your teachers? Paying attention in school? Getting your homework done? Getting along with other students?" Responses ranged from "never" (0) to "every day" (4). The classroom management climate score was the mean of these four items. | High values on this scale indicate that students are disengaged, unmotivated and/or acting in ways that shift the focus in the classroom environment away from learning. When classrooms are not well managed, the overall level of school connectedness decreases.[30,31] |

receive out-of-school suspension or expulsion the first time they are caught smoking, and 3) a composite discipline score consisting of the mean discipline policy for 10 other infractions ranging from possessing alcohol to injuring a teacher ($\alpha = .78$).

Relatively low reliability for the 10-item scale occurred due to lack of variability among policies for more serious violations, such as carrying a weapon to school or injuring a student or teacher. The scale ranges from 4.8 to 6.8, where 7 represents expulsion, 6 represents out-of-school suspension, and 5 represents in-school suspension. Scores below 5 represent successively decreasing punitive consequences. The scale categories include harsh discipline policies (6.5 or greater), average policies (6.0 to 6.5), moderate policies (5.5 to 6.0), and lenient policies (5.4 or less).

*Structural characteristics* in the model include school

Table 2
**Weighted Description of the Sample, Add Health In-School Sample**

| | Mean/Percent | Standard Deviation | Minimum | Maximum |
|---|---|---|---|---|
| **School-Level Variables (n = 127)** | | | | |
| Mean school connectedness | 3.64 | (.25) | 3.13 | 4.42 |
| *Demographic Characteristics* | | | | |
| Percent two-parent families | 75.4 | (13.1) | 43.9 | 97.1 |
| Percent Black | 14.0 | (23.8) | 0 | 89.4 |
| Percent Latino | 11.4 | (13.6) | 0 | 93.2 |
| *Teacher Qualifications* | | | | |
| Percent teachers in first year | 9.2 | (11.4) | 0 | 99.0 |
| Percent teachers with master's degree | 41.7 | (24.9) | 0 | 95.0 |
| *Structural School Characteristics* | | | | |
| Public | 82.7 | | | |
| Suburban | 59.6 | | | |
| Rural | 18.6 | | | |
| School size | 642.0 | (765.1) | 42 | 5,422 |
| Class size | 22.6 | (6.7) | 10 | 39 |
| *Discipline Policies* | | | | |
| Out-of-school suspension for smoking | 37.8 | | | |
| Out-of-school suspension for cheating | 3.6 | | | |
| Lenient discipline climate (< 5.5) | 25.6 | | | |
| Moderate discipline climate (5.5 - 5.9) | 24.9 | | | |
| Modal discipline climate (6.0 - 6.4) | 36.9 | | | |
| Harsh discipline climate (> 6.4) | 12.6 | | | |
| *Student Participation & Classroom Management* | | | | |
| Percent in no extracurricular activities | 17.2 | (13.7) | 0 | 58.6 |
| Mean classroom management climate | 1.7 | (30.6) | .61 | 2.2 |
| **Individual-Level Variables (n = 75,515)** | | | | |
| Age | 14.9 | (28.4) | 10 | 19 |
| Two-parent family | 71.2 | | | |
| Black | 15.0 | | | |
| Latino | 12.2 | | | |
| Female | 51.8 | | | |
| GPA is 3.5 or higher | 26.2 | | | |
| GPA is between 2.5 and 3.4 | 44.3 | | | |
| Does not receive grades | 5.4 | | | |
| ln (number of extracurricular activities) | 1.0 | (10.8) | 0 | 3.4 |
| Classroom management score | 1.6 | (18.6) | 0 | 4.0 |
| Skipped school more than two times in last year | 12.6 | | | |

Note: no standard deviations presented when the descripitve statistic is a percent.

size; class size; whether the school is public or private; and whether the school is urban, suburban, or rural. Also included is the *percent of students who do not participate in any extracurricular activities,* and the *classroom management climate,* the school mean of responses to four questions: Since school started this year, how often have you had trouble "getting along with your teachers?" "getting along with other students?" "paying attention in class?" and "getting your homework done?" ($\alpha$ = .83). Response options for each statement used five-point, Likert-type scales ranging from "never" to "every day."

