

School Effects on Psychological Outcomes During Adolescence

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Data from the National Longitudinal Study of Adolescent Health were used to examine school-level differences in the relations between school belonging and various outcomes. In Study 1, predictors of belonging were examined. Results indicated that belonging was lower in urban schools than in suburban schools, and lower in schools that used busing practices than those that did not. In Study 2, the relations between belonging and psychological outcomes were examined. The relations varied depending on the unit of analysis (individual vs. aggregated measures of belonging). Whereas individual students' perceptions of belonging were inversely related to depression, social rejection, and school problems, aggregated belonging was related to greater reports of social rejection and school problems and to higher grade point average.

Research on school-level differences during adolescence often has focused on nonpsychological outcomes, such as academic achievement and behavioral issues, instead of on psychological outcomes (Roeser, 1998). Indeed, research on school-level differences in nonacademic variables is quite rare. The purpose of the present research was to examine school-level differences in a variety of psychological outcomes, using a large nationally representative sample of adolescents.

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School Effects on Student Outcomes

Although there is an abundant literature on effective schools, most of the research in this literature has focused on academic variables, such as achievement, dropping out, and grade point average (GPA; e.g., Edmonds, 1979; Miller, 1985; Murphy, Weil, Hallinger, & Mitman, 1985). This literature generally indicates that schools that are academically effective have certain recognizable characteristics.

Some of these studies have examined differences between public schools and other types of schools. For example, some research indicates that students who attend public schools achieve more academically than do students who attend other types of schools (e.g., Coleman & Hoffer, 1987). Other research suggests that there may be a benefit in terms of academic achievement for students who attend Catholic schools compared with non-Catholic schools (Bryk, Lee, & Holland, 1993). Lee and her colleagues (Lee, Chow-Hoy, Burkam, Gevert, & Smerdon, 1998) found that students who attended private schools took more advanced math courses than did students who attended public schools. However, they also found specific benefits for Catholic schools: Specifically, in Catholic schools, there was greater school influence on the courses that students took, and the social distribution of course enrollment was found to be particularly equitable.

In recent years, psychologists have started to become interested in the effects of schooling on mental health outcomes (e.g., Boekaerts, 1993; Cowen, 1991; Roeser, Eccles, & Strobel, 1998; Rutter, 1980). However, little research to date has examined school-level differences in mental health outcomes. One of the areas that has received considerable attention has been the study of dropping out. Rumberger (1995) found that perceptions of schools' fair disciplinary policies by students are related to lower drop-out rates. A recent study using data from the National Education Longitudinal Study (NELS) found that after controlling for student characteristics, drop-out rates were higher in public schools than in private schools (Goldschmidt & Wang, 1999). Goldschmidt and Wang (1999) also found that a school's average family socioeconomic status (SES) was related to drop-out rates. Specifically, in both middle schools and high schools, drop-out rates were higher

when there were high numbers of low-SES children attending the school.

Perceptions of School Belonging

In recent years, a small but important literature on school belonging has emerged. Results of a variety of studies converge on the consistent finding that perceiving a sense of belonging or connectedness with one's school is related to positive academic, psychological, and behavioral outcomes during adolescence. Although different researchers operationalize and study belonging in various ways, there is a general consensus among a broad array of researchers that a perceived sense of belonging is a basic psychological need and that when this need is met, positive outcomes occur.

Baumeister and Leary (1995) have discussed belonging as a construct that is important to all aspects of psychology. Specifically, they have argued that the need to belong is a fundamental human motivation, that individuals desire to form social relationships and resist disruption of those relationships, and that individuals have the need to experience positive interactions with others and these interactions are related to a concern for the well being of others. In addition, they have demonstrated that when individuals are deprived of belongingness, they often experience a variety of negative outcomes, including emotional distress, various forms of psychopathology, increased stress, and increased health problems (e.g., effects on the immune system). Baumeister and Leary argued that belonging is a need rather than a want because it has been related to these and other outcomes; that is, if an individual is deprived of such a need (as opposed to something that the individual wants), then negative outcomes (e.g., stress, health problems) may occur (Baumeister & Leary, 1995, p. 520).

Deci and colleagues (Deci, Vallerland, Pelletier, & Ryan, 1991), in their discussion of self-determination theory, have included the concept of relatedness as one of the basic psychological needs inherent to humans (the other two needs are the need for competence and the need for autonomy). Deci et al. argued that social-contextual influences that support students' relatedness lead to intrinsic motivation if the individuals who provide support to the student are also supportive of the student's autonomy.

Finn (1989) related the concept of belonging to drop-out behavior. Finn developed the participation-identification model to attempt to explain this behavior. Finn's model posits that students who identify with their schools develop a perception of school belonging. It is this perception of belonging that facilitates the students' academic engagement and commitment to schooling. When a sense of belonging is not nurtured in students, they may become more likely to drop out.

Some programs of research have examined belonging (and related variables) specifically in relation to school learning environments. Most of these studies indicate that when students experience a supportive environment in school, they are more likely to experience positive outcomes. For example, Newman, Lohman, Newman, Myers, and Smith (2000) interviewed urban adolescents making the transition into ninth grade. One of the factors distinguishing successful from unsuccessful transitions was that high-achieving middle-school students who made a successful transition into high school reported having friends who supported their academic goals. This notion of peer support of goals is an im-

portant component of many operational definitions of school belonging.

Battistich and colleagues (Battistich, Solomon, Watson, & Schaps, 1997) have demonstrated that the presence of a "caring school community" often is associated with positive outcomes for students. Battistich et al. agreed with the tenets of Deci et al. (1991) regarding students' needs for belonging. However, Battistich et al. argued that when the school environment facilitates student participation in a caring community, students' needs for belonging (as well as for autonomy and competence) are met. The results of Battistich et al.'s program of research indicates that a sense of community is related to a variety of positive outcomes for students, such as improved social skills, motivation, and achievement (Battistich et al., 1997).

Goodenow (1993b) developed a measure of the psychological sense of school membership for use with adolescents. The scale originally was developed and validated on samples of early adolescents from suburban and urban schools. Students' reported perceptions of school membership were found to be related positively to teachers' projected year-end grades in English classes and to expectancies for success, the subjective value of school work, and academic achievement (see also Goodenow & Grady, 1993). Similar research on classroom belonging indicates that the relation between belonging and motivation (expectancies and values) declines as students progress through the sixth and eighth grades (Goodenow, 1993a).

Roeser, Midgley, and Urdan (1996) examined the relations between perceived school belonging and academic achievement in a sample of early adolescents. They found, when controlling for prior achievement, demographics, personal achievement goals, perceptions of school goal stresses, and perceptions of the quality of teacher-student relationships, that school belonging positively predicted end-of-year grades.

L. H. Anderman and Anderman (1999) examined changes in personal task and ability goal orientations over the middle-school transition. After controlling for demographics, perceptions of classroom goal orientations, and social relationship variables, they found that a perceived sense of school belonging was related to changes in personal achievement goals. Specifically, school belonging was related to an increase in personal task goals and to a decrease in personal ability goals across the middle-school transition.

In summary, a variety of studies have identified the construct of belonging as being an important psychological variable. When an individual's need for belonging is met, positive outcomes occur. Within schools, a perceived sense of school belonging is related to enhanced motivation, achievement, and attitudes toward school.

School-Level Differences in Perceived School Belonging

An extensive review of the literature has not uncovered any studies that have examined school-level differences in perceived belonging. Nevertheless, there is reason to suspect that belonging varies as a function of school characteristics. In particular, school size, school grade configuration, and urbanicity are three school-level variables that theoretically should be related to a student's sense of belonging.

School Size

It is plausible that students may develop a greater sense of belonging in smaller sized schools than in larger sized schools. Specifically, when schools are small in size, students are more likely to get to know their teachers and their classmates on a more interpersonal level. Because it may be easier to form social relationships both with students and teachers in a smaller sized school environment, the need for belonging may be more easily satisfied in a smaller school (see Baumeister & Leary, 1995).

There is some research evidence that indicates that smaller sized schools are more effective than are larger sized schools. Lee and Smith (1995) examined the effects of school size and restructuring on gains in academic achievement and engagement in high school students. They found that students who attended small-sized schools and students who attended schools that used specific reform practices (e.g., keeping the same homeroom throughout high school, interdisciplinary teaching, schools-within-schools) learned more and were more academically engaged than students who attended other schools. In addition, they found that gains in achievement were more equitably distributed (in terms of SES) in schools that used restructuring practices (see Lee & Smith, 1995, for a full description of such practices). A subsequent study that used additional data from later in students' high school careers confirmed many of these findings (Lee, Smith, & Croninger, 1997).

