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# EDUCATIONAL OUTCOMES OF GENDER-DIVERSE YOUTH:

## A National Population-Based Study

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## Abstract

Despite the growing population of youth identifying with a transgender or nonbinary gender identity, research on gender-diverse individuals' educational outcomes is limited. This study takes advantage of the first nationally representative, population-based data set that includes measures of gender identity and educational outcomes: the High School Longitudinal study of 2009. Using minority stress and structural symbolic interactionist frameworks, we examine the association between gender identity and high school and college educational outcomes. We compare the educational outcomes of gender-diverse youth—binary transgender, nonbinary, and gender unsure—with those of cisgender youth, and also examine differences within the gender-diverse population. Given the strong link between minority stress and educational experiences among gender-diverse youth, we examine differences in outcomes before and after accounting for school belonging and emotional distress. We also account for individuals' social-structural location, arguing that social positionality shapes both gender identity and educational outcomes. Results indicate important differences in educational outcomes within the gender-diverse population: Whereas binary transgender and gender-unsure youth exhibit educational disadvantage, relative to cisgender youth, nonbinary youth do not. The gender-unsure disadvantage remains even after accounting for differences in social-structural location and social-psychological factors associated with minority stress.

### Keywords

education; gender; trans

Despite what some have recently identified as a "gender swell" (Ehrensaft 2013, 6), there have always been gender-atypical youth,[1] or youth who push against their assigned gender.

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1. We use the term *youth* to refer to individuals between the ages of 12 and 25 years, combining adolescence and emerging adulthood (Arnett 2000), which roughly corresponds to the United Nations' definition of youth, or persons between the ages of 15 and 24 years (United Nations 2013).

In the past, however, these youth often remained silent, conforming to their designated binary gender category (Travers 2018). Importantly, the experiences and naming of gender diversity have continued to differ across cultural and historical contexts (Meadow 2018; Schilt and Lagos 2017), including a recent rise in individuals identifying with nonbinary identities (Barbee and Schrock 2019; Meerwijk and Sevelius 2017). These changes provide opportunities to explore how macrosocial structures and gender-related minority stressors are associated with expressed gender identities and educational outcomes of youth.

Research examining the educational outcomes of gender-diverse youth often incorporates a minority stress framework (Meyer 2003), given the risk and resilience that accompany gender-related stress and identity-based coping. We extend this literature—taking advantage of the first nationally representative, population-based data set of youth that includes measures of diverse gender identities, both binary and nonbinary, and educational outcomes. Yet we also move beyond the minority stress framework by incorporating a structural symbolic interactionist framework to examine the role of social-structural positionality in shaping gender identities and educational outcomes. Specifically, using data from the High School Longitudinal Study of 2009 (HSLS:09), we examine the following questions:

> **Research Question 1:** Is there variation in high school and postsecondary educational outcomes across gender-identity groups—between gender-diverse and cisgender respondents and among binary transgender, nonbinary, gender-unsure, and cisgender respondents?
>
> **Research Question 2:** Do any observed differences in educational outcomes by gender identity remain after accounting for factors associated with minority stress and structural symbolic interactionism?

Using the minority stress framework, we examine variation in educational outcomes between gender-diverse and cisgender youth as well as variation *within* the gender-diverse population—comparing outcomes among binary transgender, nonbinary, gender-unsure, and cisgender youth. We integrate structural symbolic interactionism (Sheldon Stryker 2008) and a dynamic systems model of gender identity (Fausto-Sterling 2012, 2019) to articulate, theoretically, how subjective gender identities are constructed through iterative interactions between the sociocultural world and physical bodies across the life course (O'Brien 2016). Fausto-Sterling (2019, 539) defines gender identity as "a property of the individual mind/body and a collective property involving interactions with others and with objects in the world," and we focus here on the role of social-structural forces in shaping gender identity and educational outcomes. Our framework and findings have implications for measuring and theorizing gender identity, raising questions about youth's ability to express their gendered selves given cultural narratives of gender identity.

## BACKGROUND

### Gender Identity, Minority Stress, and Educational Outcomes

The minority stress framework highlights the unique stresses that accrue to gender and sexual minorities as a result of higher rates of stigma and discrimination (Meyer 2003). Previous research based on regional and national samples indicates that gender-diverse

youth experience high levels of gender-related victimization, especially in secondary schools (Johns et al. 2019; McBride 2021). Although often resilient in the face of these experiences, gender-diverse individuals, on average, have higher levels of emotional distress and lower levels of school belonging than individuals who do not identify as gender diverse (Kosciw et al. 2020; McBride 2021). Experiences of victimization, reduced feelings of school belonging, and emotional distress can negatively affect school attendance and educational performance (Aragon et al. 2014; Kosciw et al. 2020). Given exposure to high levels of minority stressors in secondary school, we expect gender-diverse youth to have poorer educational outcomes, including lower test scores and higher rates of course failure, than their cisgender peers. Test scores are common indicators of educational achievement used in decisions such as course placement, high school completion, and college entrance (Willingham, Pollack, and Lewis 2002), and course failure is an important indicator of academic risk and disengagement, frequently precipitating dropping out of high school (Allensworth and Easton 2005). Given the consequences of minority stress and associated academic disengagement, we also expect gender-diverse youth to have lower rates of college preparatory course completion, such as advanced math—a traditional indicator of college readiness (Trusty and Niles 2003; Woods et al. 2018)—and lower rates of postsecondary enrollment, relative to cisgender youth.

Currently there exists no research using nationally representative, population-based data to compare the high school outcomes and postsecondary enrollment of gender-diverse and cisgender students. Previous research using non-population–based samples of LGBTQ (lesbian, gay, bisexual, transgender, queer) youth indicates that gender-diverse students report lower grades and educational aspirations than cisgender male LGBQ-identified students (Greytak, Kosciw, and Diaz 2009). Other non-population–based studies, relying on samples recruited primarily online, find that transgender adults have *higher* levels of educational attainment than the general population (Grant et al. 2011; James et al. 2016). Population-based studies using the Center for Disease Control and Prevention's Behavioral Risk Factor Surveillance System (BRFSS) indicate, however, that gender-diverse adults in the United States have *lower* educational attainment than cisgender adults (Downing and Przedworski 2018; Meyer et al. 2017), likely, in part, due to experiences of minority stress and lower achievement in secondary schools.