***Individual-level Variables.*** This paper focuses on effects of school-level characteristics on school connectedness, but models also include individual-level characteristics to adjust for compositional differences within schools. Eight individual-level attributes are included: race/ethnicity (composed of indicators for Black and Latino, with the reference category as White/Other), family structure (1 = two-parent, 0 = other), age, gender (1 = female, 0 = male), grade point average (indicator variables for As, Bs, Cs or lower, and does not receive grades in their school), whether the student participates in any extracurricular activities, the individual score on the classroom management scale, and whether the student skipped school more than twice in the past 12 months.

## Multilevel Models

Hierarchical linear models (HLM) estimated the associa-

Table 3
**Weighted School-Level HLM Coefficients from the Regression of School Connectedness on School-Level and Individual-Level Predictors, Add Health In-School Sample**

| | Model 1 Demographic Characteristics | | Model 2 Demographics and Teacher Qualifications | | Model 3 Demographics and Discipline Policies | |
|---|---|---|---|---|---|---|
| | Coefficient | t-Ratio | Coefficient | t-Ratio | Coefficient | t-Ratio |
| Intercept | 3.599*** | (209.64) | 3.599*** | (210.19) | 3.599*** | (216.19) |
| **Demographic Characteristics** | | | | | | |
| Percent two-parent families | .085** | (3.02) | .087** | (3.13) | .083** | (3.19) |
| Percent Black | -.056* | (-2.31) | -.054* | (-2.21) | -.045 | (-1.75) |
| Percent Black Squared | .090** | (3.50) | .088** | (3.42) | .077** | (2.90) |
| School more than 80% Latino | .069 | (1.01) | .066 | (.98) | .064 | (.93) |
| **Teacher Qualifications** | | | | | | |
| Percent teachers in first year | | | -.000 | (-.59) | | |
| Percent teachers with master's degree | | | -.000 | (-.09) | | |
| **Discipline Policies** | | | | | | |
| Harsh smoking policy | | | | | .040 | (1.46) |
| Harsh cheating policy | | | | | -.086 | (-.92) |
| Lenient policy climate | | | | | .092 | (.95) |
| Modal policy climate | | | | | -.086* | (-2.33) |
| Harsh policy climate | | | | | -.118* | (-2.42) |
| **Structural School Characteristics** | | | | | | |
| Public | | | | | | |
| Suburban | | | | | | |
| Rural | | | | | | |
| Ln school size (in 100s) | | | | | | |
| Class size | | | | | | |
| **Student Participation & Classroom Management** | | | | | | |
| Percent in no extracurricular activities | | | | | | |
| Mean classroom management score | | | | | | |
| Percent of between-school variance explained | 22.8 | | 21.9 | | 24.8 | |

Note: N = 71,515 for individual-level variables; N = 127 for the school-level variables. All individual-level variables presented in Table 4 are included in these models.
* p < .05; ** p < .01; *** p < .001 (two-tailed tests)

tion between school characteristics and students' connectedness to school.[10,11] These models are well-suited for the multi-level nature of the research question, and for the nested data structure of Add Health, in which observations within schools are not independent. Within-school (individual-level) and between-school (school-level) models are estimated simultaneously. The within-school model regresses individual-level school connectedness on the individual-level characteristics. Because individual-level characteristics are centered around their school means, parameter estimates are interpreted as the additive effect of the covariate relative to the school mean rather than the sample mean.

At the school level, it is possible to model each of the parameters for the individual-level model as a function of school-level characteristics. In the intercept model, mean level of school connectedness in each school is regressed on the school-level variables. This model demonstrates association between school characteristics and the average level of connectedness. Since the central question of this paper asks whether school structure and environment are associated with shifts in the average level of school connectedness in a school, slope coefficients are not modeled as a function of school variables. Six slope coefficients from the individual-level model are estimated as random effects; they are allowed to vary randomly across schools. Based on preliminary analyses, the other five slope coefficients are constrained to be constant across schools.

