

School Diversity and Social Capital: Conditions That Foster **Bridging Ties** in Schools

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Abstract

Diverse social networks can drive upward mobility for low-income youth, yet ties across social class remain difficult to form due to structural and organizational constraints. We examined the mechanisms through which friendship ties form within schools, especially cross-class ties. Using administrative and survey data from 948 11th-grade students, and 32 student interviews, across five high schools in metropolitan Detroit, we found that shared extracurricular activities and courses are the strongest predictors of friendships, while residential proximity plays a minimal role in most schools. We found that these mechanisms operated similarly for cross-class and same-class friendships, suggesting that students do not require different social processes to bridge class differences. Rather, it is the unequal opportunity for repeated interaction within organizational settings that prevents cross-class friendships from forming. Interviews further illuminated mechanisms through which school activities created spaces for cross-class interaction. Findings suggest schools can foster cross-class and other social ties through intentional programming, course structuring, and course scheduling, with important implications for educational equity and social mobility.

Key Words: Peer Networks, Social Capital, Diversity, Social Network Analysis

Social networks—one's relationships with others—can be a key driver of upward mobility for historically marginalized youth. Networks provide resources, or social capital (Adler & Kwon, 2000), and can foster access to educational and economic opportunity (Graham et al., 2014; Granovetter, 1995; McDonald & Day, 2010; Mani & Riley, 2019; Mishra, 2020). Social networks, however, are often segregated by race and class, limiting access for people from marginalized groups to dominant forms of social capital (Bonilla-Silva et al., 2006; Bourdieu, 1997; Castilla, 2022; Fernandez & Sosa, 2005; Fischer & Mattson, 2009), including resources related to education, college, or jobs (Lareau, 2011; McDonough, 1997; Perna, 2006; Tierney & Venegas, 2006).

For adolescents from historically marginalized groups, friendships with people from different social class or racial/ethnic background—sometimes called *bridging ties*—could provide access to dominant forms of social capital, and increase educational aspirations for all students (Calvó-Armengol & Jackson, 2004; Chetty et al., 2022a, 2022b; Montgomery, 1991; Moody, 2001; Putnam, 2016; Sacerdote, 2011; Small et al., 2010). Some research finds, for example, that both Black and white students who had cross-race friendships had higher educational aspirations than those with only same-race friendships (Hallinan & Williams, 1989). Low-income children with exposure to affluent contacts and a socioeconomically diverse network may experience greater economic mobility, move out of poverty, and have access to more educational opportunities (Chetty et al., 2022a, 2022b; Kazmina et al., 2025). Higher-income individuals with cross-class relationships have more egalitarian attitudes and deeper understandings of and awareness of inequality (Franetovic, 2026; Newman, 2014; Otero & Mendoza, 2023).

While recent work demonstrates that cross-class ties predict upward mobility (e.g., Chetty et al., 2022), we know far less about how those ties actually emerge within schools. Schools, even though they are increasingly segregated, are often more diverse than other networks (e.g., family networks) in students' lives, providing more opportunities for intergroup interaction (Malacarne, 2017). Much existing research has focused on whether diverse schools improve outcomes (e.g., Reardon, 2016), rather than on the organizational factors that allow for demographic diversity in a school building to foster meaningful social relationships. By organizing opportunities for interaction through schedules, extracurricular activities (Schaefer et al., 2011), course-taking patterns and course placement (Engzell & Raabe, 2023; Frank et al., 2013; Kubitschek & Hallinan, 1998; McFarland et al., 2014), assigned seating (Rohrer et al., 2021), and other institutional structures (McFarland et al., 2014), schools can facilitate or constrain opportunities for social interactions and capital exchange. These organizational arrangements may be as important as school demographic composition for determining whether friendships across social class emerge.

Research on diversity in K-12 schools has been focused primarily on school and classroom composition and its effects on outcomes, rather than the interactions between young people in schools (Diehl & Tunzi, 2021). Yet, the mere presence of high-SES peers in a school does not necessarily drive upward mobility; the *interaction* with those peers has been tied to greater opportunity (Chetty et al., 2022b). Further, studies that do examine these relationships have often focused on interracial friendships or racial homophily (e.g., Goodreau et al., 2009; Graham, 2018; Kogachi & Graham, 2021; McPherson et al., 2001; Quillian & Campbell, 2003), rather than friendships that occur across social class or socioeconomic status–socioeconomic

homophily (Malacarne, 2017). To inform school organizational practices, we need to understand the mechanisms that drive these ties—the specific school-level factors and conditions that increase the chances of forming friendships, particularly across social class.

