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Effect of School Belonging Trajectories in Grades 6–8 on Achievement: Gender and Ethnic Differences

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Abstract

This study investigated the association between trajectories of school belonging across grades 6–8 and academic achievement in grade 8 in an ethnically diverse sample of 527 academically at-risk adolescents. Students reported annually on school belonging. Reading and math achievement were assessed at grade 5 (baseline) and grade 8. Interactive effects of gender and ethnicity were found in the conditional growth models for school belonging. Girls of all ethnicities had identical growth trajectories and reported higher initial school belonging than Euro-American or Latino boys. Latino and Euro-American males had lower initial level of school belonging than African American males, and Latino males had lower growth in school belonging than Euro-American males. In structural equation modeling (SEM) analyses, initial level of school belonging predicted grade 8 reading for girls and grade 8 math for boys and girls, above prior achievement and school and child covariates, but growth in school belonging predicted grade 8 achievement only for African American students. Implications for strategies to improve school belonging among academically at-risk youth are discussed.

A sense of belonging to school can be defined as the extent to which students feel personally accepted, respected, included, and supported by others in the school social environment (Goodenow, 1993). Considered a component of affective or emotional engagement in school (Fredericks, Blumenfeld, & Paris, 2004), researchers use different terms to refer to constructs that are closely akin to school belonging, including liking for school, identification with or attachment to school, school bonding, and school connectedness. Although some researchers consider these terms interchangeable, Benner and Graham (2007) suggest a sense of belonging to school, more so than liking for school, reflects one's social adaptation, or "fitting in" at school. In the review of school belonging literature that follows, we include studies that use terms that reflect this sense of "fitting in" at school,

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including students' emotional connection and identification with their academic institutions and the people in those institutions (Gillen-O'Neel & Fuligni, 2013). Appendix A provides the specific terms used in studies referenced in this review to refer to this construct.

Self-determination theory (Deci & Ryan, 2000) and the Self-System Model of Motivation (Connell & Wellborn, 1991) offer conceptual frameworks for understanding the importance of a sense of school belonging to students' academic motivation and achievement. Both theories posit that a sense of relatedness to others at school (along with a sense of autonomy and competence) is fundamental to students' internalization of the norms and values of school and self-determined engagement in learning (Fredericks et al., 2004; Vansteenkiste, Lens, & Deci, 2006).

Consistent with these theoretical frameworks, empirical studies have documented positive associations between school belonging and academic motivation and achievement from elementary school (Furrer & Skinner, 2003) through high school (Gillen-O'Neel & Fuligni, 2013). However, school belonging has been most extensively studied in the middle school grades. As students transition from elementary to middle school, their school belonging often declines, with a corresponding drop in their academic effort and achievement (Anderman, 2003; Niehaus, Rudasill, & Rakes, 2012; Roeser, Midgley, & Urdan, 1996; Wang & Holcombe, 2010). In turn, low levels of academic motivation and achievement during middle school predict poor academic performance in high school, including dropping out of school (Janosz, Archambault, Morizot, & Pagani, 2008). Consequently, researchers and educators have advocated for policies and interventions to improve school climate in middle school, thereby enhancing students' sense of belonging to school (Brand, Felner, Shim, Seitsinger, & Dumas, 2003; Juvonen, 2007).

Despite the literature documenting associations between middle school students' sense of school belonging and academic effort and achievement, gaps remain in our understanding of the role of school belonging on achievement. The current study aims to address these gaps by examining the contribution of school belonging trajectories across middle school (i.e., grades 6–8) to reading and math achievement in grade 8, as well as ethnic differences in trajectories and their relationship to achievement. We pursue these aims with a longitudinal sample of students who were identified as at-risk for academic difficulties at entrance to first grade, based on a measure of literacy skills (see Participants). Ethnic minority and low socioeconomic status children are over-represented among students who enter formal schooling with low academic readiness skills and continue to be over-represented among students who repeat grades and leave school prior to earning a high school diploma (Chapman, Laird, & KewalRamani, 2011). Academically at-risk students may experience a lower sense of belonging to school, yet be more responsive to variations in level of school belonging than their higher achieving counterparts (Olsson, 2009; Wang, Brinkworth, & Eccles, 2012). Thus, it is important to understand trajectories of school belonging among an ethnically diverse sample of students who are at-risk for low educational attainment.

School Belonging During Middle School

The transition to middle school is difficult for many students and is often associated with a decline in students' academic motivation, psychosocial adjustment, and grades (Anderman, 2003; Barber & Olsen, 2004). According to the stage-environment fit model (Eccles et al., 1993), a mis-match between students' developmental needs as they enter adolescence and the structure and processes of middle school contribute to declining academic motivation. Specifically, at a developmental period when youth desire increased autonomy and experience a heightened sensitivity to peers' reactions to them (Brown & Larson, 2009), the middle school context provides less choice over academic tasks, an enhanced focus on competition, a larger and more diverse peer context, and increased demands for organization and planning skills (Roeser et al., 1996). Furthermore, as students move from elementary to middle school they report less availability of adults to provide support and guidance in meeting these challenges (Eccles et al., 1993; Furrer & Skinner, 2003; Niehaus et al., 2012). Consistent with the stage-environment fit model, to the degree that middle school students perceive low levels of teacher emotional support and autonomy and an emphasis on grades and competition, they report lower liking for and sense of belonging to school (Roeser et al., 1996; Wang & Holcombe, 2010).

Recent research suggests that the normative drop in school belonging across the transition to middle school continues across the first year of middle school (Niehaus et al., 2012). However, little is known about students' trajectories of school belonging *across* the middle school grades. It is possible that a decline in school belonging observed during the first year of middle school levels off or is followed by a gradually increasing sense of school belonging, as students adjust to the context of middle school. Support for this view comes from a study of urban adolescents (Benner & Graham, 2009). Specifically, using piecewise growth modeling, Benner and Graham (2009) reported a positive slope for school belonging from the beginning of grade 7 to the end of grade 8, followed by a level slope for the first two years of high school. Their findings also highlight that trajectories of school belonging in middle school and high school may differ. Thus, studies that analyze trajectories of school belonging across middle and high school (Wang & Eccles, 2012; Witherspoon & Ennett, 2011) may obscure patterns of school belonging specific to middle school or high school.

The middle school and high school contexts are similar in many ways, including a departmentalized curricula and a larger and more complex social environment; however, the middle school student navigates these changes while also adjusting to the biological changes associated with puberty and experiencing an increased sensitivity to peer approval. Thus, trajectories of school belonging and the impact of gender and ethnicity on these trajectories may differ between middle school and high school. Studies of trajectories of school belonging from the first to the last year of middle school would contribute to a more complete picture of the development of school belonging across the crucial middle school grades.

Effects of School Belonging in Middle School on Academic Functioning

When measured concurrently, students' perceived school belonging and indices of achievement are positively related (Anderman, 2003; Goodenow, 1993; Singh, Chang, &

Dika, 2010). Longitudinal studies have also documented associations between middle school students' school belonging and academic engagement and achievement (Wang & Holcombe, 2010). For example, Niehaus et al. (2012) found that declining levels of school belonging from the beginning to the end of the first year of middle school were associated with lower end-of-year grades. However, because many of these studies did not control for students' baseline levels of academic performance, the association between a sense of school belonging and subsequent achievement may be the result of an effect of achievement on school belonging (Anderman, 2003; Voelkl, 1997) or an effect of other confounding variables not included in the analyses.