Table 3 *(continued)*
**Weighted School-Level HLM Coefficients from the Regression of School Connectedness on School-Level and Individual-Level Predictors, Add Health In-School Sample**

| | Model 4 Demographic and Structural Characteristics | | Model 5 Demographics, Participation, and Management | | Model 6 Full Model | |
|---|---|---|---|---|---|---|
| | **Coefficient** | **t-Ratio** | **Coefficient** | **t-Ratio** | **Coefficient** | **t-Ratio** |
| Intercept | 3.600*** | (232.97) | 3.599*** | (218.15) | 3.599*** | (243.62) |
| **Demographic Characteristics** | | | | | | |
| Percent two-parent families | .075** | (2.84) | .013 | (.334) | .031 | (.90) |
| Percent Black | -.052* | (-2.29) | -.061** | (-2.78) | -.037 | (-1.65) |
| Percent Black Squared | .077** | (3.16) | .071** | (2.77) | .048 | (1.94) |
| School more than 80% Latino | .160* | (2.54) | .156 | (3.22) | .216*** | (4.22) |
| **Teacher Qualifications** | | | | | | |
| Percent teachers in first year | | | | | | |
| Percent teachers with master's degree | | | | | | |
| **Discipline Policies** | | | | | | |
| Harsh smoking policy | | | | | | |
| Harsh cheating policy | | | | | | |
| Lenient policy climate | | | | | -.001 | (-.01) |
| Modal policy climate | | | | | -.073** | (-2.46) |
| Harsh policy climate | | | | | -.143** | (-2.90) |
| **Structural School Characteristics** | | | | | | |
| Public | -.015 | (-.22) | | | | |
| Suburban | -.037 | (-.95) | | | | |
| Rural | -.026 | (-.44) | | | | (-4.62) |
| Ln school size (in 100s) | -.084** | (-3.52) | | | -.089*** | |
| Class size | -.005 | (-1.14) | | | | |
| **Student Participation & Classroom Management** | | | | | | |
| Percent in no extracurricular activities | | | -.069** | (-3.22) | -.027* | (-1.99) |
| Mean classroom management score | | | -.213 | (-1.88) | -210* | (-2.12) |
| Percent of between-school variance explained | 36.6 | | 27.6 | | 41.8 | |

Note: N = 71,515 for individual-level variables; N = 127 for the school-level variables. All individual-level variables presented in Table 4 are included in these models.
* p < .05; ** p < .01; *** p < .001 (two-tailed tests)

The number of school-level covariates that can be included in a model is constrained by the number of schools in the sample. In this case, including all school-level covariates in the school-level model would overfit the model.[11] Consequently, submodels are fit for each of the four conceptually distinct categories of school characteristics, with demographic composition variables included in all models. The strongest predictors from each submodel are combined in an overall model.

## RESULTS

### Descriptive Results

The average level of school connectedness in all schools is 3.64 on a scale from 1 to 5, indicating most students in most schools feel quite attached to school. The restricted range of mean school connectedness across the 127 schools (from 3.1 to 4.4) indicates that at no schools do the majority of students feel totally disconnected, and at no schools do all students feel enchanted with their school career.

The intraclass correlation coefficient (ICC) is .12, meaning that 12% of total variance in school connectedness is due to between-school variance. An ICC of this magnitude is consistent with previous research on school effects. Large school differences can translate into small ICCs.[11] Moreover, the measure of school connectedness is highly reliable ($\lambda$ = .93), indicating the measured variance in connectedness across schools did not occur due to measurement error.

Schools in the sample are predominantly suburban (60%) and public (83%) (Table 2). Their size spans the full range from tiny schools (42 students) to mega-schools with more than 5,000 students. Average class size is just under 23 students. The racial/ethnic composition of schools mirrors the racial/ethnic composition of this adolescent cohort: 14% Black and 11% Latino. These averages, however, mask the uneven distribution of students of color across schools. The mean classroom management score is 1.7, which equates to a frequency of slightly less than once a week that each student has trouble getting along with others, trouble paying attention in class, or trouble getting homework done. Most students (83%) participate in at least one extracurricular activity.

Nearly 40% of schools give out-of-school suspension the first time a student is caught smoking, but less than 4% give out-of-school suspension the first time a student is caught cheating. Thirteen percent of schools give out-of-school suspension or even expel students for the 10 infractions listed in the discipline climate scale, including possession of alcohol and fighting. One-quarter of schools have a lenient discipline climate. In these schools, students receive out-of-school suspension or expulsion for only the most serious offenses.

### Multivariate Results

***School-level Findings.*** The dependent variable for the school-level model is the mean level of school connectedness in each school. Table 3 contains school-level models that control for effects of the individual-level covariates. The association between percent of students who are Black and mean level of school connectedness is consistent across all of the models, although parameter estimates fall just short of statistical significance in the final model.