In this study, we fill a critical gap in the literature. First, we examine the organizational mechanisms through which school-based friendships are made in socioeconomically diverse high schools, drawing on administrative and social network survey data from 11th grade students (n=948) in five high schools in the metropolitan Detroit area. Second, we examine whether these mechanisms operate differently for cross-class and same-class friendships, allowing us to test whether bridging ties have distinct social processes. Third, by conducting interviews with a subset of these students (n=28), we identify how school organizational structures translate demographic diversity into opportunities for cross-class friendships.

We find that the organizational conditions supporting friendship formation operate similarly for same-class and cross-class relationships. This suggests that a primary barrier to bridging ties is the unequal opportunity for sustained interaction inside schools. When students have the opportunity to connect, the organizational conditions that facilitate same-class friendship ties are the same conditions that foster cross-class ties. We found that structured school experiences, particularly shared extracurricular activities and courses, were the primary drivers of friendship formation, with residential proximity playing a surprisingly minimal role in most school contexts. Shared extracurriculars emerged as the strongest predictor of ties across all schools, with students approximately twice as likely to form friendships when participating in the same activities. Interviews revealed that these structured activities create “third spaces” within schools where interaction occurs naturally through teamwork, repeated exposure, and

shared purpose. Our findings suggest that schools can support adolescent friendship ties through the intentional design of extracurricular programs, strategic course scheduling and placement, and attention to within-school tracking practices. By identifying actionable mechanisms through which social ties form, especially cross-class friendships, this study provides evidence that economically diverse schools, when structured appropriately, can serve as powerful sites for fostering the social capital that is associated with upward mobility and educational opportunity.

Literature Review

People access social capital—resources including information, emotional support, and new opportunities—through their social networks (Adler & Kwon, 2000; Lin, 2000; McDonald, 2010). There are many forms of social and cultural capital, including *bonding capital*, where ties form and strengthen between members of the same racial/ethnic group or social class, as well as nondominant forms of capital held by marginalized groups, such as familial and in-kind supports and resiliency (Moll et al., 1992; Nora, 2001; Rios-Aguilar et al., 2011; Yosso, 2005). Our focus in this paper is on what network scholars call *bridging capital*, connections between individuals who are dissimilar, i.e., from different racial/ethnic or social class backgrounds. Such connections, often fostered through organizations that connect people to different others, may be weaker but can lead to new information, jobs, or economic opportunities (Briggs, 1998; Liu et al., 2017; Putnam, 2002). We focus specifically on connections across social class, which are highly correlated with economic mobility for low-income youth (Chetty et al., 2022b).

There are many possible mechanisms that could explain why bridging capital improves outcomes and economic mobility for low-income youth. Sharing high aspirations, motivation, or positive attitudes toward education can improve academic outcomes (Graham et al., 2014;

Hallinan & Williams, 1990; Mani & Riley, 2019; Nunn, 2014). For underrepresented students, support from network members can compensate for lack of resources or information-related social capital, thereby improving educational outcomes, such as high school completion and college attendance (Brouwer et al., 2018; Chetty et al., 2016; Chyn & Katz, 2021; Mishra, 2020). For example, social ties can also provide direct supports (e.g., a ride to school) or information (e.g., how to access and complete the FAFSA, how to prepare for exams or deal with academic challenges), which can lead to academic success (Brouwer et al., 2018; Mishra, 2020). Social connections can yield information about job or internship opportunities, or career pathways (Lin, 2001; Stigler, 1962). Peer networks, particularly those that yield cross-class social connections, are thus a critical factor driving youth outcomes, including economic mobility (Chetty et al., 2022b) and academic performance (Lessard & Juvonen, 2019). For middle- or upper-middle class children with more cross-class or cross-race connections, they also have more tolerant views, less racist attitudes (Gaías et al., 2018), greater awareness of inequality (Otero & Mendoza, 2023), and greater civic engagement (Powers & Webster, 2023).