The gender-diverse population, however, is indeed diverse, with different experiences of minority stress within this population. Although individuals unsure of their gender identity are not always included within the LGBTQ acronym, here we examine the outcomes of youth who are unsure of their gender identity, as well as the outcomes of binary transgender and nonbinary youth. The minority stress framework emphasizes both risk and resilience (Meyer 2015), arguing that gender minorities often develop coping skills through access to resources such as LGBTQ communities, which may lead to collective action, sense of purpose, and personal growth in response to identification with a marginalized group (DiFulvio 2011; Riggle et al. 2011). Research on LGBTQ youth finds that those questioning their gender identity or sexual orientation may demonstrate poorer mental health and educational outcomes relative to LGBTQ-identified youth (Birkett, Espelage, and Koenig 2009; Robinson and Espelage 2011), perhaps due to lack of access to identity-based resources (Kosciw, Palmer, and Kull 2015) and an inability to conceptualize their

experiences through a transgender identity and within a transgender community (Riggle et al. 2011; Testa, Jimenez, and Rankin 2014). Previous research, therefore, suggests psychological and educational costs of being unsure of one's gender identity.

Binary transgender and nonbinary youth likely experience similarities and differences in risk and resilience associated with minority stress. Research suggests that these youth are exposed to similarly high levels of gender-based minority stress (Chew et al. 2020; Kosciw et al. 2020), relative to cisgender individuals, although individuals with nonbinary identities may face higher levels of cis-sexism given binary privilege prevalent in the United States (Matsuno and Budge 2017). Nonbinary youth may also experience less access to identity-based resources, because they are often stigmatized or excluded by the transgender community for not being "trans enough" (Darwin 2020; Garrison 2018) and stigmatized by the medical community for not "doing transgender" in accordance with established medical guidelines and expectations (shuster 2016). Although nonbinary youth may have less access to identity-affirming resources than binary transgender youth (see Factor and Rothblum 2008 for exceptions), previous research indicates higher rates of educational attainment among nonbinary individuals relative to binary transgender individuals (Grant et al. 2011). While findings are mixed regarding differences in minority stress between nonbinary and binary transgender youth, we next present findings suggesting an advantage in educational outcomes among nonbinary youth.

## A Structural Symbolic Interactionist Perspective on Gender Identity and Educational Outcomes

Today there is a growing proportion of individuals identifying as gender diverse, expressing both binary and nonbinary identities (e.g., gender-queer; Barbee and Schrock 2019; Meadow 2018), yet explanations for implications of growth in these identities is not clear. For some, these cultural changes reinforce an understanding of gender as socially constructed, or gender as a phenomenon not rooted in physical reality or in the body, but one which is produced and reproduced entirely through *social* interaction (Butler 1990; West and Zimmerman 1987). Early symbolic interactionism, including Gagnon and Simon's (1973) sexual script theory, and more recent gender and transgender scholarship (Fausto-Sterling 2019; O'Brien 2016), however, suggest that gender (and sexuality) is dependent on both "internal" states, defined as biological or psychological inclinations, and "external" socially organized scripts and structures that shape how internal states are expressed and acted upon. While acknowledging the complexity of gender identity (Fausto-Sterling 2012; shuster 2019), in this article, we focus on the structuralist lens of symbolic interactionism, which emphasizes the role of individuals' social locations within the social structure in shaping self-concept and identity (House 1977; Sheldon Stryker 2008). We use this lens to examine differences in educational outcomes within the gender-diverse population, given the central role of social-structural location in shaping both gender identity and educational outcomes.

Research suggests that a gendered "internal state," or set of predispositions, is often present and recognized by the self at an early age, as gender-diverse individuals report feeling different due to their gender, or different from their assigned birth sex, most often in childhood or early adolescence (Grossman, Park, and Russell 2016; Levitt and Ippolito

2014; Tatum et al. 2020). While, on average, nonbinary-identified individuals report feeling this difference at a slightly older age than binary transgender individuals (i.e., 12–14 compared with 10–12 years), most individuals who identify as gender diverse express this internal feeling of difference before the end of the teenage years. Much of the previous research on the timing of gender-identity milestones, however, is based on non-population–based samples of adults (see Grossman, Park, and Russell 2016 for exceptions) who are asked to recall childhood and adolescent experiences, which may not fully capture the experiences of younger cohorts of gender-diverse youth.

While the "internal state" argument is potentially controversial, with an inability to scientifically identify and quantify a "transgender" or "gender-diverse" state within the body, transgender scholars have critiqued a rigid adherence to the social constructionist approach and the limited attention paid to internal states, arguing that pure social constructionism erases and invalidates the lives of gender-diverse individuals (Namaste 2000; Serano 2007; Susan Stryker 2008). While we are unable to measure gendered inclinations in this article, we suggest that, while the majority of youth with gender-diverse identities may have in common an early feeling of difference due to their gender, cultural narratives and individual positionality within the social structure shape the gender identities that youth adopt throughout the life course, particularly in the critical life stages of adolescence and emerging adulthood (Arnett 2000; Crosnoe 2011).

Prior research indicates associations between social-structural location and the identity—either nonbinary or binary transgender—that gender-diverse individuals adopt. This same research speaks to possible associations between social-structural location and being unsure of one's gender identity. Youth from families with higher socioeconomic status (SES) may have more opportunity for exploration of and identification with a gender-diverse identity, binary or nonbinary (Ehrensaft 2016): Parents with higher SES have more liberal attitudes toward gender, more exposure to diverse ways of doing gender, and greater access to resources (Bolzendahl and Myers 2004; Fan and Marini 2000), and they are more able to advocate for their gender-diverse children (Ehrensaft 2013; Travers 2018). Family SES might be a strong predictor of the expression of nonbinary identities given our current historical context, which provides cultural narratives for doing nonbinary gender (Darwin 2020)—narratives that often incorporate a critique of the gender binary and the gender structure (Dembroff 2020). In addition to SES, the social location of assigned female at birth is positively associated with a nonbinary gender identity, relative to a binary transgender identity (Kuper, Nussbaum, and Mustanksi 2012; Reisner and Hughto 2019; Whyte, Brooks, and Torgler 2018), perhaps because of the greater ease (i.e., less stigma and fewer negative sanctions) attached to being read as a masculine or androgynous girl/woman relative to feminine or androgynous boy/man in U.S. society (Kuper, Nussbaum, and Mustanksi 2012). Recent results from non-population–based samples of youth and adults suggest that individuals who identify as nonbinary are more likely than those who identify as binary transgender to identify racially as white (Reisner and Hughto 2019; Toomey, Syvertsen, and Shramko 2018), although data from the 2015 United States Transgender Survey (USTS) indicate no racial/ethnic differences between nonbinary and other gender-diverse adults (James, Brown, and Wilson 2017; James and Salcedo 2017).