Nevertheless, not all evidence points to negative effects of large school size. One recent study using NELS data (Rumberger & Thomas, 2000) examined school effects on dropping out. Results indicated, after student characteristics were controlled, that dropping out was related to several variables. Specifically, characteristics of schools with high drop-out rates included low SES, high student-teacher ratios, perceptions of poor quality of teaching, and low teacher salaries. Public schools had significantly higher drop-out rates than did Catholic schools or other private schools. However, the results concerning school size were surprising. Specifically, large-sized schools had lower drop-out rates than did smaller sized schools.

Pianta (1999) noted that student-teacher ratios must be considered when examining relationships between students and teachers in schools. Specifically, Pianta argued that in both regular and special education classrooms, lower student-teacher ratios lead to better communication and more positive interactions between teachers and students and to closer monitoring of student progress by teachers. In addition, from a Vygotskian perspective, Pianta also argued that the teacher is more effectively able to operate within individual children's zones of proximal development when student-teacher ratios are low.

Grade Configuration

Although there have been no studies to date that have examined specifically the relations between grade configuration and perceived school belonging, it is plausible that certain configurations are more conducive to the development of a sense of belonging than are others. Specifically, some research indicates that schools with larger grade spans and schools that educate both young children and older adolescents simultaneously may be conducive to more positive outcomes for adolescents than other types of

schools. In addition, some research suggests that feelings of belonging may be particularly low in typical middle-grade schools.

For example, there is some evidence that schools that contain multiple grades and that also educate elementary school children along with adolescents tend to be more developmentally appropriate for adolescents. For example, Simmons and Blyth (1987) found that girls who attended schools with kindergarten-eighth-grade configurations made a healthier transition into high school than did girls who attended more typical middle schools (e.g., schools with a Grade 6-8 configuration). Eccles and Midgley (1989) found that typical middle schools (e.g., Grades 6-8 or 7-9) were associated with declines in academic motivation for many adolescents.

E. M. Anderman and Kimweli (1997) found that adolescents who attended schools with a kindergarten-Grade 8 or a kindergarten-Grade 12 type of grade configuration were less likely to report being victimized, less likely to report getting into trouble for bad behavior, and less likely to perceive their school as unsafe, compared with students in more traditional Grade 6-8 or 7-9 configuration schools. Other research (e.g., National Institute of Education, 1978) has demonstrated that violent behavioral problems among students in the seventh-ninth grades are fewer when those students are in schools with configurations of seventh-12th grade, compared with more traditional middle-school grade configurations. Blyth, Thiel, Bush, and Simmons (1980) found that students were victimized more often in schools with seventh-ninth-grade configurations than in schools with kindergarten-eighth-grade configurations. However, other studies examining other types of outcomes have found the opposite pattern (e.g., Simmons & Blyth, 1987).

Urbanicity

Some research indicates that students in urban, rural, and suburban schools may have different types of educational experiences. For example, some studies indicate that the academic achievement of students in urban schools is lower than the achievement of students in other schools (e.g., Eisner, 2001; National Assessment of Educational Progress, 2001).

There has been some school-level research on nonacademic outcomes comparing students in urban, rural, and suburban regions. E. M. Anderman and Kimweli (1997) found that students in urban schools reported being victimized and perceiving their schools as unsafe more than did students in suburban schools; they also found that students in rural schools perceived their school environments as more unsafe than did students in suburban schools. Other research (e.g., Rumberger & Thomas, 2000) has indicated that drop-out rates may be lower in urban schools than in suburban schools.

A limited amount of research has specifically examined perceptions of belonging across these settings with mixed results. For example, some research (e.g., Trickett, 1978) suggests that students who attend urban schools report a greater sense of belonging or relatedness than do students who attend rural schools. However, results of a recent comparative study by Freeman, Hughes, and Anderman (2001) using an adapted version of Goodenow's (1993b) measure of belonging compared adolescents' perceptions of belonging in urban and rural schools. Results indicated that perceptions of belonging were higher in rural schools than in urban schools.

School Contexts in Educational Psychology

In the present research, the relations of perceived school belonging to a variety of other psychological outcomes were examined. Reviews of the literature suggest that psychological phenomena are seldom examined contextually across different school environments. To verify this observation, in addition to reviewing all of the literature on school belonging, I examined all studies published in the *Journal of Educational Psychology* and *Contemporary Educational Psychology* over a 5-year period (between 1995 and 1999) to explore the frequency of studies of children and adolescents in educational psychology that incorporated more than one school in their design. I did not examine the frequency of studies that included institutions of higher education because the present study only concerned students in kindergarten–12th-grade schools.

The search indicated that a total of 428 articles were published between 1995 and 1999 in those journals. Specifically, 135 articles were published in *Contemporary Educational Psychology*, and 293 articles were published in the *Journal of Educational Psychology*. An examination of the methodology sections of those studies revealed that 105 of the 428 studies (24.5%) were studies of children or adolescents that incorporated at least two or more schools in the design of the study. Consequently, it appears that in the field of educational psychology, researchers do examine phenomena across multiple school contexts in about 25% of published studies; however, the relations of perceived school belonging to various phenomena to date have not been examined across multiple school contexts.

The present series of studies were designed to examine school-level differences in perceived school belonging. Both studies used data from the National Longitudinal Study of Adolescent Health (Add Health). Study 1 was an examination of school-level differences in perceived school belonging. Specifically, characteristics of schools that might be predictive of a perceived sense of belonging, after controlling for student characteristics, were examined. Study 2 examined school-level differences in the relations between school belonging and a variety of outcomes. The analyses focused on psychological outcomes that have been identified as being highly prevalent or problematic during adolescence, including social rejection (e.g., Asher & Coie, 1990), depression and optimism (e.g., Hogdman, 1983; Peterson & Bossio, 1991; Reynolds, 1984), and behavioral problems (e.g., Caspi, Henry, McGee, Moffitt, & Silva, 1995).

For Study 1, the hypothesis that perceived school belonging would be greater in schools with specific sizes, grade configurations, and locations was examined. Specifically, it was predicted that after controlling for individual differences, a greater sense of belonging would be associated with schools that were small in size, with schools that used a kindergarten–Grade 8 or kindergarten–Grade 12 type of configuration, and with schools that were not located in urban regions. In Study 2, the relations of school belonging to other psychological outcomes were examined, controlling for student and school-level variables. Specifically, it was predicted that the relations between perceived belonging and other psychological outcomes would vary by school. In addition, it was hypothesized that aggregated school belonging, grade configurations, school size, and urbanicity would be significant school-level

predictors of the outcomes and of the relations between belonging and psychological outcomes.

Study 1

The purpose of Study 1 was to examine individual and school-level predictors of perceived school belonging. Although a variety of studies have examined the positive relations of school belonging with a variety of outcomes (e.g., L. H. Anderman & Anderman, 1999; Goodenow, 1993a, 1994b; Roeser et al., 1996), no studies to date have examined school-level differences in belonging.

Method

Sample

Data for both studies came from Add Health. Data for Add Health were collected from several sources, from 1994 through 1996. Initially, 132 schools that served adolescents were selected for participation. From those schools, a large sample of students ($N = 90,118$) completed in-school questionnaires. In addition, a subsample of 20,745 students were interviewed in their homes in 1995 (14,738 were reinterviewed in 1996). Administrators from the 132 schools also completed a school-administrator survey describing various school characteristics.

For Study 1, the Add Health in-school survey data were used, with a subsample size of 58,653 students from 132 schools. On the basis of the suggestions of Raudenbush, Bryk, Cheong, and Congdon (2000), listwise deletion of data at the student level was used; consequently, the student sample in this data set had full data on all variables. The sample is evenly divided in terms of gender (48.8% male, 51.2% female). The sample is diverse in terms of ethnicity, with 1.5% of the sample being Native American, 5.6% Asian–Pacific Islander, 15.0% African American, and 6.3% being of other non-White racial groups. Some ethnic minority groups were oversampled, but the oversampling of those groups is corrected through the use of weights. In addition, 14.0% of the sample indicated that they were of Hispanic or Spanish origin. In terms of grade level, 10.9% of the sample were in the seventh grade, 11.6% were in the eighth grade, 20.1% were in the ninth grade, 20.8% were in the 10th grade, 19.2% were in the 11th grade, and 17.4% were in the 12th grade.