Yet, bridging capital is difficult to obtain in practice because of structural constraints in social and organizational contexts, including residential segregation (McFarland et al., 2014; Mouw & Entwisle, 2006), which limit (or expand) opportunities to interact across race and social class, and because people have a tendency toward *homophily*, forming relationships with people who share similar traits (McPherson et al., 2001). Homophily can perpetuate inequities by race and class because of the differential access to opportunity these networks provide (e.g., Bell, 2009; Chabot, 2024). Homophily can be further increased by the tendency for students to form relationships with their friends' friends, i.e., triadic closure (Chabot, 2024). Therefore,

initial homophilous relationships may drive further homophily (Malacarne, 2017).

Homophily is not always negative, however. In diverse contexts, people may be more likely to befriend others of their own race or social class when the proportion of that race or social class in the school is lower, indicating a need for in-group support, but these settings may also increase the number of outgoing ties to out-group members. Moody (2001) suggests a curvilinear relationship, whereby friendship segregation increases with increasing levels of diversity but then levels off when diversity is high. Therefore, we may observe different levels of bridging ties in schools that are more or less diverse demographically. Research on cross-racial ties further suggests that such bridging ties are not very strong (McGill et al., 2012) and are less stable (Jugert et al., 2013). Students may have friendships across social class, but these relationships may not be as deep or substantive as same-class ties (Kretschmer et al., 2025). Such weak ties (e.g., acquaintances) may still provide meaningful access to new opportunities (e.g., Granovetter, 1973). Some research further suggests that socioeconomic homophily is weaker than racial/ethnic homophily, suggesting that there may be more opportunities to foster cross-class friendships (Kruse et al., 2016; McFarland et al., 2014; Smith et al., 2014). Indeed, some research suggests that rather than preference for same-class friends, socioeconomic homophily is explained more by ethnicity, residence, curricular options, and endogenous network processes, such as the tendency for friendships to be reciprocated and triadic closure, i.e., becoming friends with a “friend of a friend” (Chabot, 2024).

School-based friendships, in particular, are shaped by school policies, organizations, and programs, such as formal and informal tracking (Gamoran, 1987; Kogachi & Graham, 2021; Lucas, 1999; McFarland et al., 2014; Oakes, 1985; Tyson, 2014), course-taking patterns (Frank

et al., 2013), seating assignments (Rohrer et al., 2021), the extent of diversity (Moody, 2001), and other structural factors (McFarland et al., 2014; Kossinets & Watts, 2009; Lewis & Diamond, 2015; Zeng & Xie, 2008). For example, Frank et al. (2013) find that friendship ties, in general, are far higher among clusters of high school students with shared courses. However, tracking within schools can result in “racial cohabitation” rather than “true integration” in schools, which may be reflected in peer friendships (Bonilla-Silva, 2021). The opportunity for contact between students from different social groups is thus a necessary but insufficient condition for diversity to foster more intergroup connections (Marmaros & Sacerdote, 2006; Thijs & Verkuyten, 2014; Tropp & Prenevost, 2008).

In diverse schools, broader school-based opportunities can interact with peer networks to yield positive outcomes. For example, in a study of Black students from St. Louis who attended predominantly White and middle-class high schools in the suburbs, researchers found that the students not only benefited from information from well-connected peers, but were also supported through resources such as college fairs, constant reminders from counselors, and details on the college application process—resources that were available to them *because* of the affluence of their peers (Wells et al., 1994). The additional and timely information on college applications came from both their peer networks, or social capital, as well as from resources at the school (e.g., counselors). The authors note that these “micro-macro connections [are] inherent in the flow of information and opportunities through interpersonal networks” (Wells & Crain, 1994, p. 534).

Research examining cross-class social ties finds that such relationships are less likely among minority and non-English speakers than White students (Malacarne, 2017), and less

likely among high-achieving students, perhaps because they are tracked into classes with students socioeconomically similar to them (Carbanaro, 2005; Malacarne, 2017). Other mechanisms can also drive friendships across social class. For example, extracurricular activities, such as sports and the arts, are associated with increased intergroup friendships, yet academic club participation is negatively associated with intergroup friendships (Malacarne, 2017). While this work identifies individual student characteristics and activities associated with having more cross-class friendships, we still lack an understanding of how specific friendships emerge between students. At the same time, research on adolescent social networks demonstrates that structural and organizational contexts, especially shared course-taking patterns, are among the strongest predictors of friendship formation generally (Frank et al., 2013; Goodreau et al., 2009; McFarland et al., 2014). However, considerably less attention has been paid to whether these same organizational mechanisms also foster friendship across social class. Therefore, we know much less about whether repeated co-enrollment in courses, shared extracurricular activities, or other school-based opportunity structures make cross-class friendships more likely to form.