Although causal inferences cannot be made with the same certainty in observational studies as in randomized experiments, the inclusion of strong covariates, especially prior performance on the outcome measure, can reduce the likelihood that associations are due to the influence of unmeasured confounders, including between-person variables that influence both achievement and school belonging. Results of the few studies that have controlled for students' baseline academic performance have yielded inconsistent findings. In a short-term longitudinal study of predominantly Euro-American middle socioeconomic status students in grade 8, Roeser et al. (1996) found that students' school belonging mediated the effect of teacher support on students' spring semester grades, controlling for prior achievement. In contrast, in a predominantly African American sample, declining trajectories of school belonging in grades 7–11 were not associated with changes in students' grade point averages (Wang & Eccles, 2012). Finally, in a prospective study of high school students, Gillen-O'Neel and Fuligni (2013) found an effect of year-to-year changes in school belonging on year-to-year changes in students' liking for and valuing of school, but not on year-to-year changes in student grades.

Ethnic Differences in School Belonging

Many early studies on middle school students' school belonging were conducted with predominantly Euro-American samples (Anderman, 2003; Roeser et al., 1996) or compared only two ethnic or racial groups. Studies of differences in school belonging between African American and Euro-American adolescents have yielded inconsistent results. Consistent with the oppositional culture theory (Ogbu, 1993), some researchers have reported lower levels of school belonging among African American than Euro-American adolescents (Johnson, Crosnoe, & Elder, 2001; Witherspoon & Ennett, 2011). Other studies have reported either no differences (Singh et al., 2010) or higher levels of school belonging among African American than Euro-American adolescents (Voelkl, 1997; Wang & Eccles, 2012). Studies comparing Latino and Euro-American adolescents have found that Latino students report levels of school belonging that are similar to or higher than those of Euro-American students (Benner & Graham, 2009; Johnson et al., 2001).

Scholars have suggested that the well-chronicled ethnic differences in high school graduation have their origin in a gradual process of school disengagement and alienation from school that begins during the middle school years (Janosz et al., 2008). Yet, to the author's knowledge no study has investigated ethnic or gender differences in in growth (or decline) in school belonging specifically during the middle school grades. Furthermore, few

studies have investigated racial or ethnic moderation of the association between school belonging and achievement. The vulnerability hypothesis postulates that children at risk of school failure are more affected by school experiences than low risk children (Entwisle & Alexander, 1988; Hamre & Pianta, 2005). According to this hypothesis, because African American and Latino students face more academic challenges than Euro-American students (National Center for Education Statistics, 2010), a sense of school belonging may be especially important to their academic motivation and achievement. Empirical studies have provided mixed support for this hypothesis. In a sample of African American and Euro-American high school students, Singh et al. (2010) reported that school belonging was concurrently associated with self-reported grades for African American students, but not for Euro-American students. Conversely, in a study of fourth and eighth graders, school belonging was associated with scores on an objective test of academic achievement for Euro-American, but not for African American students (Voelkl, 1997).

The limited literature on differences between Latino and Euro-American adolescents in the strength of the association between school belonging and academic motivation or achievement suggests that a sense of school belonging is more important to school adjustment among Latino than Euro-American students. For example, in a short-term, longitudinal study, Espinoza and Juvonen (2011) found that the transition to middle school was associated with a decline in school belonging for both Latino and Euro-American students; however, lower school belonging predicted rule breaking and academic disengagement only for Latino youth. Goodenow and Grady (1993) found that the association between perceived school belonging and academic motivation was stronger for Latino than for African American or Euro-American middle school students. Additional research in multi-ethnic samples is needed to identify groups of adolescents whose academic achievement may be more or less strongly linked to their sense of school belonging.

Gender Differences in School Belonging

From elementary school to high school, girls report higher average levels of school belonging than boys (Furrer & Skinner, 2003; Gillen-O'Neel & Fuligni, 2013; Goodenow, 1993; Johnson et al., 2001; Voelkl, 1997). However, few studies have examined gender differences in the slope for school belonging, particularly over the middle school years. In a study of sixth grade students attending high poverty schools, although boys had lower levels of school belonging than girls, boys and girls did not differ in the slope for school belonging from the beginning to the end of the school year (Niehaus et al., 2012). However, longitudinal studies spanning the middle and high school grades report that the advantage girls have initially in school belonging dissipates over the following years (Gillen-O'Neel & Fuligni, 2013; Witherspoon & Ennett, 2011).

Current Study

In an ethnically diverse, academically at-risk sample, the current developmental (i.e., observational) study investigates trajectories of school belonging across middle school (i.e., grades 6–8) and the effect of these trajectories on students' scores on a nationally standardized test of reading and math achievement in grade 8. To the authors' knowledge, this study is the first to assess trajectories of school belonging specifically across the middle

school grades and the association between these trajectories and gains in academic achievement. Based on empirical findings that school belonging drops when students transition to middle school (and high school) but may increase as students adjust to the new school context (Benner & Graham, 2009), no directional hypotheses regarding slope are advanced. We also investigate gender and ethnic differences in middle school trajectories. Consistent with the research summarized previously, we expect girls will report higher levels of school belonging in grade 6. We offer no hypotheses regarding gender differences in growth in school belonging. Based on few and inconsistent findings regarding ethnic differences in levels and change in school belonging, these analyses are exploratory. Given ethnic group differences in gender socialization (Else-Quest, Mineo, & Higgins, 2013) we also conduct exploratory analyses of the intersection of gender and ethnicity.

Turning to the effect of school belonging on achievement, we expect school belonging trajectories will predict reading and math achievement scores in grade 8, over and above scores on the same measure at grade 5 and relevant potential confounders (i.e., parent education level, school size, school level academic achievement, and student's grade retention history). Consistent with the vulnerability hypothesis, we expect the effect of school belonging trajectories will be stronger for Latino and African American than for Euro-American students. A more complete understanding of ethnic differences in school belonging can contribute to the development and implementation of more targeted interventions to reduce racial and ethnic disparities in educational attainment (Chapman, et al., 2011).

Method

Participants

Participants were 525 students recruited in the fall of 2000 or 2001 into a larger longitudinal study (N=784) on the development of academic and social competencies among academically at-risk students when they were in grade 1. Students in the larger longitudinal sample were enrolled in one of three school districts (one urban and two small city districts) in Texas and were selected into the study on the basis of scoring below the median on a district-administered test of literacy administered in the spring of kindergarten or the fall of grade 1. School District A (student population = 13,558) had an ethnic distribution of 38% Euro-American, 37% Latino/Hispanic, 25% African American, and less than 1% other. District B (student population = 24,429) had an ethnic distribution of 35% Euro-American, 30% Latino/Hispanic, 30% African American, and 5% other. District C (student population = 7,424) had an ethnic distribution of 67% Euro-American, 12% Latino/Hispanic, 12% African American, and 9% other. Additional inclusionary criteria for the larger study included speaking English or Spanish, not receiving special education services other than speech and language services, and not having been previously retained in grade 1. Details on the recruitment of the 784 participants are reported in Author (2006).