The schools included in this study represent an array of diverse characteristics. Schools were divided among urban (32.6%), suburban (54.7%), and rural (12.8%) locations. Most schools in the sample (90.1%) were public schools. With regard to school size, 22.7% of the schools were small sized (1–400 students), 45.3% were medium sized (401–1,000 students), and 32.0% were large sized (1,001–4,000 students). In addition, 16.0% of the participating schools ($n = 23$) reported using busing practices (i.e., busing students to schools in other neighborhoods).

Measures

Scales were developed to measure perceived school belonging and self-concept. Principal-components analyses with varimax rotations guided all scale construction. All scales displayed good reliability. All items and descriptive statistics are listed in full in Table 1.

Several demographic measures were included. Gender was coded as a dummy variable, where 0 = male and 1 = female. Ethnicity was coded as several dummy variables, where 0 = not a member of ethnic group and 1 = member of ethnic group. Dummy variables were created for African American, Asian–Pacific Islander, Native American, and other race (European American served as the comparison group). Grade-level was represented by five dummy variables, with 12th grade serving as the comparison group. In subsequent hierarchical linear modeling (HLM) analyses, these dummy-level variables were grand-mean centered (as were all other predictor variables); consequently, the coefficients for the dummy vari-

Table 1
Items and Descriptive Statistics for Scales

Scale and item	<i>M</i>	<i>SD</i>	Loading	α
School Belonging				.78
I feel like I am part of this school.	2.49	1.22	.84	
I am happy to be at this school.	2.47	1.25	.81	
I feel close to people at this school.	2.48	1.15	.77	
I feel safe in my school.	2.33	1.09	.64	
The teachers at this school treat students fairly.	2.62	1.15	.56	
Self-Concept				.86
I have a lot to be proud of.	4.11	0.95	.80	
I like myself just the way I am.	3.83	1.11	.78	
I feel loved and wanted.	3.94	1.00	.77	
I feel socially accepted.	3.76	0.98	.76	
I feel like I am doing everything just right.	3.32	1.04	.76	
I have a lot of good qualities.	4.16	0.85	.74	

ables in the HLM analyses are interpreted as the mean difference between each group and the omitted group (e.g., European Americans). GPA was the mean of students' grades for English, mathematics, social studies, and science, where 1 = A, 2 = B, 3 = C, and 4 = D or lower. GPA data were omitted for students who did not take a particular subject or who indicated that they did not know their current grades in that subject domain. All items assessing GPA were reverse coded, so that a high GPA was indicative of receiving high grades. Participants also indicated how many years they had been a student at their present school (1 = *this is my 1st year*, 2 = *this is my 2nd year*, . . . 5 = *this is my 5th year*, 6 = *I have been here more than 5 years*). All continuous variables were transformed into *z* scores across schools so that results could be reported as standard deviation units.

Construction of School-Level Variables

School-level variables were created from a school-administrator survey that was completed by an administrator at each site. Several general demographic variables were created. School size was coded as small (1–400 students), medium (401–1,000 students), and large (1,001–4,000 students) on the basis of a priori categories. Dummy variables were created for small- and large-sized schools (medium-sized schools served as the comparison group). Class size was the actual average class size in whole numbers, as reported by a school administrator. In addition, schools were classified as urban, rural, or suburban. Dummy variables were created for urban and rural schools, with suburban schools serving as the comparison group. In addition, a dummy variable was created to compare Catholic schools with other types of schools (i.e., public, private, other parochial) because research suggests that Catholic schools often operate in a more equitable manner than do other schools (Bryk et al., 1993). A dummy variable also was included indicating whether or not the school used any

types of busing practices (0 = does not use busing, 1 = does use busing). Schools were identified as using busing practices if the school administrator reported that the school assigned students from several geographic areas to achieve a desired racial and/or ethnic composition of students or if the school used busing practices to allow for transfers.

For the present study, schools were classified into two groups on the basis of grade configurations. The first group ($n = 21$) included schools that educated young children in addition to adolescents; specifically, it contained schools with a configuration of kindergarten–Grade 12 ($n = 14$) and kindergarten–Grade 8 ($n = 7$). The other group consisted of all other types of grade configurations. These included schools that served early adolescents ($n = 51$), schools with configurations of Grades 6–12 ($n = 15$), and high schools with grade configurations of Grades 9–12 ($n = 70$) and Grades 10–12 ($n = 5$).

Results and Discussion

Scale Development

The School Belonging items were analyzed using a principal-components analysis with a varimax rotation. One of the items (“The students at this school are prejudiced”) did not load on the School Belonging factor, so that item was dropped. The remaining factor exhibited an eigenvalue of 2.71 and explained 45.21% of the variance in the items. The items and descriptive statistics are presented in Table 1. The scale displayed good internal consistency (Cronbach's $\alpha = .78$).

A self-concept scale was constructed from six items (see Table 1). A principal-components analysis indicated that the six items formed one factor, explaining 58.95% of the variance in the items (eigenvalue = 3.54). The scale displayed good reliability (Cronbach's $\alpha = .86$). Because items were anchored with a scale where 1 = *strongly agree* and 5 = *strongly disagree*, the six items were reverse coded so that a high score on the scale represented a positive self-concept.

Descriptive statistics and correlations are presented for student-level variables in Table 2. Perceived school belonging was correlated positively with self-concept ($r = .57, p < .01$), GPA ($r = .20, p < .01$), and parental education ($r = .09, p < .01$).

Multilevel Regressions

HLM (Bryk & Raudenbush, 1992) was used to examine the nested structure of school belonging. HLM analyses proceeded in three steps. First, the intraclass correlation (ICC), or between-schools variance in perceived school belonging, was examined. Second, student-level predictors of school belonging were examined (similar to a traditional ordinary least squares multiple regres-

Table 2
Descriptive Statistics for In-School Sample

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Belonging	3.56	0.83	—				
2. Self-concept	3.86	0.74	.57**	—			
3. Years at current school	2.50	1.39	-.01	-.01*	—		
4. GPA	2.84	0.79	.20**	.12**	.05**	—	
5. Parent education	4.28	1.50	.09**	.06**	-.01	.24**	—

Note. GPA = grade point average.
* $p < .05$. ** $p < .01$.

sion). Third, school-level variables were added to the model to examine school-level predictors of perceived school belonging while controlling for individual differences. The appropriate student weights were used in all HLM analyses; thus, results are generalizable to the population of American adolescents. All predictor variables were grand-mean centered, as suggested by a number of methodologists (e.g., Bryk & Raudenbush, 1992; Snijders & Bosker, 1999). By grand-mean centering the predictor variables, the intercept can be interpreted as the expected value for an average student rather than for students who are coded as zero. In HLM analyses, all continuous variables were standardized using z scores prior to their inclusion in the HLM models. Consequently, coefficients should be interpreted as standard deviation units, similar to the interpretation of a beta in a traditional ordinary least squares regression.

ICCs. As a first step, the variance between schools in perceived school belonging was examined. For this step, perceived school belonging was entered into the HLM analysis as a dependent variable, with no predictors in the model. Results indicated that a significant portion of the variance in perceived school belonging lies between schools. Specifically, 7.95% of the variance occurs between schools, $\chi^2(137, N = 58,653) = 4,225.44, p < .01$.

Student-level model. A student-level model was run with characteristics of students as predictors of perceived school belonging. The model is expressed by the following equation:

$$\begin{aligned} \text{Individual school belonging} = & \beta_{0j} + \beta_{1j} (\text{gender}) \\ & + \beta_{2j} (\text{GPA}) + \beta_{3j} (\text{self-concept}) \\ & + \beta_{4j} (\text{years at present school}) + \beta_{5j} (\text{Hispanic ethnicity}) \\ & + \beta_{6j} (\text{African American}) + \beta_{7j} (\text{Asian-Pacific Islander}) \\ & + \beta_{8j} (\text{Native American}) + \beta_{9j} (\text{other race}) \\ & + \beta_{10j} (\text{Grade 7}) + \beta_{11j} (\text{Grade 8}) + \beta_{12j} (\text{Grade 9}) \\ & + \beta_{13j} (\text{Grade 10}) + \beta_{14j} (\text{Grade 11}) + \varepsilon_{ij}. \end{aligned}$$

The intercept was allowed to vary between schools. The slopes for grade level and for ethnicity-race were fixed, whereas all other slopes were allowed to vary randomly between schools.¹ Results are displayed in Table 3.