To address this gap, we examine the organizational mechanisms through which cross-class friendships form in high school. Rather than examining which students have more cross-class friendships, as prior studies have done, we examine friendship formation, exploring what shared experiences make a friendship tie more likely to emerge, and whether those factors vary across same-class and cross-class friendships. We draw on merged administrative records, social network surveys, and qualitative interviews to examine how shared courses, extracurricular activities, school feeder patterns, residential proximity, and other organizational

contexts shape friendship formation. We test whether these mechanisms operate differently for same-class and cross-class pairs, allowing us to assess whether bridging ties require distinct processes, or if they emerge through the same organizational opportunity structures that facilitate friendship formation more generally. Specifically, we ask: What individual and school-level mechanisms predict school-based friendship ties among adolescents? How, if at all, do these mechanisms operate differently across same-class and cross-class pairs?

Data and Methods

We sampled five socioeconomically diverse high schools in the Detroit metropolitan area. The schools had varying levels of racial diversity, and included two majority-White schools and three schools with a majority of students of color (Black, Latine, and Asian), with between 43-79% students who are economically disadvantaged. Given that social capital and social interactions vary across stages of childhood (Diehl & Tunzi, 2021; McDougall & Hymel, 2007), our focus is on older adolescents (11th graders), who have more stable and less exclusive friendships (Poulin & Chan, 2010), and who are likely forming plans for future employment or postsecondary education. (See Table 1 for descriptive information about each school in our study.)

Data Collection

Social Network Surveys. In each school, we administered roster-style social-network surveys, lasting 10–15 minutes, to all 11th-grade students, capturing their strong and weak ties to peers, between October and November of 2024. Rosters, which list all other students in the grade, are the recommended method for collecting network data (Ávila de Lima, 2010) because they simplify the reporting task, reduce measurement error (Marsden, 2011), and demonstrate

test–retest reliability (Wasserman & Faust, 1994). Because network analysis is particularly sensitive to missing data (Burt, 1987) and cannot be easily imputed (Daly, 2010), we used school and individual (raffle) incentives to ensure a high response rate (~75% or higher for all but one school) (see Table 1). We obtained passive consent from parents and assent from youth. Respondents sat separately and used individual devices to complete the electronic survey privately during classes, advisory periods, or assemblies to ensure higher participation.

Table 1. Survey response rates, school characteristics and 11th grade class demographics

School	A	B	C	D	E
Survey response rate	86%	92%	80%	75%	59%
<i>School Characteristics</i>					
Type	Charter	Charter	Public	Public	Public Magnet
Setting	Urban	Urban	Suburban	Suburban	Suburban
<i>Demographics (11th grade)</i>					
Female	46%	51%	51%	48%	50%
Economically disadvantaged*	65%	80%	42%	82%	37%
English language learner (ELL)	0%	0%	8%	21%	5%
Special education (SPED)	13%	10%	11%	11%	12%
<i>Ethnicity</i>					
African-American	99%	96%	13%	18%	26%
Non-Hispanic White	1%	3%	72%	32%	60%
Hispanic/ Latine	--	1%	7%	48%	5%
Other [±]	--	--	8%	2%	9%

*Students were classified as economically disadvantaged according to the State of Michigan Department of Education classification, which includes those who have been determined to be eligible for free or reduced-price meals, are in households receiving food (Supplemental Nutrition Assistance Program) or cash (Temporary Assistance to Needy Families) assistance, are homeless, are migrant, are in foster care, or certain Medicaid eligible children.

[±]Due to small percentages, Asian, Middle Eastern, and Native American or Pacific Islander categories were combined into a single ‘Other’ category.

To capture friendship ties, we used validated items to ask participants to name their “best

friends,” and those whom they considered “just friends” (Wegge et al., 2014), with no limit on the number of friends that could be selected. We combined these “best friend” and “just friend” ties for the purpose of our analysis of student friendships.

In these surveys, we also asked about students’ extracurricular participation. We provided them with a list of all activities offered at the school, and asked them to mark off which activities they participated in, since this information was not available in the district administrative records. We also asked them about their postsecondary aspirations, which we used to construct a measure of similarity in aspirations (i.e., if both students in the dyad planned to go to college).