At the end of the first five years of participation in the study, parent consent for continued participation was received for 569 of the 784 participants. With the exception of 12 declinations, all non-consent was due to non-response. Of the 569 students, 6 were excluded from the current study because they were retained more than once in the elementary grades

and would, therefore, not have a sufficient number of assessment waves post-transition to middle school to be included in the analyses. An additional 38 students had no data on school belonging. Relative to the 525 participants included in the current analyses, the 259 attrited subjects did not differ on other variables (e.g., gender, parent education level, literacy scores, cohort, reading and math achievement, IQ, ethnicity, and bilingual status). At entrance into the longitudinal study, these 525 participants (54.9% male) were 6.57 years of age ($SD = 0.37$); 57.3% were economically disadvantaged based on income eligibility for free or reduced lunch, and 40% of parents' highest level of educational attainment was a high school diploma or less. The ethnic composition of the sample was 33.9% Euro-American, 37.5% Latino/Hispanic (of which 53.8% were enrolled in bilingual education at baseline), 25.3% African American, and 3.3% other (i.e., Asian, Native American, or Pacific Islander). At grade 6, the 525 participants were enrolled in 93 different schools in 35 school districts.

Trajectories of middle school belonging were based on assessment of school belonging for grades 6, 7, and 8. Students who were retained in an elementary grade ($n = 167$ and 31.8%) were delayed a year in transitioning to middle school and were, on average, one year older at grade 6 than students who were continuously promoted.

Assessment Overview

Students' perception of school belonging was assessed annually in individual interviews at school at grades 6, 7, and 8 by trained research staff, with a minimum of eight months separating each annual assessment. Interviews were typically conducted in the library, hall, counselor's office, or other setting outside the classroom. Students more proficient in Spanish than English, based on performance on the Woodcock-Muñoz Language Test (Woodcock & Muñoz-Sandoval, 1993) ($n = 18$ at grade 6) were administered the school belonging measure in Spanish by bilingual examiners. The Spanish version was translated into Spanish from the English version and back-translated into English to ensure its validity. Reading and math achievement were assessed at grade 5 (baseline for this study) and at grade 8. Achievement was tested with the Woodcock Johnson III Tests of Achievement (WJ-III, Woodcock, McGrew, & Mather, 2001) Broad Reading and Broad Math scales. Students assessed as more proficient in Spanish than English ($n = 23$ at grade 5) were administered the Bateria III, the equivalent Spanish version of the WJ-III (Woodcock, Muñoz-Sandoval, McGrew, Mather, & Schrank, 2004).

Measures

School belonging—Students completed the Psychological Sense of School Membership Scale (Goodenow, 1993) by indicating their agreement on a 5-point Likert-type scale (1=not at all true; 5=very true) to 18 items that assess students' perceived acceptance, feelings of inclusion, respect, and encouragement for participation. Example items include "I feel like a real part of this school", "It is hard for people like me to be accepted here" (reverse coded), and "Most teachers at (name of school) are interested in me." Higher school membership scores are associated with greater school attendance, higher grades, more positive self-concept, greater time spent on homework, and better social-emotional adjustment (Goodenow, 1993; Hagborg, 1998). Cronbach's α across three longitudinal measurement

waves for the current sample ranged from 0.81 to 0.91 (median = 0.89). Scores on this scale are moderately correlated with students' perceived level of teacher support and academic self-efficacy (Author, 2011a, 2011b).

Academic achievement—The Woodcock Johnson III Tests of Achievement (WJ-III; Woodcock et al., 2001) is an individually administered measure of academic achievement for individuals of ages 2 to adulthood. The WJ-III Broad Reading W Scores (based on Letter-Word Identification, Reading Fluency, and Passage Comprehension subtests) and the WJ-III Broad Math W Scores (based on Calculations, Math Fluency, and Math Calculation Skills subtests) were used. The Reading and Math W scores are based on the Rasch measurement model, yielding an equal interval scale, which facilitates modeling growth in underlying latent achievement. Evidence of the reliability and construct validity of scores on the WJ-III and its equivalent Spanish version is strong (Woodcock et al., 2004; Woodcock et al., 2001). Reading and math achievement were analyzed separately based on the fact that students were selected into this study based on academic risk in the area of reading and on prior studies finding differences in factors that predict growth in reading and math (Author, 2008).

Gender and ethnicity—Gender and ethnicity were determined from school records, based on parent report to schools.

Covariates—To control for potential confounds, two school-level covariates and two child-level covariates were employed in the conditional growth model and in the SEM outcome model. The school-level covariates were school size and average academic achievement. School level achievement is positively associated and school size is negatively associated with students' perceptions of school climate and student engagement and achievement (Benner, Graham, & Mistry, 2008; Bowen, Bowen, & Richman, 2000; Mertens, Flowers, & Mulhall, 2001). School size was based on the total student population of the middle school (i.e., grades 6–8) the student attended at grade 8. School achievement was calculated as the mean percentage of 8th grade students who obtained a passing score on the state mandated grade 8 test of reading and math achievement. Both school size and school achievement were obtained from the Texas Education Agency Academic Performance Reports. Child covariates were parent education level and having been retained in grade during the elementary grades (i.e., retention status). Parent education level is negatively associated with students' school belonging (Juvonen, 2007) and positively associated with academic achievement (Zhan, 2006). Because children who were previously retained in grade were, on average, one year older than their grade-mates, retention status controls for potential age-related effects on school belonging. Parents were mailed questionnaires that included items asking them to indicate the highest level of education of any adult living in the home, from 1 (elementary school) to 10 (Ph.D., MD, or equivalent), with a score of "4" representing a high school diploma. If any Spanish was spoken in the home, the questionnaires were sent in both English and Spanish. Grade retention status was based on school records.

Research Design and Data Analysis

Analyses were conducted using *Mplus* (version 7, Muthén & Muthén, 1998–2012). The models in the study were tested using full information maximum likelihood, which provides proper adjustment for data that are missing at random (Enders, 2010). Although the data for the study had a nested structure with students nested within schools, our research questions were focused on a single level (i.e., student). Thus, we employed TYPE=COMPLEX routine in *Mplus* with school where students attended in year 8 as the cluster variable, which allowed us to take the data dependency (i.e., students nested within schools) into account in a single-level analysis. For all analyses, the sandwich estimator, which adjusts standard errors for the effects of clustered data and provides more appropriate tests of statistical significance, was used. Based on Hu and Bentler (1999), the following cutoff criteria were used to determine whether a relatively good fit existed between the hypothesized model and the observed data: a) a cutoff value near 0.95 for comparative fit index (CFI); b) a cutoff value near 0.06 for root mean square residual (SRMR); and c) a cutoff value near 0.06 for root mean square error of approximation (RMSEA).

First, we investigated whether the measure of school belonging was invariant across time (i.e., yields equivalent scores across time), which is a precondition of longitudinal growth modeling (Meredith 1993). The time periods were coded as 0 (intercept, grade 6), 1 (grade 7) and 2 (grade 8). Second, we investigated trajectories of student-reported school belonging across grades 6–8 (i.e., unconditional latent growth model). The unconditional latent growth models (LGM) with two trajectory factors allowed us to estimate the mean level of school belonging at grade 6 (i.e., initial status or intercept) and the rate of linear growth or decline in school belonging across grades 6–8 (i.e., linear slope). Third, using the same LGM, we investigated the main effects of gender and ethnicity as predictors on the intercept and slope for school belonging, controlling for relevant covariates. We also tested interaction between gender and ethnicity (gender $\times$ ethnicity) on the school belonging trajectories using multiple group analyses. Fourth, in separate structural equation models, we tested the hypothesized effect of school belonging trajectories (i.e., intercept and slope in LGM) on reading and math achievement scores at grade 8, controlling for grade 5 performances on the same measure of reading or math achievement. We also investigated whether ethnicity or gender moderated the SEM results, using multiple group analyses.