The strongest student-level predictor of perceived belonging was self-concept ($\gamma = .56, p < .01$). The gamma coefficient of .56 indicates that a 1-unit increase in self-concept produces a .56 standard deviation increase in perceived belonging. Other results indicated that African American ($\gamma = -.24, p < .01$) and Native American students ($\gamma = -.13, p < .05$) perceived less belonging than did European American students. Seventh ($\gamma = .25, p < .01$), eighth ($\gamma = .16, p < .01$), ninth ($\gamma = .19, p < .01$), and 10th ($\gamma = .09, p < .01$) graders reported greater perceptions of belonging than did seniors. School belonging was related to gender, with girls perceiving stronger senses of belonging than boys ($\gamma = .07, p < .01$). Belonging also was related positively to GPA ($\gamma = .09, p < .01$).

Full model. For the full model, school characteristics from the Add Health school-administrators' surveys were added to the model as predictors of the intercept. This allowed for an exami-

Table 3
Student-Level Hierarchical Linear Model Predicting School Belonging Using In-School Survey With Design Weights

Variable	γ	SE
Intercept	.05*	.02
Gender	.07**	.01
Grade point average	.09**	.01
Self-concept	.56**	.01
Parental education	.02**	.01
Years at present school	.01†	.01
Hispanic-Latino American	-.01	.02
African American	-.24**	.02
Asian-Pacific Islander	-.03	.02
Native American	-.13*	.06
Other race	-.05*	.02
Grade 7	.25**	.04
Grade 8	.16**	.03
Grade 9	.19**	.03
Grade 10	.09**	.02
Grade 11	.02	.02

Note. For gender, 0 = male, 1 = female; for all measures of ethnicity, 0 = not a member of ethnic group, 1 = member of ethnic group, with European American as the comparison group.

† $p < .10$. * $p < .05$. ** $p < .01$.

nation of the relations between both student and school-level characteristics and school belonging. School-level predictors were not incorporated as predictors of other Level 1 parameters.

Several sets of school characteristics were examined. First, schools with grade configurations of kindergarten-Grade 12 (i.e., schools that contained both young children and older students) were compared with all other types of schools. Second, dummy variables were included, comparing public schools and Catholic schools with all other types of schools (e.g., private, parochial). Third, dummy variables representing busing and geographic location of the school were included (urban and rural, with suburban as the comparison). Fourth, several indices of school size were incorporated, including a measure of the average class size and dummy variables representing school size (large and small, with medium as the comparison). The between-schools model is expressed by the following equation:

$$\begin{aligned} \beta_{0j} = & \theta_{00} + \theta_{01} (\text{urban}) + \theta_{02} (\text{rural}) + \theta_{03} (\text{large}) \\ & + \theta_{04} (\text{small}) + \theta_{05} (\text{busing}) \\ & + \theta_{04} (\text{kindergarten-Grade 12 configuration}) \\ & + \theta_{05} (\text{average class size}). \end{aligned}$$

Results are presented in Table 4.

The variables representing Catholic and public schools were dropped because neither were significant in the analysis. After controlling for student-level variables, I found that belonging was lower in schools that reported using busing practices compared

¹ Grade level and ethnicity were fixed because some schools did not contain large enough populations of certain ethnicities to estimate effects. In addition, not all schools contained all grade levels. These parameters were fixed to maximize the number of schools used to compute chi-square statistics.

Table 4
Full Hierarchical Linear Model Predicting School Belonging
Using Full In-School Survey and Administrator Survey With
Design Weights

Variable	γ	SE
Intercept	.05**	.02
School-level predictors		
Urban	-.07**	.03
Rural	.03	.04
Large	-.02	.03
Small	.07	.06
Busing	-.13**	.05
Kindergarten–Grade 12 configuration	.12†	.07
Average class size	-.03	.02
Student-level predictors		
Gender	.07**	.01
Grade point average	.09**	.01
Self-concept	.56**	.01
Years at present school	.01†	.01
Hispanic–Latino American	-.02	.02
African American	-.24**	.02
Asian–Pacific Islander	-.02	.02
Native American	-.12*	.06
Other race	-.05†	.02
Grade 7	.24**	.03
Grade 8	.16**	.03
Grade 9	.19**	.03
Grade 10	.09**	.02
Grade 11	.02	.02

Note. For gender, 0 = male, 1 = female; for all measures of ethnicity, 0 = not a member of ethnic group, 1 = member of ethnic group, with European American as the comparison group. For the final model, $\chi^2(124, N = 58,653) = 1,797.67, p < .01$.

† $p < .10$. * $p < .05$. ** $p < .01$.

with those that did not ($\gamma = -.13, p < .01$). In addition, belonging was lower in urban schools than in suburban schools ($\gamma = -.07, p < .01$). Attending schools with the kindergarten–Grade 12 type of configuration was modestly related to belonging ($\gamma = .12, p < .10$). School size was unrelated to perceived belonging. The model explained 36.67% of the between-schools variance in the intercept.

Summary. In summary, results of Study 1 indicate that perceived school belonging does vary across schools. Perceived school belonging is related to several individual difference variables. Specifically, higher perceived school belonging is associated with high self-concept. Ethnicity emerged as a predictor of belonging for African Americans and Native Americans, each of whom reported lower levels of perceived belonging than did European Americans.

Several school-level characteristics are related to perceived school belonging. The practice of busing was related to lower levels of perceived belonging. Perceived belonging was significantly lower in urban schools than in suburban schools. Attending a kindergarten–Grade 12 type of school was modestly related to belonging, once other variables were controlled.

One of the questions that remains is whether perceived school belonging is related to lower levels of psychological distress among adolescents. More importantly, the significant ICC found in the present study leads to the question of whether the relations between belonging and other outcomes vary between schools. Those questions are addressed in Study 2.

Study 2

The purpose of Study 2 was to examine the relations of perceived school belonging to various psychological outcomes. For this study, the in-home interview portion of the Add Health study was used ($N = 20,745$ students, $N = 132$ schools).

Method and Measures

The outcome variables included measures of depression, optimism, social rejection, school problems, and GPA. Scaled predictors included perceived school belonging and self-concept.

Items for scales are presented in Table 5. The Depression, Social Rejection, and Optimism scales were anchored with four response categories (0 = *never or rarely*, 1 = *sometimes*, 2 = *a lot of the time*, and 3 = *most of the time or all of the time*). For the Self-Concept scale, participants indicated how much they agreed with a series of statements (1 = *strongly agree*, 3 = *neither agree nor disagree*, and 5 = *strongly disagree*). For the scale measuring school problems, students indicated how often during the current school year they had trouble with various issues (e.g., getting along with teachers, getting homework done). That scale was anchored with five response categories (0 = *never*, 1 = *just a few times*, 2 = *about once a week*, 3 = *almost everyday*, and 4 = *everyday*). The items measuring perceived school belonging were identical to those used in Study 1. Most demographic items were treated identically to those in Study 1. Gender and ethnicity were treated as dummy variables. For gender, 0 = male and 1 = female. For the measures of ethnicity, dummy variables were created for African American, Native American, Asian–Pacific Islander, and other race categories, with European Americans serving as the omitted comparison group (0 = not a member of ethnic group, 1 = member of ethnic group). GPA was calculated the same way as in Study 1 (items were identical across the two data sets). Five grade-level dummy variables were included for all grades except the 12th grade (0 = not in the grade, 1 = in the grade).

Parent education was the mean level of education for both resident parents (if data were available for only one resident parent, then those data were used). Parent education was recoded so that 0 = never went to school, 1 = eighth-grade education or less, 2 = more than eighth-grade education but did not graduate high school (or attended vocational or trade school instead of high school), 3 = high school graduate or completed a graduate equivalency diploma, 4 = went to business or trade school or some college, 5 = graduated from a college or a university, and 6 = professional or training beyond a 4-year college or university. This measure is similar to measures used in other large-scale research (e.g., Johnston, O'Malley, & Bachman, 1992). Data on parental income were only provided for a subsample of students; consequently, parental education was used because it was the best available measure that would maximize the sample size.

To assess school absenteeism in the in-home interviews, respondents indicated how many times they were absent from school for a full day with an excuse. Response categories included 0 = *never*, 1 = *one or two times*, 2 = *3 to 10 times*, and 3 = *more than 10 times*.