School characteristics—including the social class of the students attending a school, school sector, locale, and region—are also likely associated with youth's expressed gender identity. Research indicates that schools with a higher percentage of students from low-SES families or schools located in the South or in rural areas, for example, often have fewer LGBTQ-affirming resources (Fetner and Kush 2007; Kull, Kosciw, and Greytak 2015). Attending schools with a greater percentage of students from high-SES families and schools with more affirming resources could provide youth greater access to gender-diverse identities, including nonbinary identities.

Importantly, the social-structural locations associated with gender-diverse identities, including social class, assigned birth sex, and perceived racial identity, are strongly associated with educational outcomes, as are the characteristics of the school youth attend. SES remains one of the strongest predictors of educational achievement and attainment in the United States (Biddle 2001; Gamoran 2001). Individuals assigned female at birth and socialized as girls are more likely than boys to be academically engaged and to conform to teachers' expectations of ideal students (Musto 2019; Perez-Felkner 2013). These early differences in gendered socialization have long-term implications for educational outcomes: Female-identified students exhibit higher grades, fail fewer high school courses, and enroll in and complete college at higher rates than do male-identified students (DiPrete and Buchmann 2013). Whiteness continues to carry with it an advantage in the U.S. educational system: Non-Latinx white and Asian American students have higher levels of educational attainment than Black or Latinx students (Reardon, Robinson-Cimpian, and Weathers 2015). School characteristics, including the average SES of the student body, sector, locale, and region, continue to be associated with educational success (Figlio and Stone 1997; Owens, Reardon, and Jencks 2016; Roscigno, Tomaskovic-Devey, and Crowley 2006). In addition, given the complex and iterative nature of gender identity over the life course (Fausto-Sterling 2012), education itself, especially college attendance, has the potential to influence gender identity. College, through coursework and participation in student organizations, provides access to new ways of understanding, conceptualizing, and expressing gender, including exposure to diverse gender identities (Beemyn and Rankin 2011; Goldberg and Kuvalanka 2018).

Given differences in social-structural location among gender-diverse youth—differences that are closely tied to educational experiences—we hypothesize important variation in educational outcomes within the gender-diverse population. Overall, we hypothesize an educational disadvantage among gender-diverse youth, relative to cisgender youth, given greater exposure to gender-based minority stress throughout the life course. While we expect nonbinary youth, given their exposure to minority stressors, will not be advantaged relative to cisgender youth, they may experience less educational disadvantage than binary transgender youth due to their potentially advantaged social-structural location. We expect that gender-unsure youth, however, will experience more educational disadvantage than nonbinary youth and cisgender youth because of their lack of identity-based resources and more disadvantaged social location. We first explore differences in educational outcomes, social-structural location, and social-psychological factors at the bivariate level, first examining gender-diverse youth (aggregated and then disaggregated) relative to cisgender youth and then binary transgender and gender-unsure youth relative to nonbinary youth. We

next use multivariable regression models to examine whether any observed differences by gender identity in educational outcomes remain after accounting for observed differences in social-structural location and social-psychological factors.

## DATA AND METHODS

### Sample

We use data from HSLS:09, collected by the National Center for Education Statistics (NCES). HSLS:09 is a nationally representative study of the educational trajectories of a cohort of 21,444 students in the ninth grade in the United States in 2009. We use student and school data from Wave 1 (2009), math test scores from Wave 2 (2012), transcript data collected in 2014, and student data from Wave 4 (2016). Most respondents were in 11th grade at Wave 2, with Wave 4 collected about 3 years after most students completed high school. Wave 4 respondents are 20 to 24 years of age, with the majority 21 to 22 years. Our analytic sample includes the 14,160 youth who participated in Waves 1 and 4 and who responded to the Wave 4 assigned birth sex and gender-identity questions. To preserve the sample size, we allow the analytic sample size to vary across analyses depending on the number of valid responses (i.e., not missing) for each dependent variable (ranging from 79 to 89 percent of cases). The only independent variables with missing values are those measuring social-psychological factors in ninth grade (~20 percent missing), age (7 percent), and high schools' percentage of students eligible for free/reduced lunch (8 percent). We address missing values on independent variables with multiple imputations by the MICE system of chained equations (White, Royston, and Wood 2011). We use Stata's survey procedure to apply the Wave 4 student analytic weight, account for HSLS's complex survey design, and adjust standard errors for the clustering of students within schools (Duprey et al. 2018). We round all unweighted frequencies to the nearest 10, as required by NCES.[2]

### Measures

**Gender Identity.—**We measure gender identity with a categorical variable, classifying 13,890 respondents as cisgender, 90 as binary transgender, 130 as nonbinary, and 60 as gender unsure. This measure is based primarily on students' Wave 4 responses to the gender-identity question that asks, "What is your gender? Your gender is how you feel inside and can be the same or different than your biological or birth sex." Respondents could describe their gender identity with one or more of the following responses: (1) "male"; (2) "female"; (3) "transgender, male-to-female"; (4) "transgender, female-to-male"; (5) "genderqueer or gender nonconforming, or some other gender"; or (6) "not sure." Youth who chose a binary gender identity (male or female) that was consistent with their reported assigned birth sex are categorized as cisgender. In addition to those who identified exclusively as binary transgender ($n = 50$), we also classify as binary transgender youth who reported a "male" or "female" gender identity that differed from their reported assigned birth sex ($n = 40$). In addition to the 50 youth who exclusively identify as gender unsure ("not sure"), we classify a small number of youth ($n < 10$)[3] who report both a binary transgender identity

[2]All unweighted frequencies are rounded to the nearest 10, per National Center for Education Statistics (NCES) requirements; see https://nces.ed.gov/statprog/instruct_respdata.asp?resptype=sub.

[3]We are unable to report the exact number of youth, given NCES requirements to round all unweighted frequencies to the nearest 10.

and uncertainty of their gender identity as gender unsure. Finally, in addition to the 110 youth who exclusively identify as nonbinary ("genderqueer or gender nonconforming, or some other gender"), we classify as nonbinary 20 youth who report a nonbinary gender identity in combination with either a binary transgender identity or a report of being unsure of their identity. We recognize our inability to determine whether those who did not identify as transgender, nonbinary, or gender unsure would have identified as cisgender if asked, because a cisgender identity was not a response option in HSLS.