Results

Descriptive Statistics

Descriptive and correlational statistics for the predictors in the hypothesized LGM and for the observed variables in the middle school achievement SEM are presented in Table 1. The variables were screened for non-normality and extreme values. None of the variables exhibited levels of skewness or kurtosis associated with problematic tests of fit or standard errors in structural equation modeling (West, Finch, & Curran, 1995); thus, maximum likelihood estimation was used. Of the 525 participants, 474 (90.3%) had data for all three waves, 35 (6.7%), had data for two waves, and 16 (3.0%) had data for one wave. To deal with these missing data we used full information maximum likelihood estimation (FIML), which uses all the available information for parameter estimation (Enders, 2010). Thus, we

probed the type of missingness by comparing the means of all analysis variables between those participants who had complete data with those who were missing data for each time. We did not find any significant differences between completers and non-completers, indicating the data were missing at random and no adjustment in the results would be needed.

Girls reported significantly higher levels of school belonging than boys each year. Latino students, relative to Euro-American students, reported significantly lower levels of school belonging during grades 7 and 8. African American and Euro-American students reported similar levels of school belonging during the middle school years. School belonging showed moderate one-year stability (0.60 and 0.68). Relative to Euro-American students, the highest level of parent education in the home was lower for Latino and African American students. Math and reading scores at grade 5 were strongly predictive of math and reading scores at grade 8 ($r = 0.81$ and 0.86 , respectively). African American students, relative to Euro-American students, performed lower on reading and math tests at grade 8. Latino students' reading and math scores did not differ from those of Euro-American students. Parent education level was positively associated with reading and math performance at grade 8 (0.31 and 0.31 respectively). Retention status was negatively associated with reading and math performance at grade 8 (-0.23 and -0.24 , respectively).

Measurement Invariance

Table 2 presents the global model fit indices of measurement invariance tests. Following the recommendations of Knight and Zerr (2010), we investigated the measurement invariance of the school belonging measure across time (grades 6, 7 and 8), and student gender and ethnicity (Euro-American, African American, and Latino). Invariance tests of students' gender and ethnicity were investigated separately for each time. Following the sequence of tests of measurement invariance (Meredith, 1993; Millsap & Cham, 2012), we tested configural, metric, and scalar invariance models using χ^2 difference test (at $\alpha = 0.05$) and the examination of significant differences of the RMSEA (change > 0.015 ; Chen, 2007) between the two nested invariance models. The null hypothesis of the χ^2 difference test is that the more restricted invariance model (e.g., metric) fits the data equally well as the less restricted invariance model (e.g., configural). Given that the sensitivity of the χ^2 difference test to sample size, we also examined significant differences on this test with an examination of the RMSEA. A small change in the RMSEA between the more restricted and less restricted invariance models supports retention of the more restricted invariance model (Chen, 2007). We tested the longitudinal invariance of the school belonging measure across three assessment years (grades 6, 7 and 8) in Model A. We also tested invariance of students' gender (Model B) and ethnicity (Model C). The test results suggested that school belonging has the same measurement structure across grades 6 to 8 in males and females and in Euro-American, African American, and Latino students at each year.

Unconditional Latent Growth Model

We first tested the hypothesized unconditional LGM for student-reported school belonging with two latent growth factors (i.e., intercept at grade 6 of middle school and linear slope during grades 6 to 8). The hypothesized unconditional LGM had adequate fit according to

suggested criteria (Hu & Bentler, 1999), $\chi^2(1) = 1.572, p = 0.2098$, CFI=0.999; RMSEA = 0.033 (C.I. = 0.000 to 0.127), SRMR = 0.010. The unconditional latent growth trajectory with parameter estimates is presented in Table 3.

For the unconditional LGM, the result showed that the average level of student-reported school belonging at grade 6 (i.e., intercept β_{00}) was 3.84 ($SE = 0.04, p < 0.001$). The intercept variance among students was significant ($\tau_{00} = 0.31, SE = 0.03, p < 0.001$), indicating significant variation between students in their initial level of school belonging. For the linear growth trajectory during grades 6 to 8, on average, we found no change in slope across middle school years ($\beta_{10} = 0.02, SE = 0.01, p = 0.058$). Although the average slope was not different from zero, the variance in slope among students was significant ($\tau_{11} = 0.07, SE = 0.02, p < 0.001$), indicating significant variation in students' rate of linear growth or decline in school belonging across middle school years.

Effect of Gender and Ethnicity

Main effect—We tested the first order (main) effect of gender and ethnicity as a predictor on growth parameters controlling for two individual-level covariates (i.e., parent education level and retention status) and two school-level covariates (i.e., school average reading and math score and school size) on school belonging growth parameters. Because there are three ethnic groups, we tested three LGMs, rotating the reference group. Models B, C, and D in Table 3 report results for models with Euro-American, African American, and Latinos as the reference group, respectively. Each model had adequate fit, $\chi^2(8) = 3.587, p = 0.8924$, CFI = 1.000, RMSEA = 0.000 (C.I. = 0.000 to 0.024), SRMR = 0.007. In each model, boys showed lower school belonging at grade 6 in middle school than girls ($\beta_{01} = -0.18, SE = 0.05, p < 0.001$), whereas for the linear growth trajectory from grade 6 to 8, no gender differences were found. Regardless of which ethnic group was used as the reference group, we found no main effect of ethnicity on average level of school belonging at grade 6. For average linear growth of school belonging during middle school years, we also found no ethnic differences.

Interaction effect—Next, using multiple group analysis, we tested the interaction between gender and ethnicity (gender $\times$ ethnicity) on growth parameters (intercept and slope, separately), controlling for the same covariates used in main effect LGM. Based on three ethnic groups and two gender groups, we created six different groups (i.e., Euro-American male student (EA_M), Euro-American female student (EA_F), African-American male student (AA_M), African-American female student (AA_F), Latino male student (Latino_M), and Latino female student (Latino_F). In multiple group analyses, we first allowed the growth parameters (i.e., intercept and slope) to vary across student gender and ethnicity (i.e., relaxed model) and then imposed equality constraints on these relations (i.e., constrained model), sequentially. We used the TYPE=COMPLEX routine; thus, we conducted Satorra-Bentler χ^2 difference tests (χ^2) to compare the two competing nested models at the significance of $\alpha = 0.05$. The null hypothesis of the χ^2 test is that the constrained model (indicating no moderation effect) fits the data equally well as the relaxed model (indicating existence of moderation effect).