Administrative Data. We then linked students’ survey responses to administrative records collected from the school districts. These records included student demographics, test scores, attendance rates, current and prior residential blocks, current and prior schools enrolled in, and current and prior assigned courses and teachers. With these administrative data, we constructed a set of variables used to predict student ties, representing factors such as a student’s own demographics (race, class, and gender) and average racial and social diversity exposure in 9th and 10th grade courses determined by a school mean-centered Simpson Index of Diversity¹, their demographic match and academic match with peers, the number and types of shared courses in current and prior years, their shared extracurricular activities, attendance of the same middle school as their peers, and how close they live to their peers.

¹The Simpson Diversity Index (SDI), adapted to be used to measure demographic diversity by Peter Blau in 1977, is now a commonly used measure in the social sciences (Blau 1977; Rushton 2008). The measure uses the formula $\frac{1}{\sum p_i^2}$ where p_i^2 is the proportion of students in each demographic category i . The index increases with heterogeneity and decreases with homogeneity.

Data Analysis

We used exponential random graph models (ERGMs), to examine the factors associated with tie formation in each school network. ERGMs model the probability of ties as a function of both exogenous actor and dyadic characteristics and endogenous network processes, allowing local tendencies, such as homophily (the tendency to form ties with similar others), reciprocity (if i reports a tie with j , j is more likely to report a tie with i), and triadic closure (e.g., the friend of a friend is more likely to be a friend) to explain the observed global network structure. (For technical details, see Lusher et al., 2012; Robins et al., 2007). Unlike logistic regression, which assumes the independence of observations, ERGMs explicitly model the dependencies inherent in social networks. The ability to explicitly model these dependencies are the primary advantage of ERGMs over regression models for the purpose of our study.

We estimated ERGMs in R using the `ergm` package from the `statnet` suite (Handcock et al., 2026; Hunter et al., 2008; Krivitsky et al., 2023), which uses Markov chain Monte Carlo maximum likelihood estimation. ERGM coefficients represent the change in log-odds of observing a tie associated with each specified network configuration or actor attribute, conditional on all other model terms. Positive significant coefficients indicate that a feature occurs more frequently than expected by chance, whereas negative significant coefficients indicate that it occurs less frequently than expected.

In our model, we included relational characteristics between students, such as the number of shared classes, and shared attributes of the individual students in the pair, while controlling for interdependence between observations that occur from network processes (such as reciprocity). We first ran models separately for each school and then also pooled results across the five

schools. In the models, we accounted for exogenous factors shaping tie formation, which were of interest to us and measurable in administrative or survey data, including number of shared prior core, honors, and elective courses, shared extracurricular activities,² and shared socioeconomic status (or socioeconomic homophily). The number of shared core and honors courses were log-transformed to reflect a diminishing marginal effect of additional shared classes on tie formation, whereas shared electives were left untransformed due to a linear association with tie likelihood.

Other variables included can be thought of as “controls” in our models, including average attendance rate over 9th, 10th, and 11th grade (which might influence the opportunity to form and sustain friendships), shared middle schools (e.g., school feeder patterns that allow for friendship formation to occur prior to entry into high school), and residential distance in miles between classmates (e.g., living near a classmate). We also included dyadic homophily terms such as shared race/ethnicity and gender, and a measure of shared postsecondary aspirations.

We also included endogenous variables that influence networks (e.g., triadic closure, or “a friend of a friend is a friend”). By including this endogenous network process, our model yielded more accurate estimates of our exogenous parameters of interest. Following standard ERGM practice, all undirected-tie models included terms for edges (baseline friendship likelihood) and geometrically weighted edgewise shared partnerships (GWESP), which captures triadic closure (i.e., tendency for friends of friends to become friends). Undirected-tie models excluded mutual (reciprocity), since all ties were reciprocated.

To examine whether these patterns operated differently for cross-class friendships and

² We also ran models where we differentiated between type of extracurricular activities (e.g., sports, arts, or other), but we did not find any significant differences. Therefore, we report the results for extracurriculars as a whole.

same-class friendships, we added interaction terms for the key predictors of interest (shared extracurriculars, shared core courses, and shared elective courses). This allowed us to assess whether shared courses and extracurricular activities were more or less strongly associated with friendship formation for cross-class dyads than for same-class dyads.