During the in-home interview portion of the study, all participants completed the Peabody Picture Vocabulary Test (Dunn & Dunn, 1997). Scores on this test were included as a covariate.

All predictors were grand-mean centered in HLM analyses, as they were in Study 1. Therefore, all intercepts may be interpreted as the mean level for average students rather than as the value when all predictors are coded as zero. Effects for dummy-level variables are interpreted as the mean difference between each group represented by a dummy variable and the omitted group. All continuous variables were transformed into z scores across schools so that results could be reported as standard deviation units.

Table 5
Factor Analysis and Reliability Analyses for Psychological Measures

Scale	α	Eigenvalue	% variance	Item	Loading
School Belonging	.76	2.189	7.30	You feel like you are part of your school.	.79
				You feel close to people at your school.	.78
				You are happy to be at your school.	.75
				You feel safe in your school.	.57
School Problems	.69	1.375	4.58	Since the school year started, how often have you had trouble . . .	
				Paying attention in school?	.77
				Getting your homework done?	.64
				Getting along with your teachers?	.64
				Getting along with other students?	.53
Depression	.84	6.619	23.40	You felt depressed.	.78
				You felt you could not shake off the blues, even with help from your family and friends.	.75
				You felt sad.	.72
				You felt lonely.	.67
				You were bothered by things that usually don't bother you.	.62
				You didn't feel like eating, your appetite was poor.	.54
				You thought your life had been a failure.	.51
				You felt fearful.	.50
				You felt life was not worth living.	.48
				You felt hopeful about the future.	.75
				You felt that you were just as good as other people.	.67
Optimism	.71	1.480	4.93	You were happy.	.62
				You enjoyed life.	.62
				People were unfriendly to you.	.76
Social Rejection	.67	1.154	3.85	You felt that people disliked you.	.73
				You have a lot to be proud of.	.76
Self-Concept	.86	2.428	8.09	You like yourself just the way you are.	.74
				You have a lot of good qualities.	.72
				You feel like you are doing everything just about right.	.68
				You feel loved and wanted.	.67
				You feel socially accepted.	.66
				You feel physically fit.	.63

Results and Discussion

Scaling of Measures

Factor analyses were run to verify the uniqueness of the scaled variables. All of the psychological measures were submitted to a single analysis to examine the discriminate validity of the measures. Items were transformed into z scores for these analyses. A principal-components analysis with a varimax rotation yielded a six-factor solution. The unique factors that emerged from the analysis represented Perceived School Belonging, School Problems, Depression, Optimism, Social Rejection, and Self-Concept. The factors, eigenvalues, percentage of explained variance, loadings, reliability estimates for scales, and items are presented in Table 5.

The Self-Concept and School Belonging scales were identical to those used in Study 1. However, for the Self-Concept scale, one additional item was added from the in-home interview data. That item assessed participants' perceptions of how physically fit they perceived themselves to be. Internal consistency for the Self-Concept scale remained high (Cronbach's $\alpha = .86$).

Preliminary Analyses

Descriptive statistics and correlations are presented in Table 6. Perceived school belonging was related positively and significantly ($p < .01$) to optimism ($r = .28$), self-concept ($r = .36$), and

GPA ($r = .21$). Perceived belonging was related negatively and significantly ($p < .01$) to depression ($r = -.28$), social rejection ($r = -.27$), school problems ($r = -.34$), and absenteeism ($r = -.13$).

Most of the scaled predictors and outcomes were distributed normally. Two of the variables were somewhat skewed (depression skew = 1.63 and social rejection skew = 1.56) but not enough to significantly affect results of the HLM models.

Multilevel Regressions

ICCs. First, intraclass correlations were calculated for the outcomes tested in the HLM analyses as well as for perceived school belonging. Listwise deletion of data was used, resulting in a sample size of $n = 15,457$. Results are presented in Table 7, adjusted for the reliability of the estimates. ICCs for the outcomes ranged from a low of .027 to a high of .102. All chi-square statistics were significant at $p < .01$, indicating that all of these outcomes varied significantly between schools. Consequently, complete HLM models were developed to examine student- and school-level predictors of the outcomes.

Student-level models. Student-level HLM models were run for all of the psychological outcomes (depression, optimism, social rejection, and school problems). The within-school model is represented by the following equation:

Table 6
Correlations and Descriptive Statistics for In-Home Interview Data

Variable	M	SD	1	2	3	4	5	6	7	8	9	10
1. Belonging	3.74	0.80	—									
2. Depression	0.41	0.44	-.28	—								
3. Optimism	2.00	0.68	.28	-.45	—							
4. Social rejection	0.41	0.55	-.27	.45	-.24	—						
5. School problems	1.03	0.73	-.34	.30	-.19	.26	—					
6. GPA	2.76	0.77	.21	-.16	.23	-.10	-.34	—				
7. Parental education	3.60	1.31	.06	-.11	.16	-.06	.00†	.21	—			
8. Absences from school	1.63	0.86	-.13	.12	-.05	.04	.14	-.16	-.04	—		
9. PPVT	64.50	11.09	.04	-.16	.23	-.10	.01†	.27	.31	.01†	—	
10. Self-concept	4.07	0.59	.36	-.42	.46	-.27	-.23	.15	.09	-.11	.02	—

Note. All correlations are statistically significant ($p < .01$), except those noted with a dagger (†). GPA = grade point average; PPVT = Peabody Picture Vocabulary Test.

$$\begin{aligned}
 \text{Psychological outcome} = & \beta_{0j} + \beta_{10j} (\text{Grade 8}) + \beta_{11j} (\text{Grade 9}) + \beta_{12j} (\text{Grade 10}) \\
 & + \beta_{1j} (\text{individual school belonging}) + \beta_{2j} (\text{gender}) + \beta_{13j} (\text{Grade 11}) + \beta_{14j} (\text{absenteeism}) \\
 & + \beta_{3j} (\text{African American}) + \beta_{4j} (\text{Native American}) + \beta_{15j} (\text{Peabody Picture Vocabulary Test score}) \\
 & + \beta_{5j} (\text{Asian-Pacific Islander}) + \beta_{6j} (\text{other race}) + \beta_{16j} (\text{self-concept}) + \epsilon_{ij} \\
 & + \beta_{7j} (\text{Hispanic ethnicity}) + \beta_{8j} (\text{parent education}) \\
 & + \beta_{9j} (\text{Grade 7}) + \beta_{10j} (\text{Grade 8}) + \beta_{11j} (\text{Grade 9}) \\
 & + \beta_{12j} (\text{Grade 10}) + \beta_{13j} (\text{Grade 11}) + \beta_{14j} (\text{absenteeism}) \\
 & + \beta_{15j} (\text{Peabody Picture Vocabulary Test score}) \\
 & + \beta_{16j} (\text{GPA}) + \beta_{17j} (\text{self-concept}) + \epsilon_{ij}.
 \end{aligned}$$

In addition, a fifth model predicting GPA was included to compare the prediction of psychological outcomes with the prediction of a more traditional academic outcome. The within-school model for GPA is represented by the following equation:

$$\begin{aligned}
 \text{GPA} = & \beta_{0j} + \beta_{1j} (\text{individual school belonging}) \\
 & + \beta_{2j} (\text{gender}) + \beta_{3j} (\text{African American}) \\
 & + \beta_{4j} (\text{Native American}) + \beta_{5j} (\text{Asian-Pacific Islander}) \\
 & + \beta_{6j} (\text{other race}) + \beta_{7j} (\text{Hispanic ethnicity}) \\
 & + \beta_{8j} (\text{parent education}) + \beta_{9j} (\text{Grade 7})
 \end{aligned}$$

Background characteristics (ethnicity, parent education, grade level, and gender) were controlled in all models, as were academic and psychological characteristics (absenteeism, GPA, Peabody Picture Vocabulary Test score, and self-concept). All parameters were allowed to vary between schools, except ethnicity and the grade-level dummy variables, which were fixed to maximize the number of schools used in chi-square analyses. All variables were grand-mean centered, as they were in Study 1. Results are displayed in Table 8.

Results indicate that perceived school belonging was related to all outcomes: Higher levels of belonging were associated with lower reported levels of depression ($\gamma = -.12, p < .01$), social rejection ($\gamma = -.19, p < .01$), and school problems ($\gamma = -.25, p < .01$), whereas higher levels of belonging were associated with reports of greater optimism ($\gamma = .10, p < .01$) and higher GPA ($\gamma = .15, p < .01$).