Through the preliminary analyses, we found that for the female groups the school belonging trajectories are identical regardless of their ethnicity. Thus, for testing the interaction between gender and ethnicity on growth parameters, we used four different groups (i.e., EA_M, AA_M, Latino_M, and Female) for testing all possible comparisons between the groups, yielding twelve tests (six comparisons for each of intercept and slope). Panel A in Table 4 presents the estimated parameter coefficient of intercept (ranging from 3.33 to 3.60) and slope (ranging from -0.05 to 0.03) for each group in multiple group analysis. Panel B in Table 4 presents the results of χ^2 tests for testing the interaction between gender and ethnicities on growth parameters (intercept and slope, separately). Based on χ^2 tests, four significant effects in intercept and one significant effect in slope were found. To further understand the interaction effect, Figure 1 depicts the growth trajectories of school belonging across grade 6 to 8 by student gender and ethnicity. For the simplicity of the figure, we presented one trajectory for the three female groups. The four growth trajectories represent the four different gender and ethnic groups (i.e., three male groups for three different ethnic groups *plus* one female group for all three ethnic groups). As shown in Figure 1, all female groups, regardless of ethnic groups, had higher level of school belonging at grade 6 compared to Latino male groups ($\chi^2 = 27.447, p < 0.001$) and Euro-American male groups ($\chi^2 = 13.639, p < 0.001$) and remained at the level of school belonging throughout middle school years from grade 6 to 8. However, the male groups showed different linear growth trajectories by their ethnicity. African American male students had higher initial level of school belonging at grade 6 compared to other male groups (i.e., Latino male $\chi^2 = 6.903, p = 0.009$; Euro-American male $\chi^2 = 13.882, p < 0.001$) and remained at the higher level of school belonging across middle school. Latino male students remained at the lower level of school belonging across middle school years, whereas Euro-American male students showed a slightly positive slope across middle school years compared to Latino male students ($\chi^2 = 6.477, p = 0.011$).

Middle School Achievement SEM

We used structural equation modeling (SEM) to investigate the relation between school belonging growth parameters (intercept and slope) and grade 8 achievement (reading and math, separately). We controlled for three individual-level covariates (i.e., gender, parent education level, retention status) and two school-level covariates (i.e., school average reading and math score and school size) on school belonging growth parameters and grade 8 achievement scores. We also controlled for grade 5 reading or math achievement scores as prior performance on reading or math achievement scores at grade 8. Each SEM showed adequate fit; $\chi^2 (14) = 18.44 (p = 0.81)$; CFI = 0.997, RMSEA = 0.025 (C.I. = 0.00 to 0.054); SRMR = 0.020 for grade 8 reading achievement; $\chi^2 (14) = 25.02 (p = 0.03)$; CFI = 0.990, RMSEA = 0.025 (C.I. = 0.01 to 0.07); SRMR = 0.034 for grade 8 math achievement. Figure 2 depicts the hypothesized SEM for the effect of school belonging trajectories on achievement scores at Grade 8. Panel A of Table 4 shows the overall standardized coefficients and the corresponding standard error of the effect of the school belonging trajectories on reading and math achievement score.

Considering the reading SEM, the school belonging intercept had a significantly positive relation to grade 8 reading achievement ($\gamma_1 = 0.05, SE = 0.02, p = 0.015$). A total of 75.7%

of the variance in grade 8 reading achievement was explained by all variables in the model. For grade 8 math achievement, the school belonging intercept had a significantly positive relation to grade 8 math achievement ($\gamma_I = 0.10$, $SE = 0.03$, $p = 0.001$). A total of 69.2% of the variance in grade 8 math achievement was explained by all variables in the model. For the entire sample, the school belonging slope did not predict grade 8 reading or math achievement.

Gender and Ethnic Moderation of Effects of School Belonging on Achievement

Ethnic moderation—One significant ethnic moderation (Euro-American, Latino, and African American) effect was found. For the effect of school belonging slope, we found significant ethnic differences in χ^2 difference test ($\chi^2(4) = 12.70$, $p = 0.012$) on grade 8 math achievement scores. As a post-hoc test, we then conducted pairwise comparisons among three ethnic groups (i.e., Euro-American vs Latino; Euro-American vs African American; African American vs Latino) to determine if the effect of school belonging slope on grade 8 math achievement scores for one ethnic group differs from the effect of another ethnic group. Panel B of Table 4 shows the standardized coefficients and the corresponding standard error of the effect of school belonging trajectories on grade 8 math achievement scores for each ethnic group. According to the significant difference in χ^2 difference test between Euro-American and African American students ($\chi^2(1) = 28.87$, $p < 0.001$), for grade 8 math achievement scores, school belonging slope was a significant predictor only for African American students ($\gamma_I = 0.10$, $SE = 0.04$, $p = 0.016$), but not for Euro-American students ($\gamma_I = -0.07$, $SE = 0.05$, $p = 0.129$) or for Latino students ($\gamma_I = 0.06$, $SE = 0.05$, $p = 0.293$). The school belonging intercept was a significant predictor of grade 8 math achievement for all three ethnic groups.

Gender moderation—One significant gender moderation (female vs male) was found. For the effect of school belonging intercept, we found significant gender differences in χ^2 difference test ($\chi^2(2) = 12.43$, $p = 0.000$) on grade 8 reading achievement scores. Panel C of Table 4 shows the standardized coefficients and the corresponding standard error of the effect of school belonging trajectories on grade 8 reading achievement scores for each gender group. The significant effect of school belonging intercept on grade 8 reading scores was found only for female students ($\gamma_I = 0.12$, $SE = 0.03$, $p < 0.001$) but not for male students ($\gamma_I = -0.01$, $SE = 0.04$, $p = 0.767$).

Discussion

Trajectories of School Belonging

Results of this study add to our understanding of trajectories of school belonging across the middle school grades among ethnically diverse, educationally at-risk adolescents and underscore the importance of the intersection of gender and ethnicity in patterns of school belonging during middle school. With respect to initial levels of school belonging (i.e., intercept), consistent with prior research, girls reported a higher sense of school belonging than males; however, this effect was not consistent across ethnic groups. Specifically, African American boys reported initial levels of school belonging that were similar to that of girls of all ethnicities and higher than Euro-American and Latino boys. Girls and African

American boys continued to report higher levels of school belonging than Latino or Euro-American males across middle school. Interestingly, prior research has found that African American students' reports of social relatedness may reflect a positive reporting bias, relative to others' report of the relationship (Dunkel, Kistner, & David-Ferdon, 2010; Hughes, Wu, Kwok, Villarreal, & Johnson, 2012; Zakriski & Coie, 1996). Alternatively, a tendency for African American males to report a more positive sense of belonging to school than Euro-American and Latino males may reflect a greater valuing of or reliance on relationship supports at school (Ellison, Boykin, Tyler, & Dilihunt, 2005). Consistent with this view, prior research has found that the impact of a positive relationship with teachers on school engagement was stronger for African American than Euro-American youth (Downey & Ainsworth-Darnell, 2002; Graham, Taylor, & Hudley, 1998; Meehan, Hughes, & Cavell, 2003).

Turning to growth in school belonging, the unconditional growth model finds that the average level of school belonging was not significantly different from zero, indicating steady or flat trajectories from grade 6 to grade 8. However, in the conditional growth models, a significant interaction of gender and ethnicity was found. Specifically, Latino males have lower growth in school belonging than Euro-American males. The less positive slope for Latino males, relative to Euro-American males, may reflect lower social integration across middle school for Latino youth (Ream & Rumberger, 2008). Overall, trajectories for Latino males is troubling, as these youth, on average, report lower school belonging than African American males and all females and less positive growth, relative to Euro-American males.

School belonging did not decline, on average, for any ethnic or gender group. These findings suggest that the decline in school belonging evidenced during the first year of middle school reported by Niehaus et al. (2012) may not continue across the middle school grades, as students adjust to the social ecology and academic demands of middle school. Furthermore, prior studies finding declines in school belonging across adolescence (Way, Reddy, & Rhodes, 2007; Witherspoon & Ennett, 2011) that did not taken into account school transitions may be capturing drops in school belonging associated with school transitions (Barber & Olsen, 2004; Brenner & Graham, 2009) rather than a more continuous developmental process.