Most population-based surveys that include questions about gender identity (e.g., BRFSS) first ask respondents if they identify as transgender. Then, if respondents report a transgender identity, they are asked to choose a specific identity (e.g., nonbinary, male-to-female transgender) from a set of mutually exclusive options. In surveys designed specifically for the transgender population (e.g., USTS), when respondents identify, for example, with both a binary and a nonbinary transgender identity, information about identity gleaned from additional survey questions is used by researchers to classify respondents into mutually exclusive gender-identity categories (i.e., nonbinary, binary transgender). To our knowledge, HSLS is the only survey that allows respondents to claim multiple gender identities in one closed-ended question. We constructed our measure of gender identity using theoretical insights and ran sensitivity tests to ensure findings were not driven by operationalization decisions (sensitivity analyses available upon request).[4]

One methodological limitation relating to timing is worth noting here. The primary question used to construct gender identity does not precede the educational outcomes we treat as dependent variables, and we acknowledge that educational achievement and attainment, particularly college enrollment, can shape gender identity. The timing of our key variables limits our ability to be certain about causal order, especially given that we are unable to measure gender-diverse inclinations or prior measures of gender identity. We therefore treat associations as correlational rather than causal and are careful to indicate that educational outcomes are measured before or at the same time as gender identity and the possibility that educational experiences themselves shape gender identity over the life course.

**Educational Outcomes.—**Our measures of high school educational outcomes include 2012 math test score, course failure, high math course attainment, and postsecondary enrollment. We use the norm-referenced theta *math achievement score*, which, in the HSLS sample, ranges from −2.60 to 4.50. After using transcript data to construct dichotomous indicators of "failed" for each course with a grade of "F," "unsatisfactory," "withdrew," or "incomplete," we aggregate these course-level measures to create a student-level continuous measure of proportion high school courses failed. Because this measure was not normally distributed, we construct a dichotomous measure of *failed high proportion of courses* to

4. Allowing respondents to self-report multiple gender identities may increase the potential for "mischievous responders" (Fish and Russell 2018), an issue suspected among Add health (National Longitudinal Study of Adolescent to Adult health) respondents who answered questions about same-sex sexuality in early adolescence. Mischievous responses may be less of an issue among HSLS respondents because respondents were in their early 20s when surveyed about gender identity. Unlike Add Health, High School Longitudinal Study of 2009 (HSLS) does not provide good measures for assessing inconsistent responding. We did our best to account for mischievous responders by creating a measure assessing inconsistencies in parent and student's report of race. Including this variable did not change substantive results, although it slightly weakened associations between gender-unsure identity and educational outcomes.

indicate students who failed more than 9 percent of their courses (i.e., students in the top 20th percentile). NCES used transcript data to create dichotomous composites of whether students earned at least one credit in various levels of math. Our dichotomous measure of *high math course attainment* includes youth who took a math course higher than Algebra II: Pre-Calculus, Statistics, Trigonometry, Calculus, or any Advanced Placement or International Baccalaureate math course. Using the Wave 4 enrollment and completion variables, we created a dichotomous measure of *postsecondary enrollment* where "1" indicates enrollment in or completion of any type or level of college at Wave 4 and "0" indicates no enrollment or completion at Wave 4.

**Social-Structural Location.—**We use an HSLS composite index to measure family SES, which combines information from the Wave 1 parent survey on family income, parents' highest educational attainment, and parents' occupational prestige score. To measure *assigned birth sex*, we use the Wave 4 measure to create a dichotomous variable where "1" indicates respondent reported being assigned female at birth and "0" indicates respondent reported being assigned male at birth. To measure *race/ethnicity*, we use HSLS's mutually exclusive composite race variable, including the following categories: Latinx (of any race), non-Latinx white, non-Latinx Black, non-Latinx Asian, and non-Latinx other race (includes American Indian/Alaskan Native, multiracial, and Native Hawaiian or Pacific Islander). We control for Wave 4 *age* given that, among this cohort of youth who were all in the ninth grade in 2009, an older age can represent differences in educational progress (e.g., grade retention). We use HSLS's administrative measures to construct a dichotomous measure of attended a *private high school* (combining Catholic and "other private") rather than a public school and to construct categorical measures of *high school locale* (urban, suburban, rural) and *high school region* (Northeast, Midwest, South, West). Finally, we use HSLS's constructed school-level measure indicating *percent of students eligible for free/reduced lunch* as a measure of school-level SES.

**Social-Psychological Measures.—**We measure *school belonging* with an index ($\alpha$ = .74) constructed from nine Wave 1 survey items. The first five items ask how much the respondent agrees/disagrees with each of the following statements: I feel safe at school; I feel proud to be part of this school; I have a teacher/adult in school I can talk to about problems; I feel school is often a waste of time (reverse-coded); and getting good grades is important to me. The remaining four items ask how often the respondent does each of the following: goes to class without homework done (reverse-coded); goes to class without pencil or paper (reverse-coded); goes to class without books (reverse-coded); and goes to class late (reverse-coded). The variable ranges from 1 to 4, with higher values representing higher levels of school belonging. We measure *emotional distress* using an index ($\alpha$ = .63) constructed from three Wave 1 survey items asking the respondent's parent how much difficulty their child has with each of the following: anxiety/depression, behavior problems, and friends. The variable ranges from 1 (*no difficulties*) to 3 (*a lot of difficulties*). We use standardized versions of each scale for increased substantive meaning and comparability.

### Analytic Plan

Descriptive statistics for all analytic variables are shown in Table 1, adjusted to reflect the population rather than the sample: Data from the nationally representative HSLS sample show that gender-diverse youth comprise 2 percent of U.S. ninth graders in 2009. Those identifying as binary transgender comprise 32 percent of gender-diverse youth (90/280 = 32 percent), and nonbinary and gender-unsure respondents comprise 46 percent and 21 percent of gender-diverse youth, respectively. To address our first research question (Is there variation by gender identity in high school and postsecondary educational outcomes?) and to facilitate interpretation of our regression analyses, we present weighted bivariate associations between gender identity and all analytic variables (Table 2). We estimate the statistical significance of differences in outcomes for gender-diverse youth relative to cisgender youth; binary transgender, nonbinary, and gender-unsure youth relative to cisgender youth; and binary transgender and gender-unsure youth relative to nonbinary youth. To address our second research question (Do any observed differences in educational outcomes by gender identity remain after accounting for social-structural location and social-psychological factors?), we predict each educational outcome using three regression models. Unadjusted models include gender identity as the independent variable, and adjusted models add controls for social-structural location and then controls for social-structural location and social-psychological factors. We run each model twice: The first model uses cisgender as the reference category, to compare all groups to cisgender youth, and the second uses nonbinary as the reference category, allowing for comparison between gender-diverse groups. We use logistic regression models to predict failed a high proportion of courses, high math course attainment, and postsecondary enrollment; we use linear regression models to predict math test score. We show results graphically using predicted probabilities and predicted means to facilitate substantive interpretations. Full models are available in the Online Appendix Tables A1 to A8.