Node-level covariates, including economically disadvantaged status (approximated by free or reduced-price lunch eligibility), ethnicity, English language learner status, and special education identification were explored in initial models but were found to be nonsignificant in predicting tie formation. Gender as a node-level covariate did not improve model fit. In accordance with standard ERGM modeling practice, we thus retained only terms which improved model performance and fit (Morris et. al, 2008).

Because two schools had substantially lower survey response rates, friendship networks were symmetrized, whereby a tie was retained if either student nominated the other. Specifically, friendship nominations were assumed to be reciprocated when one student nominated another, even if the nominated student was not surveyed, thereby reducing missing ties attributable to survey nonresponse. To ensure that ERGM coefficients were directly comparable and could be pooled in the meta-analysis, all five school networks were symmetrized and modeled as undirected. This approach was supported by analyses of the original directed networks, in which reciprocity was highly significant across schools, with friendship nominations associated with approximately 8 to 15 times greater odds of reciprocation. The undirected symmetrized specification improved overall model fit across all schools while allowing model convergence for the two schools with lower response rates (See Appendix 3 for model fit plots.)

After estimating ERGMs separately for each school, we pooled school-specific

coefficients using a random-effects meta-analytic approach. This two-step hierarchical pooling strategy is recommended when networks are independent and when substantive heterogeneity across contexts is expected, as was the case with school networks in this study (Tolochko & Boomgaarden, 2024). This approach allows us to estimate an overall average effect across schools while appropriately reflecting between-school variability.

To examine the extent to which courses and extracurricular activities fostered cross-class friendships, we also simulated networks from the fitted model. We computed the total number, average per student, and density of cross-class ties averaged from 100 simulated friendship networks, and then explored what happened when we removed each mechanism (i.e., shared extracurricular, shared core courses, and shared elective courses) and re-simulated the networks to compute the number, per-student average, and density of cross-class ties. We then compared these results to report whether a given opportunity structure increases cross-class ties net of its effects on same-class ties. Specifically, we compared changes in the average number and density of cross-class friendship networks generated from base ERGMs and the simulated counterfactual networks where each organizational opportunity had no effect.

Qualitative Data Collection and Analysis. In four of the schools (Schools A, C, D and E), we conducted 45-minute semi-structured interviews with 6–8 students at each school (n=28), sampled based on characteristics of their reported networks, to validate our instruments, elicit other factors that drove social ties, and explore the resources that flowed between students. Interviews were conducted in February 2025. Specifically, we focused on the four schools with greater diversity, and sampled eight students in each, aiming for an even split of lower and higher SES students. Within each of those income groups, we sought to interview two students

who had no SES diversity in their networks, and two who were in the top 25% of SES network diversity in their schools. Ultimately, due to scheduling and availability, we were able to interview 28 students in total. Interviews were conducted in person during the school day. We transcribed all interviews and systematically coded the qualitative data in Dedoose (see Appendix 1 and 2 for interview protocol and codebook).

Results

School Contexts and Friendship Patterns

In Table 2, we present descriptive summaries of the study sample, including network characteristics, characteristics of surveyed students, and dyadic measures across all observable student dyads (any two students where at least one was surveyed, regardless of whether they share a friendship tie). We could not observe dyads involving two survey non-respondents. Respondent characteristics generally reflected the demographics of their school's 11th grade classes (see Table 1). Schools A and B were charter schools and had largely African American student bodies, while Schools C and E were predominantly non-Hispanic White, and D provided a diverse, non-ethnic majority sample with a strong representation of Latine students. Mean distance between residential locations were the longest in the two charter schools, Schools A and B, (6-7 miles), closest in the traditional public schools and magnet schools (2-3 miles), possibly reflecting different catchment geographies. Students typically share one core course and one elective with any other student, though elective-sharing was more common in the charter schools and honors course-sharing was more common in the magnet school. Network density is a measure of how many ties are observed out of all possible ties. Here, schools A and B may have relatively higher density (both .06) due in part to a smaller n and

higher relative response rate. Reciprocity (proportion of reciprocated friendships) was lowest in School B (.40) and triangular closure (likelihood of friendships to form between two students with friends in common) was lowest in School E (.26) but similar in all other schools (.34-.37) potentially due to missingness from a relatively lower response rate in School E. Schools D and E networks were imputed as undirected (all nominated friends were assumed to have nominated the nominee as a friend too) due to low response rates, so reciprocity was 1 for these schools.