Effect of School Belonging on Achievement

A primary rationale for investigating trajectories of school belonging in middle school is the premise that these trajectories predict students' subsequent achievement and educational attainment. With respect to reading achievement, higher levels of school belonging at grade 6 predicted grade 8 reading above prior levels. This finding was similar across ethnic groups, but not across gender. An effect of initial level of school belonging on reading was true only for girls. The slope in school belonging did not predict grade 8 reading, and neither gender nor ethnicity moderated the null finding.

With respect to math achievement, higher levels of school belonging at grade 6 predicted grade 8 math, above prior math achievement and other school-level and child-level covariates. This finding held for boys and girls and across ethnic groups. In contrast, a

significant effect of school belonging slope on grade 8 math was found only for African American students. Post-hoc comparisons found that the effect of school belonging slope on grade 8 math achievement was more positive for African American than for Euro-American youth but that the effect was similar for African American and Latino youth (yet only reached statistical significance for African American youth).

The finding that growth in school belonging across the middle school grades predicts math achievement only for African American youth is consistent with prior research reporting a greater impact of social support from peers and teachers on school engagement for African American than Euro-American adolescents (Downey & Ainsworth-Darnell, 2002; Graham, et al., 1998). Also, according to the vulnerability hypothesis, students who face more challenges at school are expected to be more affected by a supportive school environment. African American students, relative to Euro-American students, experience a number of challenges at school. Relative to Euro-American students, African American students' relationships with teachers are characterized by higher levels of conflict and less support throughout the elementary and middle school (Spilt, Hughes, Wu, & Kwok, 2012). Furthermore, African American students are more likely to experience disciplinary sanctions, including disciplinary placements, suspensions, and expulsion than are their Euro-American counterparts, a difference that is not explained by differences in disciplinary infractions (Nicholson-Crotty, Birchmeier, & Valentine, 2009; Skiba et al., 2014). In the face of these challenges, maintaining a sense of belonging to school may be especially important to African American youths' academic effort and achievement.

The finding that Latino males are particularly likely to have low levels of school belonging at the beginning of middle school and to remain low is of particular concern given evidence that a sense of school belonging may be more important to Latino students' behavioral compliance and academic engagement in school than to other ethnic groups (Espinoza & Juvonen, 2011). For example, low school belonging in middle school and at the beginning of high school predicts low behavioral engagement in school and dropping out of school (Barile et al., 2012; Fall & Roberts, 2012; Janosz et al., 2008; Ream & Rumberger, 2008). In a rigorous study of school belonging across high school, year-to-year changes in school belonging predicted higher student liking for and valuing of school (Gillen-O'Neel & Fuligni, 2013).

Implications for Educational Practice and Policy

Although findings varied according to ethnicity and gender, school belonging intercept predicted reading or math achievement, or both, in grade 8 for all groups, above prior achievement, and growth in school belonging predicted math achievement for African American youth. These findings take on added significance in light of findings from a large longitudinal study finding that, among a range of factors predicting dropping out of school, academic performance at grade 8 (as measured by achievement test scores and GPA) was the most important unique predictor of dropping out of school (Neild, Stoner-Eby, & Furstenberg, 2008). Given the at-risk nature of the current sample, these findings suggest the potential value of policies and strategies that improve school belonging for reducing ethnic and income disparities in school completion.

Participation in extracurricular activities is one possible strategy for improving school belonging. Considerable research reports that participation in extracurricular activities promotes students' positive school identity, academic achievement and school completion, particularly among low-income and minority students (Eccles, Barber, Stone, & Hunt, 2003; Feldman & Matjasko, 2005). Presumably, extracurricular participation facilitates finding one's "niche" in school, as well as providing access to supportive adult leaders and academically engaged peers (Eccles & Gootman, 2002). Importantly, Latino youth are less likely than African American or Euro-American youth to participate in extracurricular activities (Lugaila, 2004; National Center for Educational Statistics, 2010). This lower likelihood of participation may explain, in part, the less positive slope in school belonging for Latino boys relative to Euro-American and African American boys. Importantly, empirical studies suggest the association between participation in extracurricular activities and school belonging and achievement may be stronger for Latino youth than it is for youth from other ethnic groups (Feldman & Matjasko, 2007; McCarthy, 2000; Villarreal, 2013).

Prior research suggests that supportive teacher-student relationships are especially important to minority students' affective and behavioral engagement in school (Brewster & Bowen, 2004; Downey & Ainsworth-Darnell, 2002; Graham et al., 1998; Meehan et al., 2003). Thus policies and practices that promote close teacher-student relationships may enhance academic achievement for all students, but especially among Latino and African American youth (for a promising intervention, see Allen, Pianta, Gregory, Mikami, & Lun, 2011). Also, given the negative association between perceived school-level racial discrimination and minority students' academic motivation (Benner & Graham, 2011), policies that promote respect for ethnic diversity and intolerance of discrimination, as well as assistance to teachers in creating supportive and fair classroom practices may facilitate higher levels of school belonging, especially among minority students. School psychologists are well positioned in schools to consult with school administrators and teachers regarding ways to improve teacher-student relationships and to build inclusive, positive school climates (Ferner, Favazza, Shim, Brand, Gu, & Noonan, 2001)). For example, schools implementing school-wide positive behavior supports (Lewis, Sugai, & Colvin, 1998) experience decreases in behavior problems and increased positive school engagement and achievement (Ward & Gersten, 2013).

Enhancing parent involvement in school may also promote higher school belonging, especially among low-income and minority youth, whose parents are less likely than higher income and Euro-American youth to attend school-based activities, such as general educational meetings and school events (Hill et al., 2004). Parent involvement in school communicates to students the value of education and builds social connections between home and school (Grolnick, Kurowski, Dunlap, & Hevey, 2000). In a study of middle and high school Latino students, the effect of parent involvement on academic success was mediated by its direct effect on school belonging (Kuperminc, Darnell, & Alvarez-Jimenez, 2008). Through consultation with teachers and parents, school psychologists can improve home-school partnerships and students' school adjustment (Sheridan, Ryoo, Garbacz, Kunz, & Chumney, 2013).

Juvonen (2007) found that students in the United States, relative to students in other industrialized nations, perceived a less caring peer culture at school. Specifically, Americans felt more socially isolated at school than their counterparts in 8 of the other 11 nations, perceiving their schoolmates as generally unfriendly, unaccepting, and not helpful. Whole school reform focused on creating a culture of acceptance and respect can lead to improved sense of connection to school for all students (Brand et al., 2003). Such a peer culture may be especially important to school belonging among ethnic minority youth (Fuller & García Coll, 2010).

Study Limitations and Directions for Future Research

Students in the current sample were recruited into a larger longitudinal study in first grade based on scoring below the median for their school district on a test of early literacy, and minority and low-income students are over-represented in this sample, relative to the student population in these districts. Thus, study findings may not generalize to students entering school with above average academic readiness. Conversely, because the current sample represents students who are at elevated risk for dropping out of school, findings are of considerable relevance to educators and policy makers concerned with reducing ethnic and income disparities in educational achievement.