## RESULTS

### Bivariate Results: Differences Across Gender-Identity Groups

In Table 2, we examine educational outcomes across gender-identity groups, reporting differences that are statistically significant. Gender-diverse respondents are more likely than cisgender respondents to fail a high proportion of high school courses (34 vs. 22 percent) and are less likely to take an advanced math course by the end of high school (24 vs. 37 percent). Additional results in Table 2 indicate the importance of disaggregating the gender-diverse population into binary transgender, nonbinary, and gender-unsure groups. Binary transgender youth are less likely than cisgender youth to take a high math course or to enroll in college. Gender-unsure youth are disadvantaged, relative to cisgender youth, on all educational outcomes reported. Nonbinary youth, however, do not exhibit a disadvantage, relative to cisgender youth, in educational outcomes measured.

Looking within the gender-diverse population, nonbinary youth are less likely to fail courses and are more likely to enroll in college than their binary transgender peers. Nonbinary youth also exhibit higher achievement and attainment relative to gender-unsure youth, with higher average math test scores, a lower likelihood of failing a high proportion of

courses, and a greater likelihood of taking advanced math and enrolling in college. These observed differences within the gender-diverse population suggest that nonbinary youth may experience less minority stress or more social-structural advantage relative to binary transgender or gender-unsure youth, which we turn to next.

Table 2 shows differences in social-structural location across gender-identity groups. Comparing all gender-diverse youth with cisgender youth, only the percentage of students eligible for free/reduced lunch is significantly different, with gender-diverse youth attending schools with a higher percentage of youth eligible for free/reduced lunch. More differences emerge once the gender-diverse population is disaggregated: Relative to cisgender youth, binary transgender respondents are less likely to identify as Asian, have lower levels of family SES, and attend schools with a greater percentage of students eligible for free/reduced lunch. Gender-unsure youth, however, are more likely than cisgender youth to identify as Asian, and nonbinary-identified youth come from families with higher average levels of SES than do cisgender youth. Differences in racial/ethnic identity across gender-identity groups should be interpreted with caution given the small number of gender-unsure and binary transgender Asian respondents in our sample ($5 < n < 10$). Findings align with previous literature suggesting that nonbinary youth may be more likely than other gender-diverse groups to come from socioeconomically advantaged contexts.

Table 2 shows that gender-diverse youth have lower levels of school belonging than do cisgender youth, but we see no differences between gender-diverse and cisgender youth in parent reports of respondent's emotional distress (which could be attributable to lack of student-reported measures of emotional distress in these data). Importantly, levels of school belonging are similar among binary transgender and nonbinary youth, and the difference in school belonging between nonbinary-identified and cisgender youth is statistically significant. These findings suggest that youth who identify as nonbinary or binary transgender experience similarly high levels of minority stress in secondary schools.

## Regression Results

Next, we review results from multivariable regression models examining the association between gender identity and educational outcomes before and after accounting for differences in social-structural location and social-psychological factors. Figures 1 through 4 show predicted probabilities and means estimated from regression models predicting each educational outcome. We include unadjusted models (Model 1) primarily as a base of comparison for the adjusted models (Models 2 and 3).

Figure 1 shows predicted mean 2012 math test score across gender-identity groups. After adjusting for differences in social-structural location (Model 2) and social-psychological factors (Model 3), the significantly lower math score of gender-unsure respondents, relative to cisgender respondents, remains. While nonbinary youth and cisgender youth, on average, have math test scores of 0.89 and 0.66, respectively, gender-unsure youth have an average math score of 0.32, even after accounting for covariates. Gender-unsure youth also have lower math scores than nonbinary-identified youth, a difference that remains after controlling for social-structural location and social-psychological factors.

In Figure 2, binary transgender and gender-unsure youth are more likely to fail a high proportion of high school courses, relative to both cisgender and nonbinary youth. The higher predicted probability of failing a high proportion of high school courses observed among gender-unsure youth (.48), relative to cisgender youth (.22), remains after adjusting for social-structural location in Model 2 and social-psychological factors in Model 3. Binary transgender youth's greater likelihood of failing a high proportion of courses, relative to cisgender youth, however, is reduced to nonsignificance once social-psychological factors are accounted for in Model 3, suggesting that higher levels of failure among binary transgender youth may be attributable to experiences of minority stress. The proportion of gender-unsure youth failing a high proportion of courses is significantly higher than that of nonbinary-identified youth, even after adjusting for social-structural location and social-psychological factors, yet the binary transgender disadvantage, relative to nonbinary youth, becomes nonsignificant in Model 2, which adjusts for social-structural location. This suggests that the academic advantage observed among nonbinary-identified youth, relative to binary transgender youth, could be related to nonbinary youths' higher family and school SES.

Figure 3 focuses on high math course attainment or completing a math course higher than Algebra II by the end of high school. In adjusted estimates that account for differences in social-structural location, the probability of high math course attainment remains significantly lower for binary transgender youth (.24) and for gender-unsure youth (.09), relative to cisgender youth (.37). The disadvantage for binary transgender youth, however, is reduced to nonsignificance in Model 3, which adjusts for social-psychological factors, suggesting that minority stress could be implicated in their poorer educational outcomes. Similar to other outcomes, nonbinary-identified youth do not experience a disadvantage in high math course attainment, relative to cisgender youth, and even demonstrate academic advantage relative to gender-unsure youth: Nonbinary youth are more likely than gender-unsure youth to complete a high math course (.37 vs. .07), and this advantage remains even once social-structural location and social-psychological factors are accounted for.

In Figure 4, the lower predicted probability of postsecondary enrollment for binary transgender youth (.40), relative to cisgender youth (.56), is reduced to nonsignificance after social-structural location is adjusted for in Model 2. This suggests that differences in social-structural location are associated with educational outcomes among the gender-diverse population. The disadvantage in postsecondary enrollment experienced by gender-unsure youth, relative to cisgender youth, however, remains after controls for social-structural location are added (Model 2), but is reduced to nonsignificance once social-psychological measures are added (Model 3), suggesting that gender-unsure youth's poorer educational outcomes are attributable partly to minority stress, although some disadvantage remains unexplained.

There is not a significant difference in the likelihood of enrolling in college between nonbinary and cisgender youth, although nonbinary youth have higher probabilities (.64) of college enrollment than their binary transgender (.40) and gender-unsure (.33) peers. This advantage, however, is not significant after controls for social-structural location are added

in Model 2. This reiterates the significance of the relatively advantaged social-structural position of nonbinary youth, which help to explain their educational advantage.