A curvilinear relationship exists such that the level of school connectedness is lowest in racially integrated schools. Students who attend a school more than 80% Latino feel significantly more attached to school than students in schools not predominantly Latino. Only three schools in the sample reported student bodies more than 80% Latino, and hence it is unwise to offer substantive interpretation of this finding. The percent of students from two-parent families was not associated with school connectedness when other school characteristics are included in the model.

Model 2 presents coefficients for teacher qualifications, controlling for school-level demographic characteristics and individual-level characteristics. Neither the percent of teachers in their first year nor the percent of teachers with a master's degree is associated with average level of school connectedness. School connectedness is lower in schools that expel a student temporarily or permanently for infractions more serious than cheating or smoking (Model 3 in Table 3). Discipline policies for cheating and smoking are not associated with school connectedness. Together, policy variables account for only a fraction of between-school variance.

The next model, Model 4 in Table 3, presents associations between structural school characteristics and school connectedness. Among the structural characteristics explored, only school size is associated with school connectedness. As school size increases, school connectedness declines. The strength of this association, however, is fairly weak. An increase of 500 students in school size — a change of major economic significance to a school district

Table 4
**Weighted Individual-level HLM Coefficients from Regression of School Connectedness on Individual-level Predictors and School-level Predictors (Model 6 in Table 3)**

| | *Coefficient* | t-*Ratio* |
|---|---|---|
| Intercept | 3.599*** | (243.62) |
| Age | -.043*** | (-10.12) |
| Two-parent family | .056*** | (5.79) |
| Black | -.074** | (-3.29) |
| Latino | .019 | (.97) |
| Female | -.093*** | (-7.31) |
| GPA is 3.5 or higher | .206*** | (16.53) |
| GPA is between 2.5 and 3.4 | .106*** | (7.92) |
| Does not receive grades | -.024 | (-.56) |
| No extracurricular activities | -.283*** | (-18.22) |
| Classroom management score | -.069*** | (-12.56) |
| Ever skipped school | -.411*** | (-17.37) |
| Percent of within-school variance explained | 10.5 | |

Note: N = 71,515 for individual-level variables; N = 127 for the school-level variables. All school-level variables presented in Model 6, Table 3 are included in this model.
* p < .05; ** p < .01; *** p < .001 (two-tailed tests)

— is associated with a very small decline in school connectedness (.04 units on a 0-4 scale). This model also shows that the effect of school size is not mediated by class size. Though classes are larger in large schools (r = .37), class size itself is not associated with school connectedness. Despite the small magnitude of the association between connectedness and school size, school size accounts for a significant portion of the between-school variation in school connectedness.

Model 5 presents coefficients for extracurricular activities and classroom management climate. Both variables are associated with school connectedness. As the classroom management climate declines, so does overall school connectedness. Conversely, as more students participate in extracurricular activities during or after school, overall connectedness is higher.

Model 6 in Table 3 combines the strongest predictors (those with t-ratios greater than 1.5) from each of Models 1-5. The effect for discipline policies remains essentially unchanged from Model 3. The effect for school size also does not change from Model 4. Model 4 demonstrated the first hypothesis regarding school size — that the association with connectedness is due to class size (Table 1) — does not hold. Model 6 reveals that the second hypothesis — that the association is due to greater opportunities to participate in extracurricular activities in smaller schools — is not supported either. Instead, it appears that school size partially mediates the association between participation in extracurricular activities and mean school connectedness. The magnitude of the coefficient for the mean classroom management score remains unchanged from Model 5. The final model explains 41.8% of between-school variance in school connectedness.

***Individual-level Findings.*** Table 4 presents the individual-level coefficients. Females and Black students feel less connected to school, whereas students from two-parent families feel slightly more connected to school than do students in other family types. Coefficients for these demographic variables, however, are small relative to the effect sizes for age, grade-point average, participation in extracurricular activities, and skipping school. Together, individual-level and school-level covariates explain 10.9% of within-school variance.

## DISCUSSION

Schools have always been an important place for intervention to improve student health. Traditional public health approaches include immunization programs, nutrition programs, health and physical education curricula, and health services. Yet, these programs do not address a crucial requirement for student health and well being: the need to feel like one belongs to and is cared for at school. This analysis explored the association between attributes of schools and school connectedness to identify potential ways schools can improve student well being.