School belonging is about “fitting in” and adapting to the social environment. Finding one’s “niche” may depend, in part, on the proportion of same-ethnicity students in the school (i.e., ethnic congruence) (Benner & Graham, 2007). An investigation of the role of school ethnic composition was outside the scope of the current study. Such an investigation would need to be sensitive to sources of heterogeneity within ethnic groups. For example, Latino students differ on a number of individual and family variables that may moderate the association between ethnic congruence and school belonging (Author, 2014). Future research within ethnic groups is needed to obtain a better understanding of the interplay of characteristics of the school and the student. Other school-level variables, such as perceived school climate and discrimination may also be associated with students’ school belonging trajectories and warrant additional investigation (Author, 2014; Alfaro, Umaña-Taylor, Gonzales-Backen, Bámaca, & Zeiders, 2009; Benner & Graham, 2011).

An additional limitation is the availability of school belonging data for only 3 time periods, which did not permit testing non-linear trajectories. Finally, the standardized estimates reported in the SEM models represent small effect sizes, suggesting that other factors likely explain more variation in outcomes.

Conclusion

Whereas previous studies have reported declines in school belonging during early adolescence, the current study suggests that during the critical middle school grades, the slope for school belonging is flat for girls of all ethnicities and for Latino boys and positive for African American and Euro-American boys. Importantly, level of school belonging at the beginning of middle school predicts reading achievement in grade 8 for girls and math achievement in grade 8 for both genders, above effects of earlier achievement and a number of demographic and school variables. In contrast, growth in school belonging is predictive of

grade 8 math only for African American youth. Findings suggest the potential value of policies and programs to improve school belonging among academically at-risk youth, especially ethnic minority youth, to reducing ethnic disparities in educational attainment, including school completion.

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Appendix A. Definitions of School Belonging in Cited Studies

Study	Definition of school belonging and number of items
Anderman, 2003	School belonging, defined as feelings of being accepted and comfortable (5 items)
Barber & Olsen, 2004	Perceived school environment, defined as liking for school and perceived support from adults (7 items)
Benner & Graham, 2009	School belonging, defined as feeling a part of the school and connected to others at school (5 items)
Espinoza & Juvonen, 2011	Perceived school climate, defined as a sense of belonging to school, feeling safe at school, and feeling treated fairly by teachers (3 items)
Furrer & Skinner, 2003	Sense of relatedness or belonging to teachers and peers at school (12 items)
Gillen-O'Neel & Fuligni, 2013	School belonging, defined as feeling close to people at one's school, feeling a valued part of one's school, being happy to be at school, and identifying with school (7 items)
Goodenow & Grady, 1993	School belonging, defined as perceived liking for school, personal acceptance, and inclusion (18 items)
Goodenow, 1993	School belonging, defined as perceived liking for school, personal acceptance, and inclusion (18 items)
Johnson, Crosnoe, & Elder, 2001	School attachment, defined as feeling close to people at school, a part of school, and happy to be at school (3 items)
Niehaus, Rudasill, & Rakes, 2012	Perceived support from teachers and peers (16 items)
Roeser, Midgley, & Urdan, 1996	School belonging, defined as a sense of belonging to and important at school (4 items)
Singh, Chang, & Dika, 2010	School belonging, defined as connectedness or belonging to school (5 items)
Voelkl, 1997	Identification with school, defined as feelings of belongingness to, liking for, and valuing of school (16 items)
Wang & Eccles, 2012	Identification with school, defined as feeling a part of one's school, liking of school, and valuing of school (7 items)
Wang & Holcombe, 2010	Identification with school, defined as feeling a part of one's school, liking of school, and valuing of school (7 items)
Way, Reddy, & Rhodes, 2007	Perceived school climate, defined as perceived support from teachers (6 items) and peers (6 items)
Witherspoon & Ennett, 2011	Perception of students' sense of the school as a community, defined as feeling a valued part of the school (3 items)

Figure 1.

Students' school belonging trajectories across middle school years by student's gender and ethnicity based on the parameter estimated in Panel A in Table 4. For the simplicity of the figure, we presented one trajectory for the three female groups because for the female groups, the school belonging trajectories are identical regardless of their ethnicity.

Figure 2.

Hypothesized SEM model for effect of school belonging on achievement scores at grade 8. Reading and Math are Woodcock Johnson III Broad Reading Broad and Broad Math scores. Belonging is student-reported school belonging scores during middle school year. The number after Belonging indicates the grade of middle school. γ_1 and γ_2 are standardized coefficients. γ_1 refers to the coefficients effect of estimated mean level of school belonging at grade 6 on grade 8 academic achievement scores and γ_2 refers to the effect of linear slope during grade 6 to 8 on grade 8 academic achievement scores.

Table 1

Zero-Order Correlations and Descriptive Statistics for All Analysis Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Correlation															
1 Gender	-														
2 Latino	-.03	-													
3 AA	-.04	<u>-.47</u>	-												
4 Parent Edu.	.00	<u>-.31</u>	<u>-.11</u>	-											
5 Retention	<u>.10</u>	<u>-.09</u>	<u>.19</u>	<u>-.15</u>	-										
6 School Read8	-.02	<u>-.22</u>	-.04	<u>.35</u>	<u>-.14</u>	-									
7 School Math 8	-.01	<u>-.18</u>	-.06	<u>.32</u>	<u>-.13</u>	<u>.92</u>	-								
8 School size	-.01	<u>-.09</u>	<u>.13</u>	.00	-.04	<u>.17</u>	.05	-							
9 Belonging6	<u>-.15</u>	-.03	.07	.02	-.04	.02	.07	-.02	-						
10 Belonging7	<u>-.11</u>	<u>-.10</u>	.08	.09	-.02	.01	.07	-.04	<u>.60</u>	-					
11 Belonging8	<u>-.11</u>	<u>-.09</u>	.06	.09	-.02	.04	.07	-.02	<u>.48</u>	<u>.68</u>	-				
12 WJ III Read5	-.08	.03	<u>-.35</u>	<u>.24</u>	<u>-.19</u>	<u>.10</u>	<u>.14</u>	-.03	.06	.07	.03	-			
13 WJ III Math5	.04	.03	<u>-.29</u>	<u>.23</u>	<u>-.14</u>	<u>.12</u>	<u>.14</u>	.01	.00	<u>.09</u>	.06	<u>.63</u>	-		
14 WJ III Read8	-.06	-.01	<u>-.34</u>	<u>.31</u>	<u>-.23</u>	<u>.16</u>	<u>.21</u>	-.04	<u>.12</u>	<u>.13</u>	.08	<u>.86</u>	<u>.63</u>	-	
15 WJ III Math8	.04	-.02	<u>-.31</u>	<u>.31</u>	<u>-.24</u>	<u>.24</u>	<u>.31</u>	-.04	.08	<u>.17</u>	<u>.14</u>	<u>.59</u>	<u>.81</u>	<u>.68</u>	-
Descriptive Statistics															
Missing(%)	0%	3%	3%	0%	0%	0%	0%	0%	3%	4%	6%	3%	4%	6%	6%
Mean	.55	.39	.26	2.86	.32	79.96	90.55	345.5	3.85	3.84	3.88	501.5	506.9	524.8	520.0
Std. Deviation	.50	.49	.44	1.08	.47	10.50	5.56	63.47	.67	.67	.65	19.13	10.24	22.41	12.09

Note. Gender was coded as 1 for male and 0 for female. Latino is coded as 1 for Latino and 0 for Euro-American. AA is coded as 1 for African American and 0 for Euro-American. Parent Edu. is highest educational level in home. Retention is coded as 1 for retained ever during the elementary grades and 0 for continuously promoted during the elementary grades. School Read and School Math are school average reading and math achievement scores. School size is middle school size at grade 6. Belonging is student-reported school belonging. The numbers in the repeated measure refer to the grade of middle school. WJ III Read and Math are WJ-III Broad Reading and Broad Math W scores, respectively. Underlined correlations are significant at $p < .05$ (two-tailed).