## DISCUSSION AND CONCLUSION

Using the first nationally representative, population-based education data set that allows respondents to report gender-diverse identities, this study uses minority stress and structural symbolic interactionist theoretical frameworks to examine the association between gender identities—cisgender, binary transgender, nonbinary, and gender unsure—and educational outcomes. This study adds to our understanding of associations between gender-diverse identities and educational outcomes, speaking to important differences within the gender-diverse population that likely emerge due to gender-based minority stress as well as social-structural location. Results have implications for the use of interactionist models of gender, including the structural symbolic approach, to further our understanding of gender identity, a phenomenon that is inadequately understood in both the physical and social sciences (Fausto-Sterling 2012; shuster 2019). As shuster (2019) notes, the field of (trans)gender studies is changing more rapidly than researchers can keep up with, and our results contribute to this ever-evolving discussion of gender identity, emphasizing the role of social-structural location, especially SES, in shaping youth's expressions of gender-diverse identities.

At the bivariate level, before accounting for differences in social-structural location and social-psychological factors, we find that gender-diverse youth are more likely than their cisgender peers to fail a high proportion of high school courses and are less likely to take an advanced math course in high school. We see more differences, however, once the gender-diverse population is disaggregated into binary transgender, nonbinary, and gender-unsure groups. We find a disadvantage among binary transgender youth, relative to cisgender youth, in high math course attainment and postsecondary enrollment, yet these disadvantages appear to be explained by social-structural location and social-psychological factors associated with minority stress. We also observe disadvantages among gender-unsure youth, relative to cisgender youth, in math test score, course failure, math course attainment, and postsecondary enrollment, but these disadvantages are not entirely explained by social-structural location or social-psychological factors. Youth who identify as nonbinary, however, exhibit no educational disadvantage, relative to cisgender youth.

This study's comparison of educational outcomes within the gender-diverse population presents fruitful areas for future research. Previous research most often leaves gender-unsure youth unexamined, and our findings suggest these youth's experiences are distinct from those of other gender-diverse youth and from cisgender youth. Findings align with theories suggesting that being unsure of one's gender identity may present internal psychological costs. While minority stress theory acknowledges positive aspects of marginalized identities (Meyer 2015), more research should assess the importance of identity-affirming resources and aspects of youth's families, schools, and communities potentially associated with uncertainty about gender identity, including identity narratives that reaffirm binary understandings of gender (Darwin 2020; Vega et al. 2019).

As the central theoretical and analytic contribution of our study, we consider how differences in social-structural location may account for differences in educational outcomes by gender identity, including the educational advantage experienced by nonbinary-identified youth relative to binary transgender and gender-unsure youth. Multivariable results suggest that some of nonbinary youth's educational advantage is attributable to their advantaged social position, which presents a crucial site for future research. For example, if parental and school SES account for nonbinary youth's educational advantages, what specific elements of SES shape their educational experiences and their gender identity? Previous research indicates that college, through student organizations and coursework, for example, provides affirming spaces and opportunities for emergent gender and sexual identities (Beemyn and Rankin 2011; Goldberg and Kuvalanka 2018). Future research should continue to explore the rapid increase in nonbinary identities among younger cohorts of youth (Barbee and Schrock 2019; Meerwijk and Sevelius 2017). Are increases in nonbinary identities due to the expanding gender-identity choices available to youth with stable non-cisgender inclinations? Or are increases due to greater exposure to nonbinary identities among youth who do *not* exhibit stable non-cisgender inclinations, suggesting broader social changes related to gender? These are fundamental questions that transgender studies can speak to, which, as shuster (2019, 5) articulates, get us closer to answering the bigger question of "what is gender" and the utility of a cisgender/transgender dichotomy (Risman, Myers, and Sin 2018).

Importantly, the HSLS data offer strengths and limitations for the current analysis. HSLS does not allow us to properly investigate the temporal ordering of gender identity and educational outcomes, because gender identity is reported only in Wave 4, when respondents were approximately 3 years out of high school, whereas the educational outcomes are measured at or prior to Wave 4. To better assess how gender identity is associated with secondary and postsecondary outcomes and the mechanisms involved in this association, data with longitudinal measures of gender identity, including age at which respondents first felt different due to gender and first identified as gender diverse, are necessary. Given that gender-diverse youth comprised only 2 percent of the HSLS sample, or 280 respondents, our analysis is also limited by sample size, especially after disaggregating gender-diverse youth into binary transgender, nonbinary, and gender-unsure groups. It is noteworthy, however, that differences in educational outcomes, social-psychological factors, and social-structural location are statistically significant across small samples of gender-identity groups. Future research with larger samples of gender-diverse youth is needed to further explore our findings.

In conclusion, we argue that macrosocial structures are associated with the gender-identity development process among youth, with implications for youth's ability to explore and create new ways of doing gender and to connect authentically to a culturally available identity and its associated resources. If factors such as SES or college enrollment are associated with the gender identity that individuals express, perhaps not all youth are afforded the same opportunities to access identities, or to transcend binary gender identities and create new possibilities for themselves and for society. The ability to explore or transcend one's sense of self should not be limited by the family or community one is born into, or to the educational opportunities one is given. Although cultural narratives have

shifted dramatically in recent decades to give youth access to more diverse and affirming identities, we must continue to recognize the socially constructed nature of these identities and the voices and experiences that are potentially excluded from current narratives.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Jennifer Pearson is professor of sociology at Wichita State University. Her research explores the importance of social contexts such as schools and families for adolescent development and well-being, and her work is driven by an interest in how inequalities by gender and sexuality are reproduced within these institutions.

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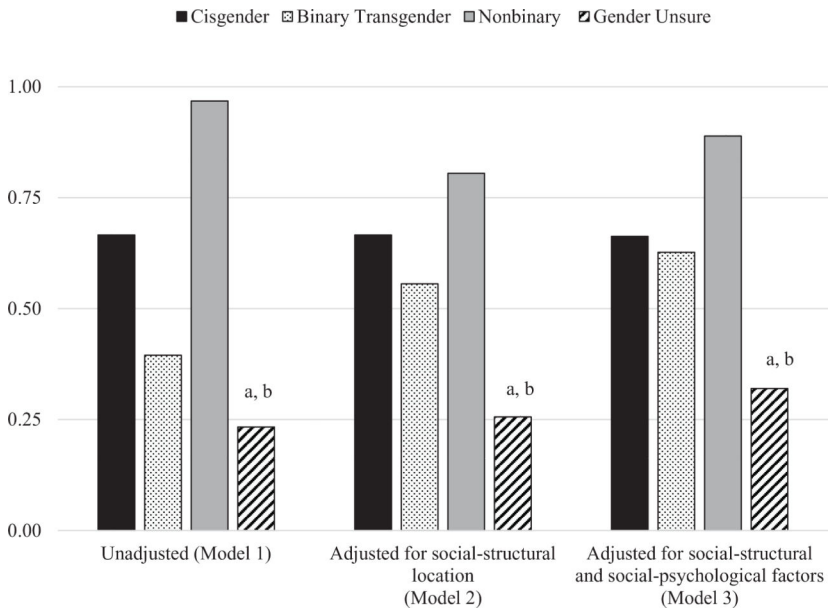


**FIGURE 1: Predicted Mean 2012 Math Test Score, by Gender Identity**

Source: U.S. Department of Education, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09).