Most background characteristics were unrelated to the outcomes, although girls reported higher levels of depression ($\gamma = .21, p < .01$) and higher GPAs ($\gamma = .36, p < .01$) and lower levels of social rejection ($\gamma = -.06, p < .05$) and school problems ($\gamma = -.22, p < .01$) than did boys. Ethnicity was, for the most part,

Table 7
Intra-School Correlations for In-Home Interview Dependent Variables

Variable	τ	Σ^2	Reliability	ICC	$\chi^2(126, N = 15,547)$
Belonging	.056	.926	.850	.066	912.13**
Depression	.027	.891	.747	.039	532.43**
Optimism	.037	.949	.786	.047	633.55**
Social rejection	.017	.947	.641	.027	393.31**
School problems	.028	.969	.738	.038	518.93**
Grade point average	.094	.918	.902	.102	1,426.66**

Note. ICC = intraclass correlation.
** $p < .01$.

Table 8
Student-Level Hierarchical Linear Models Predicting Psychological Outcomes and Grade Point Average (GPA)

Variable	Depression		Optimism		Social rejection		School problems		GPA	
	γ	SE	γ	SE	γ	SE	γ	SE	γ	SE
Intercept	-.04**	.01	.04**	.01	-.02	.01	.01	.02	.08**	.02
Background characteristic										
Gender	.21**	.02	.01	.02	-.06*	.03	-.22**	.02	.36**	.02
African American	.15**	.03	-.06	.04	.12**	.04	-.08†	.04	-.19**	.03
Native American	.18†	.11	.02	.13	-.05	.11	.09	.13	-.10	.13
Asian-Pacific Islander	.08*	.04	-.10*	.05	-.04	.05	-.02	.06	.46**	.06
Other race	.00	.05	-.02	.05	.04	.05	-.05	.06	.05	.06
Hispanic ethnicity	.09*	.04	-.03	.04	-.10**	.04	.03	.06	-.14**	.05
Parent education	-.02*	.01	.04**	.01	-.03**	.01	.06**	.01	.14**	.01
Grade 7	-.20**	.03	-.10**	.04	.09**	.04	.13**	.04	-.10*	.04
Grade 8	-.13**	.03	-.06†	.04	.04	.03	.14**	.04	-.11**	.04
Grade 9	-.09**	.03	-.05	.03	.01	.03	.07*	.03	-.23**	.04
Grade 10	-.07†	.04	-.05	.04	-.01	.04	.01	.03	-.20**	.03
Grade 11	-.02	.03	-.06*	.03	.01	.04	.04	.03	-.19**	.04
Academic & psychological control										
Individual School belonging	-.12**	.01	.10**	.01	-.19**	.01	-.25**	.01	.15**	.01
Absenteeism	.06**	.01	.02†	.01	.00	.01	.08**	.01	-.12**	.01
PPVT score	-.11**	.01	.16**	.01	-.06**	.01	.03*	.01	.26**	.02
GPA	-.04**	.01	.10**	.01	-.02	.01	-.29**	.01		
Self-concept	-.32**	.01	.40**	.01	-.22**	.01	-.13**	.01	.10**	.01

Note. PPVT = Peabody Picture Vocabulary Test.

† $p < .10$. * $p < .05$. ** $p < .01$.

unrelated to the outcomes, although African American students reported higher levels of depression ($\gamma = .15, p < .01$) and social rejection ($\gamma = .12, p < .01$) and lower GPAs ($\gamma = -.19, p < .01$) than did European American students. Asian-Pacific Islander students reported higher GPAs than did European American students ($\gamma = .46, p < .01$).

Scores on the Peabody Picture Vocabulary Test were related negatively and weakly to depression ($\gamma = -.11, p < .01$) and social rejection ($\gamma = -.06, p < .01$), whereas the scores were related positively to optimism ($\gamma = .16, p < .01$), school problems ($\gamma = .03, p < .05$), and GPA ($\gamma = .26, p < .01$). Self-concept was related positively to optimism ($\gamma = .40, p < .01$) and GPA ($\gamma = .10, p < .01$) and negatively to depression ($\gamma = -.32, p < .01$), social rejection ($\gamma = -.22, p < .01$), and school problems ($\gamma = -.13, p < .01$).

Full models. School-level characteristics were modeled on the intercept and on the school belonging slope; school-level variables were not modeled on other Level 1 parameters. Urbanicity (rural, urban, and suburban), school size (small, medium, and large), average class size, busing practices, grade configuration (kindergarten-Grade 12 compared with others), and aggregated school belonging were modeled on the intercept and school belonging slope.²

The between-schools model for the intercept is expressed by the following equation:

$$\beta_{0j} = \theta_{00} + \theta_{01} (\text{aggregated school belonging}) \\ + \theta_{02} (\text{urban}) + \theta_{03} (\text{rural}) + \theta_{04} (\text{busing}) \\ + \theta_{05} (\text{kindergarten-Grade 12 configuration}).$$

The between-schools model for variation in individual perceptions of school belonging as a predictor of each outcome is expressed by the following equation:

$$\beta_{1j} = \theta_{10} + \theta_{11} (\text{aggregated school belonging}) \\ + \theta_{12} (\text{urban}) + \theta_{13} (\text{rural}) + \theta_{14} (\text{large-sized school}) \\ + \theta_{15} (\text{small-sized school}) + \theta_{16} (\text{average class size}).$$

Results are presented in Table 9 and are discussed separately for each outcome.

Depression. Depression was higher in schools that reported using busing practices than in those that did not use busing practices ($\gamma = .08, p < .01$). Aggregated school belonging was not significantly related to depression.

The school belonging slope was related negatively to depression ($\gamma = -.12, p < .01$). However, the relation between individual students' perceived belonging and depression varied between schools. Specifically, that effect was diminished in schools with higher aggregated belonging ($\gamma = .16, p < .01$). The negative relation between perceived belonging and depression was less strong in large schools than it was in medium-sized schools ($\gamma = .07, p < .01$).

The strongest student-level predictors of depression were gender ($\gamma = .21, p < .01$), with girls reporting greater levels of depression than boys, and grade level, with seventh graders in particular

² School size was dropped from the intercept model because it was not significant in any of the models; the kindergarten-Grade 12 configuration was dropped as a predictor of school belonging slope because it was not significant in any of the models.

Table 9
Full Hierarchical Linear Models Predicting Psychological Outcomes and Grade Point Average (GPA)

Variable	Depression		Optimism		Social rejection		School problems		GPA	
	γ	SE	γ	SE	γ	SE	γ	SE	γ	SE
Intercept	-.05**	.01	.04**	.01	-.02	.02	.02	.02	.08**	.02
Aggregated belonging	.03	.05	.00	.05	.13*	.05	.14*	.07	.34**	.08
Urban	-.03	.04	.01	.03	.01	.03	.02	.04	.03	.05
Rural	.03	.04	-.03	.04	.01	.03	-.02	.03	.02	.05
Busing	.08**	.03	-.06†	.04	.07*	.03	.03	.05	-.05*	.08
Kindergarten–Grade 12	-.02	.03	.07†	.04	-.04	.04	-.02	.05	-.03	.08
Individual School belonging	-.12**	.01	.09**	.01	-.19**	.01	-.25**	.01	.14**	.01
Aggregated belonging	.16**	.04	.08†	.04	.09	.06	.04	.05	.00	.05
Urban	-.01	.02	-.06**	.04	.03	.03	.04	.03	-.05†	.03
Rural	.03	.03	.00	.03	.00	.04	-.01	.04	-.02	.03
Large	.07**	.02	.02	.03	.10**	.03	.09**	.03	.00	.03
Small	.02	.02	-.03	.03	.05	.04	.04	.03	-.03	.03
Average class size	-.01	.01	.03**	.01	-.01	.02	-.02	.01	.02*	.01
Background characteristic										
Gender	.21**	.02	.02	.02	-.06*	.03	-.22**	.02	.36**	.02
African American	.15**	.03	-.06	.04	.12**	.04	-.08†	.04	-.19**	.03
Native American	.18†	.11	.03	.13	-.04	.11	.10	.13	-.09	.13
Asian–Pacific Islander	.08*	.03	-.10†	.05	-.04	.05	-.03	.06	.46**	.06
Other race	.00	.05	-.02	.05	.04	.05	-.05	.06	.06	.06
Hispanic ethnicity	.09	.04	-.02	.04	-.11**	.04	-.03	.06	-.14**	.05
Parent education	-.02*	.01	.04**	.01	-.03**	.01	.06**	.01	.14**	.01
Grade 7	-.20**	.03	-.11**	.04	.07†	.04	.11**	.04	-.12**	.04
Grade 8	-.14**	.03	-.07†	.04	.02	.04	.13**	.04	-.13**	.04
Grade 9	-.09**	.03	-.05	.03	.01	.03	.07*	.03	-.23**	.04
Grade 10	-.06	.04	-.05	.04	-.01	.04	.01	.03	-.20**	.03
Grade 11	-.02	.03	-.06†	.03	.01	.04	.04	.03	-.19**	.04
Academic & psychological control										
Absenteeism	.06**	.01	.02†	.01	.00	.01	.08**	.01	-.12**	.01
PPVT score	-.11**	.01	.16**	.01	-.06*	.01	.03*	.01	.26**	.02
GPA	-.04**	.01	.09**	.01	-.02	.01	-.29**	.01		
Self-concept	-.32**	.01	.40**	.01	-.22**	.01	-.13**	.01	.10**	.01
Final model $\chi^2(119, N = 15,457)$	255.77**		331.95**		299.94**		355.90**		651.54**	
% between-school variance explained in intercept	27.14		30.96		17.97		29.67		24.66	