Table 2

Global Model Fit Indices of Measurement Invariance Tests

Invariance Model	χ^2	df	χ^2 Difference Test		RMSEA
			Comparison	$\chi^2(df)$ p value	
(A) Invariance Across Time (Years 6, 7, and 8)					
Configural	2641.10	1308			0.044
Metric	2676.93	1342	Configural	35.8 (34)	0.383
Scalar	3140.07	1376	Metric	463.1 (34)	<.001
(B) Invariance Across Students' Gender					
Year 6					
Configural	497.76	880			0.060
Metric	517.66	929	Configural	19.9 (17)	0.279
Scalar	544.96	957	Metric	27.3 (17)	0.054
Year 7					
Configural	629.43	258			0.075
Metric	655.94	275	Configural	26.5 (17)	0.066
Scalar	688.51	292	Metric	32.6 (17)	0.013
Year 8					
Configural	631.04	258			0.076
Metric	647.15	275	Configural	16.1 (17)	0.516
Scalar	688.25	292	Metric	41.1 (17)	0.001
(C) Invariance Across Students' Ethnicity					
Year 6					
Configural	789.32	387			0.080
Metric	857.23	421	Configural	67.9(34)	0.261
Scalar	944.55	455	Metric	87.3(34)	0.086
Year 7					
Configural	795.17	387			0.080
Metric	831.11	421	Configural	35.9(34)	0.378
Scalar	908.47	455	Metric	77.4(34)	<.001

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Invariance Model	χ^2	df	χ^2 Difference Test		RMSEA
			Comparison	$\chi^2(df)$ p value	
Year 8					
Configural	581.62	387			0.055
Metric	623.39	421	Configural	41.7(34)	0.169
Scalar	755.20	455	Metric	131.81(34)	<.001
					0.063

Note. RMSEA is root-mean-square error of approximation. Following the sequence of tests of measurement invariance (Meredith, 1993; Millsap & Cham, 2012), we tested configural, metric, and scalar invariance models using χ^2 difference test (at $\alpha = 0.05$) and the examination of significant differences of the RMSEA (change > 0.015 ; Chen, 2007) between the two nested invariance models.

Effect of Gender and Ethnicity in Middle School Belonging Latent Growth Modeling with Reference Ethnic Groups Rotated

Table 3

Effect	Unconditional LGM		Main Effect LGM					
	Model A		Model B (EA)		Model C (AA)		Model D (Latino)	
	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.
<i>Intercept</i>								
Gender (β_{01})			* -0.18	0.05	* -0.18	0.05	* -0.18	0.05
Latino (β_{02})			0.01	0.07	-0.11	0.06		
AA (β_{03})			0.12	0.06			-0.01	0.07
White (β_{04})					-0.12	0.06	0.11	0.06
<i>Slope</i>								
Gender (β_{11})			0.03	0.04	0.03	0.04	0.03	0.04
Latino (β_{12})			-0.04	0.03	-0.01	0.03		
AA (β_{13})			-0.03	0.03			0.04	0.03
White (β_{14})					0.03	0.03	0.01	0.03
<i>Means</i>								
Intercept (β_{00})	* 3.84	0.04	* 3.53	0.55	* 3.65	0.51	* 3.53	0.51
Slope (β_{10})	0.02	0.01	-0.04	0.12	-0.07	0.13	-0.08	0.12
<i>Variances</i>								
Intercept (τ_{00})	* 0.31	0.03	* 0.30	0.03	* 0.30	0.03	* 0.30	0.03
Slope (τ_{11})	* 0.07	0.02	* 0.07	0.02	* 0.07	0.02	* 0.07	0.02
Covariance (τ_{01})	* -0.05	0.02	* -0.05	0.02	* -0.05	0.02	* -0.05	0.02
<i>Model fit</i>								
$\chi^2(df)$; p value	1.572(1); $p=0.20$		3.587(8); $p=0.89$		3.587(8); $p=0.89$		3.587(8); $p=0.89$	
RMSEA	0.033		0.000		0.000		0.000	
SRMR	0.01		0.007		0.007		0.007	

Note. For testing main effect of gender and ethnicity, we tested three different LGMs. Model B, C, and D is the LGM with Euro-American students (EA), African American students (AA), and Latino students (Latino), respectively, as a reference group. For the simplicity of the table, the parameters for the covariates (i.e., parent education level, school size, school level academic achievement, student's retention status) were not included in the table.

* Significant at $p < .05$ (two-tailed).

Table 4

Effect of School Belonging Trajectories by Gender and Ethnicity and χ^2 Difference Tests for Testing the Interaction between Gender and Ethnicity on Growth Parameters

Panel A: Estimated parameters in multiple group analysis				
	Intercept		Slope	
	Estimate (SE)	p value	Estimate	p value
EA_M	3.34 (0.50)	< 0.001	0.03 (0.12)	0.777
Latino_M	3.33 (0.50)	< 0.001	-0.05 (0.11)	0.636
AA_M	3.60 (0.49)	< 0.001	-0.05 (0.13)	0.701
Female	3.58 (0.50)	< 0.001	-0.05 (0.12)	0.638

Panel B: χ^2 difference tests for testing the interaction between gender and ethnicity				
Comparison	Intercept		Slope	
	χ^2	p value	χ^2	p value
EA_M vs AA_M	13.882	$p < 0.001$	2.869	0.090
Latino_M	0.004	0.950	6.477	0.011
Female	13.639	$p < 0.001$	3.484	0.062
AA_M vs Latino_M	6.903	0.009	0.001	0.982
Female	0.029	0.865	0.002	0.969
Latino_M vs Female	27.447	$p < 0.001$	0.002	0.968

Note: EA_M is Euro American Male students. Latino_M is Latino Male students. AA_M is African American Male students. Female is Female student across three Ethnic groups.

Effect of Middle School Child-Rated School Belonging Trajectories on Reading and Math Achievement Score at Grade 8

Table 5

Panel A: Overall SEM			Panel B: Ethnic Moderation Model			Panel C: Gender Moderation Model				
Reading			Math			Reading				
Effect	Estimate	S.E.	Groups	Effect	Estimate	S.E.	Groups	Effect	Estimate	S.E.
Intercept (γ_1)	* 0.05	0.02	EA	Intercept (γ_1)	* 0.13	0.03	Female	Intercept (γ_1)	* 0.12	0.03
Slope (γ_2)	0.00	0.03		Slope (γ_2)	-0.07	0.05		Slope (γ_2)	-0.03	0.04
			Latino	Intercept (γ_1)	* 0.13	0.06	Male	Intercept (γ_1)	-0.01	0.04
				Slope (γ_2)	0.06	0.05		Slope (γ_2)	-0.01	0.02
Intercept (γ_1)	* 0.10	0.03								
Slope (γ_2)	0.04	0.04	AA	Intercept (γ_1)	* 0.08	0.04				
				Slope (γ_2)	* 0.10	0.04				

Note: Intercept is estimated mean level of school belonging score at grade 6 of middle school; Slope is linear slope in school belonging score from grade 6 to 8 during middle school years. EA is Euro-American. AA is African American. Estimate is standardized parameter coefficient. S.E. is standard errors.

* Significant at $p < .05$