NOTE: Full models in Online Appendix Tables A1 and A2.

a. Difference compared with cisgender youth is statistically significant at $p \leq .05$. b. Difference compared with nonbinary youth is statistically significant at $p \leq .05$.

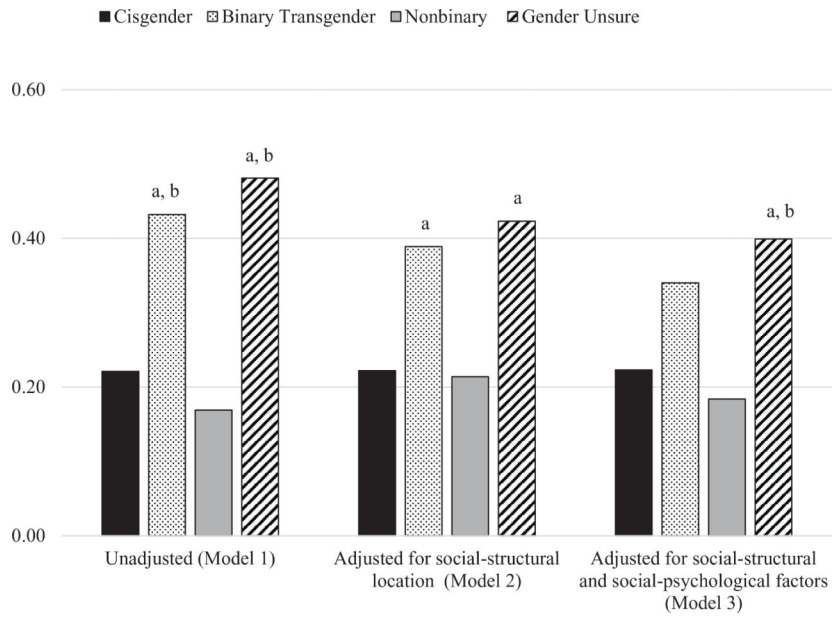


**FIGURE 2: Predicted Probability of Failing a High Proportion of High School Courses, by Gender Identity**

Source: U.S. Department of Education, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09).

NOTE: Full models in Online Appendix Tables A3 and A4.

a. Difference compared with cisgender youth is statistically significant at $p \leq .05$. b. Difference compared with nonbinary youth is statistically significant at $p \leq .05$.

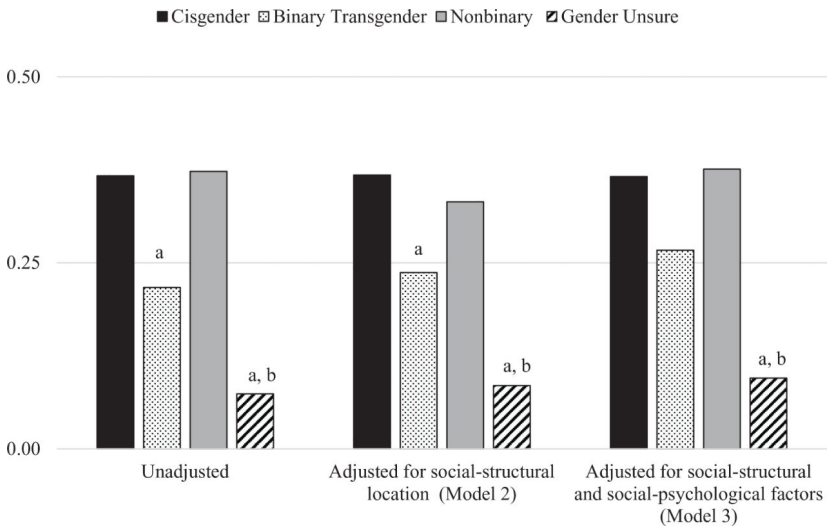


**FIGURE 3: Predicted Probability of High Math Course Attainment by End of High School, by Gender Identity**

Source: U.S. Department of Education, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09).

NOTE: Full models in Online Appendix Tables A5 and A6.

a. Difference compared with cisgender youth is statistically significant at $p \leq .05$. b. Difference compared with nonbinary youth is statistically significant at $p \leq .05$.

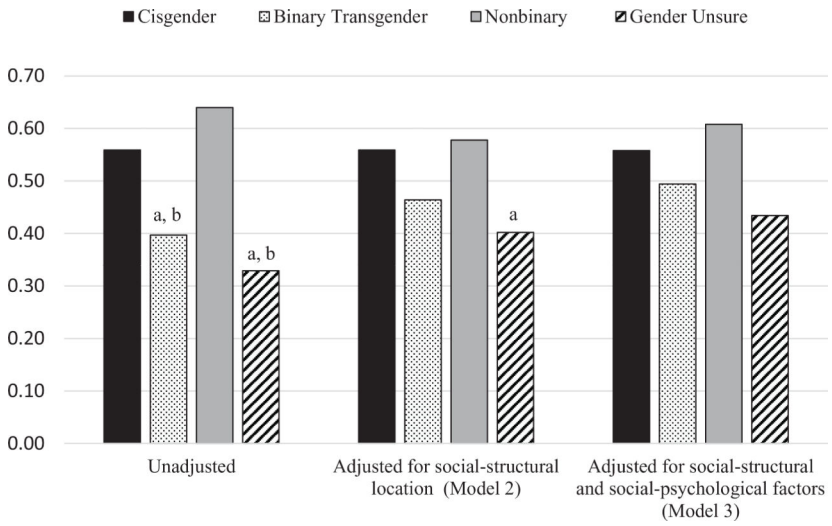


**FIGURE 4: Predicted Probability of Postsecondary Enrollment, by Gender Identity**

Source: U.S. Department of Education, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09).

NOTE: Full models in Online Appendix Tables A7 and A8.

a. Difference compared with cisgender youth is statistically significant at $p \leq .05$. b. Difference compared with nonbinary youth is statistically significant at $p \leq .05$.