Note. PPVT = Peabody Picture Vocabulary Test.

† $p < .10$. * $p < .05$. ** $p < .01$.

reporting feeling less depressed than did seniors ($\gamma = -.20, p < .01$). Students with higher self-concepts were less likely to report feeling depressed ($\gamma = -.32, p < .01$). The model explained 27.14% of the between-schools variance in depression.

Optimism. Only two of the school-level predictors emerged as being modestly related to optimism: Students reported lower levels of optimism in schools that reported using busing practices ($\gamma = -.06, p < .10$) and slightly greater levels of optimism in kindergarten–Grade 12 types of schools ($\gamma = .07, p < .10$).

Students' individual perceived belonging emerged as a predictor of optimism: Students who personally reported perceiving that they belong in their schools reported being more optimistic ($\gamma = .09, p < .01$). However, that relation varied by school. Students reported being less optimistic when they attended urban schools compared with suburban schools ($\gamma = -.06, p < .01$). In addition, optimism was slightly higher when average class sizes within the school were higher ($\gamma = .03, p < .01$).

The only student-level predictor that stood out as a strong predictor of optimism was self-concept ($\gamma = .40, p < .01$): Students who reported higher levels of self-concept reported being

more optimistic. The model explained 30.96% of the between-schools variance in optimism.

Social rejection. Students reported experiencing greater social rejection in schools with higher aggregated school belonging ($\gamma = .13, p < .05$). In addition, the use of busing practices was associated with greater perceptions of social rejection ($\gamma = .07, p < .01$).

Student-level self-reported school belonging emerged as a negative predictor of social rejection in the model ($\gamma = -.19, p < .01$). However, that relation varied between schools. Specifically, that relation was diminished in large-sized schools ($\gamma = .10, p < .01$). African American students reported feeling greater social rejection than did European American students ($\gamma = .12, p < .01$). Students of Hispanic origin reported lower levels of social rejection than did majority students ($\gamma = -.11, p < .01$). Self-concept was related negatively to social rejection ($\gamma = -.22, p < .01$). The model explained 17.97% of the between-schools variance in social rejection.

School problems. Aggregated school belonging also emerged as a predictor of self-reported school problems ($\gamma = .14, p < .05$). Students who attended schools with greater aggregated school

belonging reported having more problems in school than did students attending schools with lower levels of aggregated perceived belonging. In addition, self-reported school belonging was related negatively to school problems ($\gamma = -.25, p < .01$). This effect was less strong in large-sized schools compared with medium-sized schools ($\gamma = .09, p < .01$). Girls reported fewer school problems than did boys ($\gamma = -.22, p < .01$). GPA was related negatively to school problems ($\gamma = -.29, p < .01$). The model explained 29.67% of the between-schools variance in school problems.

GPA. The final model examined predictors of GPA; consequently, GPA was eliminated as a predictor in this model. A strong effect emerged for aggregated school belonging: In schools with higher aggregated perceived belonging, the GPAs of individual students were significantly higher ($\gamma = .34, p < .01$). Comparatively, this was the strongest effect of aggregated belonging in any of the models. GPA was lower in schools that used busing practices ($\gamma = -.05, p < .05$).

Individual-level belonging also was related positively to GPA ($\gamma = .14, p < .01$). That relation was slightly stronger in schools with greater average class sizes ($\gamma = .02, p < .05$). Female students reported higher GPAs than did male students ($\gamma = .36, p < .01$). African American students ($\gamma = -.19, p < .01$) and Hispanic students ($\gamma = -.14, p < .01$) reported lower GPAs than did European American students, whereas Asian American students reported higher GPAs than did European American students ($\gamma = .46, p < .01$). GPA was related positively to students' Peabody Picture Vocabulary Test scores ($\gamma = .26, p < .01$) and to parent education ($\gamma = .14, p < .01$). The model explained 24.66% of the between-schools variance in GPA.

General Discussion

The present studies used data from two substudies of the Add Health. The goal of Study 1 was to examine school-level variables that were related to perceived school belonging. The goal of Study 2 was to examine the relations of perceived school belonging to a variety of psychological outcomes across different types of schools.

In Study 1, it was predicted that after controlling for other variables, school size, grade configuration, and urbanicity would be related to perceptions of belonging. The results partially supported this prediction. First, after other variables were controlled for, school size was unrelated to perceptions of belonging. Other studies (e.g., Lee & Smith, 1995) have found that attending small-sized schools is related to other positive outcomes, such as increased academic achievement. Nevertheless, other research (e.g., Rumberger & Thomas, 2000) indicates potential benefits of attending large-sized schools, such as lower drop-out rates. One potential explanation for these findings may be that school size is related to other types of outcomes (e.g., achievement, drop-out rates) but that size in and of itself is unrelated to belonging. Indeed, it may be that within larger sized schools, students are able to develop a sense of belonging within smaller communities or subpopulations within the school, thus making aggregate measures of school-size inappropriate as determinants of individual belonging.

The predictions about grade configuration were partially confirmed. The hypothesis that attending a school with a kindergarten–Grade 8 or Grade 12 type of configuration would be conducive

to greater perceived school belonging was found, albeit weakly ($p < .10$). Thus, students attending kindergarten–Grade 12 types of schools reported a slightly greater sense of belonging than did students attending other types of schools. Some research suggests that schools with kindergarten–Grade 8 configurations are more conducive to early adolescent development (e.g., Simmons & Blyth, 1987). Nevertheless, results of the present study suggest that after other variables have been controlled, grade configurations of this nature are only weakly related to perceived belonging. As suggested elsewhere (e.g., Anderman & Maehr, 1994), it is the actual practices used within a school that are related to student-level outcomes and not the grade configuration per se. Nevertheless, because certain practices are associated with certain configurations (Simmons & Blyth, 1987), it is essential to control such configurations in school-level studies.

The results for urbanicity indicated that after other student- and school-level variables were controlled for, students' perceived sense of belonging was lower in urban schools than in suburban schools. Whereas other studies have yielded similar results (e.g., Freeman et al., 2001), the present study is the first to examine school belonging and urbanicity using nationally representative data. Although it is possible that students in urban schools may report lower levels of belonging because they may be drawn from diverse regions within a city, the present results were found after busing practices were controlled.

In Study 2, school belonging was examined as a predictor of several psychological outcomes. School belonging was incorporated into the analyses both as the aggregated measures of school belonging for each school (as a school-level variable) and as an individual measure of belonging for each student (as a student-level variable).

Aggregated school belonging emerged as a predictor of the outcomes in some of the models. Specifically, aggregated belonging was related positively to social rejection, school problems, and GPA. The fact that higher levels of aggregated belonging are related to increased reports of social rejection and school problems is troubling. This suggests that in schools in which many students feel that they do belong, those who do not belong may experience more social rejection and problems in school. Research clearly indicates that being accepted by one's peers is fundamental to healthy psychological development (e.g., Parker, Rubin, Price, & DeRosier, 1995). However, results of the present study suggest that when the overall level of belonging in a school is high, there is an increased reporting of social rejection and problematic behaviors by individual students. Thus, when a school environment is perceived of as supportive by many of its students, that supportive environment may be related to problematic psychological outcomes for those students who do not feel supported.