The analysis revealed that school connectedness is lower in schools with difficult classroom management climates. Intervention research has demonstrated that classroom management climate can be improved dramatically through teaching and discipline reforms. When teachers are empathetic, consistent, encourage student self-management, and allow students to make decisions, the classroom management climate improves.[13,14]

The overall level of school connectedness is lower in schools that temporarily expel students for relatively minor infractions such as possessing alcohol, compared to schools with more lenient discipline policies. When students are permanently expelled for the first occurrence of an infraction, connectedness is lower still. From this cross-sectional data it is not clear whether harsh discipline policies make students feel less attached to school or if some other, unmeasured variable causes the correlation between connectedness and severity of discipline policies. Still, this finding is relevant to the current discussion of zero-tolerance discipline policies. Zero-tolerance policies, which mandate harsh punishment (usually expulsion) for the first occurrence of an infraction, seek to make schools safer. Yet, students in schools with harsh discipline policies report feeling less safe at school than do students in schools with more moderate policies.

On average, students in smaller schools feel more attached to school than students in larger schools. This finding contributes to mounting evidence that very large schools are not good for students.[15-17] Several researchers suggest that large school size negatively affects school connectedness because, in such settings, teachers cannot maintain warm, positive relations with all students.[6,18,19] Though the school size coefficient explains a meaningful proportion of the variance in school connectedness, in this analysis the effect size is small. Moreover, the school size that would maximize school connectedness — schools with less than 300 students — is not optimal for academic achievement. Lee and Smith[17] demonstrated that the optimal high school size for academic achievement ranges from 600 to 1,200 students.

Class size was not associated with school connectedness. In general, research on class size and student outcomes is more ambiguous than research on school size.[20] Even large classes may be a small enough social unit for social integration to occur. In addition, students may have been assigned nonrandomly to different class sizes in ways that confound the effect of class size. For example, lower-ability students are more likely to be in smaller classes than their higher-ability peers.[21] If lower-ability students are less connected to school, and ability is not adequately controlled in the model, effect of class size could be masked. In addition, class size may matter more for some students than others, and the main effects model does not distinguish those effects.

School connectedness is relatively high in racially or ethnically segregated schools and lowest in integrated schools. This result confirms the finding of Moody and Bearman.[16] They demonstrated that, in racially integrated schools, friendship groups often are racially segregated because enough students of each racial group are available to form friendships internal to the group. When friendship patterns are segregated by race, students of all racial groups feel less attached to school. To the extent that minority students are disproportionately assigned to lower-track classes, school policies unintentionally exacerbate the segregation of friendship patterns.[22]

Some educators advocate segregation of schools by race and gender to enhance the school experience for girls and minorities.[23,24] However, some racially integrated schools in the Add Health sample have high levels of school connectedness, demonstrating that segregation is not a prerequisite

for connectedness. Moreover, segregation of schools has other undesirable consequences, including the unequal distribution of resources that traditionally has accompanied school segregation.

This paper also confirms the association between individual characteristics and school connectedness previously identified.[16] Students who participate in extracurricular activities, receive higher grades, and do not skip school feel more attached to school. As students grow older, they feel less attached to school. Eccles et al[6] document the decline in student engagement and motivation between elementary school and junior high. They demonstrate how changes in the school environment between sixth and seventh grade decrease students' opportunities for autonomy and relatedness. Results from this analysis suggest the stage-environment mismatch continues to worsen through junior and high school.

Findings in this paper should be interpreted with caution because the school-level effects may not be true contextual effects, but a reflection of nonrandom selection of more attached students into certain types of schools. Interpretation also should consider that the dependent variable is the average level of connectedness within a school. School policies implemented to increase the average level of school connectedness need to be sensitive to the heterogeneity of students because policies may differentially affect subgroups within a school. For example, students who feel socially isolated may be more sensitive to the negative effects of school size.

## CONCLUSION

As Resnick et al[1] showed in their original analysis of Add Health data, school connectedness is associated with diminished involvement in a range of adolescent health-risk behaviors. This analysis demonstrates that four school attributes — classroom management climate, school size, severity of discipline policies, and rates of participation in extracurricular activities — explain a significant percent of between-school variance in school connectedness. Not only are these four factors amenable to change, but evidence suggests that schools have successfully changed these factors. The concept of school health promotion should be expanded beyond health education, physical education, and health services. Adolescent health also may be promoted by fostering a school environment that meets adolescents' developmental need to feel like they belong and are cared for at school. ■

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