**TABLE 1:**

Descriptive Statistics

| | n | *Weighted means/proportions* | (SE)[a] | *Analytic sample size* |
|---|---|---|---|---|
| Cisgender | 13,890 | 0.98 | | |
| Gender diverse | 280 | 0.02 | | |
| Gender-diverse identity | | | | |
| Binary transgender | 90 | 0.007 | | |
| Nonbinary | 130 | 0.008 | | |
| Gender unsure | 60 | 0.004 | | |
| Educational outcomes | | | | |
| Score on math test administered in 2012 | | 0.67 | (0.02) | 13,200 |
| Failed high proportion of high school courses | 2,280 | 0.22 | | 13,240 |
| High math course attainment | 5,890 | 0.36 | | 13,520 |
| Postsecondary enrollment 2016 | 8,780 | 0.56 | | 14,090 |
| Social-structural location | | | | |
| Assigned female at birth | 7,320 | 0.50 | | |
| Race | | | | |
| White | 7,980 | 0.52 | | |
| Black | 1,440 | 0.14 | | |
| Hispanic | 2,160 | 0.22 | | |
| Asian | 1,170 | 0.03 | | |
| Other | 1,410 | 0.09 | | |
| Family socioeconomic status | | −0.05 | (0.02) | |
| Age as of February 2016 | | 20.63 | (−0.01) | |
| Private high school | 2,720 | 0.07 | | |
| High school locale | | | | |
| City | 4,120 | 0.32 | | |
| Suburb/town | 6,700 | 0.44 | | |
| Rural | 3,340 | 0.24 | | |
| High school region | | | | |
| Northeast | 2,210 | 0.18 | | |
| Midwest | 3,870 | 0.22 | | |
| South | 5,640 | 0.37 | | |
| West | 2,430 | 0.23 | | |
| Percent students eligible for free/reduced lunch | | 39.17 | (1.00) | |
| Social-psychological measures | | | | |
| Ninth grader’s sense of school belonging/engagement | | −0.05 | (0.02) | |
| Parent’s reports of ninth grader’s emotional distress | | 0.05 | (0.02) | |

Source: U.S. Department of Education, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09); “Base Year, Student and School Surveys, 2009”; “First Follow-Up, Math Test Score, 2012”; “Update, High School Transcript, 2014”; “Second Follow-Up, Student Survey, 2016.”

NOTE: The cohort was first surveyed as ninth graders in 2009 (Wave 1), with most respondents in 11th grade at Wave 2 (2012) and approximately 3 years out of high school at Wave 4 (2016). The total analytic sample size is $N = 14{,}160$; all sample sizes are rounded to the nearest 10 per National Center for Education Statistics requirements.

[a] We provide standard errors rather than standard deviations because descriptive statistics represent the population rather than the sample.

**TABLE 2:**

Means and Proportions of Analytic Variables by Gender Identity

| | Cisgender | | Gender diverse | | Binary transgender | | Nonbinary | | Gender unsure | |
|---|---|---|---|---|---|---|---|---|---|---|
| | M/Ps | Sig. | M/Ps | Sig. | M/Ps | Sig. | M/Ps | Sig. | M/Ps | Sig. |
| Educational outcomes | | | | | | | | | | |
| Score on math test administered in 2012 | 0.67 | | 0.62 | | 0.40 | | 0.97 | | 0.23 | *a,b* |
| Failed high proportion of high school courses | 0.22 | | 0.34 | *a* | 0.43 | *b* | 0.17 | | 0.48 | *a,b* |
| High math course attainment by end of high school | 0.37 | | 0.24 | *a* | 0.22 | *a* | 0.37 | | 0.07 | *a,b* |
| Postsecondary enrollment 2016 | 0.56 | | 0.48 | | 0.40 | *a,b* | 0.64 | | 0.33 | *a,b* |
| Social-structural location | | | | | | | | | | |
| Assigned female at birth | 0.50 | | 0.52 | | 0.53 | | 0.58 | | 0.40 | |
| Race | | | | | | | | | | |
| White (reference) | 0.52 | | 0.52 | | 0.52 | | 0.59 | | 0.40 | |
| Black | 0.14 | | 0.13 | | 0.11 | | 0.10 | | 0.18 | |
| Latinx | 0.22 | | 0.21 | | 0.29 | | 0.16 | | 0.19 | |
| Asian | 0.03 | | 0.04 | | 0.00 | *a* | 0.03 | | 0.11 | *a,b* |
| Other | 0.09 | | 0.11 | | 0.07 | | 0.12 | | 0.13 | |
| Family socioeconomic status | −0.05 | | −0.03 | | −0.21 | *a* | 0.25 | *a* | −0.25 | |
| Age as of February 2016 | 20.63 | | 20.75 | | 20.73 | | 20.62 | | 20.99 | |
| Private high school | 0.07 | | 0.07 | | 0.06 | | 0.10 | | 0.03 | |
| High school lócale | | | | | | | | | | |
| City | 0.32 | | 0.34 | | 0.42 | | 0.30 | | 0.29 | |
| Suburb/town (reference) | 0.44 | | 0.47 | | 0.33 | | 0.56 | | 0.49 | |
| Rural | 0.24 | | 0.20 | | 0.25 | | 0.15 | | 0.21 | |
| High school region | | | | | | | | | | |
| Northeast (reference) | 0.18 | | 0.16 | | 0.15 | | 0.16 | | 0.16 | |
| Midwest | 0.22 | | 0.23 | | 0.21 | | 0.27 | | 0.18 | |
| South | 0.37 | | 0.41 | | 0.51 | | 0.29 | | 0.49 | |
| West | 0.23 | | 0.21 | | 0.13 | | 0.28 | | 0.18 | |

| | Cisgender | | Gender diverse | | Binary transgender | | Nonbinary | | Gender unsure | |
|---|---|---|---|---|---|---|---|---|---|---|
| | M/Ps | Sig. | M/Ps | Sig. | M/Ps | Sig. | M/Ps | Sig. | M/Ps | Sig. |
| Percent students eligible for free/reduced lunch | 39.10 | | 42.94 | *a* | 51.68 | *a,b* | 35.29 | | 43.73 | |
| Social-psychological measures | | | | | | | | | | |
| Ninth grader's sense of school belonging/engagement | −0.04 | *b* | −0.29 | *a* | −0.34 | | −0.32 | *a* | −0.17 | |
| Parent's reports of ninth grader's emotional distress | 0.05 | | 0.30 | | 0.37 | | 0.20 | | 0.39 | |
| Youth (*n*) | 13,890 | | 280 | | 90 | | 130 | | 60 | |

Source: U.S. Department of Education, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09); "Base Year, Student and Schooi Surveys, 2009"; "First Follow-Up, Math Test Score, 2012"; "Update, High School Transcript, 2014"; "Second Follow-Up, Student Survey, 2016."

NOTE: M/Ps = means/proportions; Sig. = statisticai significance.

[a]Difference from cisgender youth is statistically significant at $p \leq .05$.

[b]Difference from nonbinary youth is statistically significant at $p \leq .05$.