The fact that aggregated school belonging emerged as a predictor in these models is important, particularly when examined in conjunction with the student-level measure of school belonging. Specifically, individual student-level reports of belonging were used as predictors as well and were allowed to vary between schools. As expected, results indicated that the individual measure of perceived school belonging was related positively to adaptive outcomes (e.g., optimism and GPA) but negatively to maladaptive outcomes (e.g., depression, social rejection, and school problems).

It is interesting to note that the findings for depression were moderated by aggregated school belonging. The negative (and

beneficial) relation between individual perceived belonging and depression is essentially wiped out in schools with higher aggregated school belonging (i.e., the negative effect of individual belonging [$-.12, p < .01$] essentially is canceled out by the positive effect of aggregated belonging [$.16, p < .01$]); thus, the potential positive buffering effects of an individual student's perception of belonging matter less in schools in which many students report a high sense of belonging.

Individual difference predictors such as gender, grade level, ethnicity, and achievement were significantly related to the outcomes in some of these models, but most of their effects were modest once school-level variables were included as well. This suggests that psychological phenomena during adolescence are related in important ways to both school-level and individual-level variables and that individual difference variables may not be as predictive of these outcomes as once thought once school-level phenomena have been controlled. This is an important finding because school-level variables are, for the most part, contextual in nature, and, thus, many of those variables may be altered through reform efforts. The fact that aggregated school belonging emerged as a predictor of many of these outcomes is encouraging from a school-reform perspective because research has demonstrated that school environments and climates can be altered to meet the developmental needs of adolescents (e.g., E. M. Anderman, Maehr, & Midgley, 1999; Battistich et al., 1997; Maehr & Midgley, 1996). Thus, policies and practices that are aimed at developing environments that foster a sense of belonging may lead to the improved psychological well being and achievement of some adolescents. However, those involved with school reform must be cautious because an increased sense of belonging for some students at the exclusion of other students may lead to detrimental outcomes for some students, such as greater levels of perceived social rejection and greater reports of problems in school. In addition, because the present research is correlational in nature, future studies with longitudinal designs may better help to explain these findings.

The results of Study 2 confirmed that the relation of an individual student's perceived school belonging to psychological and academic outcomes varies across schools. School size emerged as the most consistent predictor of the relation between school belonging and the other psychological outcomes.

School size emerged as a predictor of the relations between belonging and depression, belonging and social rejection, and belonging and school problems. Specifically, the relations between belonging and these outcomes were diminished in large-sized schools compared with medium-sized schools. Although school size emerged as a significant predictor, the advantageous effects for smaller schools are probably due to the fact that school size is related to other process variables. Lee, Bryk, and Smith (1993) have argued that effects of school size are probably indirect. Although school size often emerges as a significant predictor in multilevel studies of academic achievement (e.g., Lee & Smith, 1995), it is possible that size is influencing other variables (e.g., social organization of the school) that ultimately are related to student outcomes. Lee et al. (1997) suggested the formation of schools-within-schools as a possible solution to the problems associated with large schools.

Other School Effects

One particularly salient finding of the present studies is that mental health variables (e.g., depression, optimism) vary between schools and are related to some school-structure variables. Whereas psychological phenomena such as depression have been linked to variables such as a family history of depression (e.g., Beardslee, Keller, & Klerman, 1985), genetic factors (e.g., Pike, McGuire, Hetherington, Reiss, & Plomin, 1996), and parenting behaviors (e.g., Ge, Best, Conger, & Simons, 1996), studies to date have not demonstrated that these phenomena vary by school.

The present research does not examine processes that occur within these differing schools that may lead to the observed variations in psychological phenomena. Indeed, the purpose of the present study was to investigate the relations of perceived school belonging to these outcomes while controlling for individual and school characteristics. Nevertheless, the use of statistical tools such as HLM allowed for the analysis of school effects on several psychological outcomes. It is most probable that the observed main effects for school characteristics are a result of complex dynamics between individual and contextual variables that were not captured in the present study. Nevertheless, the present study represents a first attempt to demonstrate that individual-level psychological phenomena can be predicted by school-level characteristics during adolescence.

Limitations

The present study has a number of limitations. First, the data that were collected were part of a larger study of adolescent health and well being. Thus, it was not possible to include some of the measures that would have yielded greater insights into the processes that might explain some of the observed findings. For example, whereas school size emerged as a predictor, it was not possible to examine the more intricate processes in large- and small-sized schools that might be responsible for the observed patterns. Second, the student-level data were self-reported. The reliability and validity of student self-report data always are somewhat problematic in school-based research. However, because the in-home interviews were conducted using computer-assisted interviews that allowed for confidentiality of responses, reliability and validity are probably not greatly affected in Study 2. Third, results of all HLM analyses were reported in standard deviation units (in z -score format) to provide a standardized metric (z score) for interpretation. Nevertheless, as noted by Pedhazur (1997), there is still much debate about whether it is best to report results of regression-based analyses in standardized or unstandardized formats. In the present study, standardized coefficients were chosen so that readers could make basic comparisons among the predictors. The use of unstandardized coefficients in HLM studies is further complicated by the multiple units of analysis (i.e., student and school). Therefore, a decision was made to use standardized coefficients in the present study. Nevertheless, because the size of standardized coefficients is influenced by the variances and covariances of both other variables in the model as well as variables not included in the model, the use of standardized coefficients to compare the relative effects of predictors is somewhat limited. Fourth, the percentage of variance in the outcomes that lies between schools was not very large for some of the outcomes in

Study 2. Nevertheless, all ICCs were statistically significant, and the final models did explain reasonable amounts of the variance between schools (from a low of 17.97% to a high of 36.67%). Although the percentage of between-schools variance in some outcomes was low, this is the first study to attempt to examine these psychological phenomena from both student- and school-level perspectives. The fact that school-level predictors emerged as significant in Study 2 and between-schools variance was explained by the HLM models suggests that school-level phenomena do contribute to students' psychological well being and certainly are worthy of further study. Fifth, it is possible that belonging could be a consequence of the other psychological variables rather than a possible protective factor against those outcomes. Because these data are correlational, this possibility could not be examined directly. However, there is strong support in the educational psychology literature for the idea that the promotion of developmentally and psychologically appropriate learning environments (e.g., environments that foster a sense of belonging among students) lead to adaptive psychological and mental health outcomes (e.g., Battistich et al., 1997). In addition, some quasi-experimental research (e.g., E. M. Anderman et al., 1999; Maehr & Midgley, 1996; Weinstein, 1998) indicates that reform efforts aimed at changing schools' psychological environments can lead to adaptive outcomes, including enhanced motivation, for adolescents.

Nevertheless, the present studies do make several unique contributions to the literature. First, both studies incorporated appropriate design weights; consequently, results are generalizable to the full population of American adolescents. Second, these studies used appropriate statistical techniques (HLM) to examine school-level differences in belonging and belonging's relation to various outcomes. Whereas numerous other studies have demonstrated that the perception of belonging in schools is related to positive outcomes for students, this is the first study to do so using multilevel statistical techniques that separate within and between-schools variance. Third, the present research indicates that studies of school belonging must acknowledge both students' individual perceptions of belonging as well as aggregated belonging within particular schools because when measured at different levels, these variables relate in different ways to psychological outcomes.

Results of the present studies offer several implications for practitioners. First, educators must realize that psychological phenomena can vary as a function of school environments. Thus, issues such as depression or social rejection truly may be more salient in some schools than in others. Second, the issue of school size must be examined in greater detail. Whereas it often is difficult to build smaller schools because of financial considerations, the problems associated with large schools cannot be ignored. Some research (e.g., Lee & Smith, 1995) indicates that the use of schools-within-schools may be a reform that is both plausible and cost effective. Third, the issue of busing must be examined in greater depth. Whereas some research indicates positive effects of busing (e.g., Mathews, 1998), results of the present research indicate that busing may be related to increased psychological distress for some adolescents. Fourth, the present studies emphasize the importance of individual perceived school belonging as a possible defense against negative psychological outcomes for adolescents. If school personnel can do more to create caring communities for adolescents (e.g., Battistich et al., 1997), then students might be less likely to experience various forms of neg-

ative affect and psychological distress. Finally, results of the present study suggest that when many students in a school experience a perception of belonging (i.e., there is a high aggregated perception of belonging), some students who do not feel supported in those environments may experience additional social rejection and school problems.

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