Table 2. Sample Descriptives, network

School	A	B	C	D	E
N (surveyed)	120	102	185	259	288
<i>Survey Respondent Characteristics</i>					
Female	44%	50%	54%	52%	56%
Economically disadvantaged	65%	78%	41%	83%	37%
English language learner (ELL)	–	–	7%	22%	3%
Special education (SPED)	14%	9%	11%	11%	8%
African American	98%	96%	10%	20%	22%
Non-Hispanic White	2%	3%	76%	30%	64%
Hispanic	–	1%	8%	47%	5%
Other	–	–	6%	2%	9%
<i>Dyad Characteristics</i>					
Mean residential distance (miles)	6.93	7.07	1.93	2.22	3.12
Mean past shared core classes	1.04	0.88	0.89	0.74	0.57
Mean past shared electives	2.05	1.30	0.31	0.19	0.08
Mean past shared honors courses	0.004	–	0.005	0.07	0.31
% sharing ≥ 1 extracurricular	8%	8%	5%	6%	2%

% attended the same middle school	36%	8%	52%	64%	25%
<i>Network Characteristics</i>					
Network density	0.06	0.06	0.04	0.02	0.02
Triangular closure	0.35	0.37	0.34	0.34	0.26

Table 3 describes cross-group friendships in each school. Across all schools, about 40% of friendships were across social class. Cross-class density, like network density, shows how many cross-class pairs were present out of the possible number of cross-class pairs. Similar to overall network density, schools A and B had greater cross-class density than the other schools. We also report the percentage of cross class friends for lower and higher income students. These results help us to see whether low-income students are more likely to have cross-class friendships than higher income students. Higher-income students had a greater proportion of cross-class friendships than low-income students in Schools A, B, and D, where the student populations were predominantly economically disadvantaged. In Schools C and E, where the student population was predominantly not economically disadvantaged, low-income students had a greater proportion of cross-class friendships. We also report the percentage of cross-gender friendships and cross-race friendships. We find fewer cross-race friendships, unsurprisingly, in the schools that were the least racially diverse, schools A and B.

Table 3. Friendship Descriptives by School

School	Total Students	Total ties	Cross-class ties	Cross-class density	Avg. (%) cross-class friends, low income	Avg. (%) cross-class friends, higher income	Cross-gender friendships	Cross-race friendships
A	138	980	475 (48.5%)	0.110	5.28 (39.1%)	9.90 (63.8%)	330 (33.7%)	61 (6.2%)
B	111	525	192 (36.6%)	0.098	2.16 (23.4%)	8.73 (83.5%)	182 (34.7%)	54 (10.3%)
C	219	1586	687 (43.3%)	0.059	7.39 (59.8%)	5.45 (34.0%)	363 (22.9%)	587 (37.0%)
D	328	1823	528 (29.0%)	0.033	1.96 (17.6%)	8.95 (82.0%)	517 (28.4%)	972 (53.3%)
E	454	2400	961 (40.0%)	0.020	5.59 (60.3%)	3.41 (30.0%)	452 (18.8%)	899 (37.5%)
Average across schools	250	1462.8	568.6 (39.5%)	0.064	4.47 (40.0%)	7.29 (58.6%)	368.8 (27.7%)	514.6 (28.9%)

Table 4 shows the overall school demographics, and the average student diversity exposure across schools. In Schools A, B, and C, we find greater socioeconomic diversity than racial diversity in all courses, electives, honors courses, and extracurricular activities.

Table 4. Average Student Diversity Exposure Scores, by School and Context**

		A	B	C	D	E
All Courses	SES	0.43	0.35	0.43	0.28	0.43
	Race	0.07	0.08	0.32	0.61	0.49
Core Courses	SES	0.43	0.35	0.44	0.28	0.44
	Race	0.07	0.08	0.32	0.62	0.49
Electives	SES	0.43	0.34	0.42	0.28	0.43

	Race	0.07	0.08	0.31	0.61	0.49
Honors	SES	0.48	---	0.46	0.35	0.37
	Race	0.11	---	0.31	0.6	0.44
Extracurriculars	SES	0.42	0.32	0.4	0.25	0.39
	Race	0.09	0.12	0.26	0.57	0.45
# of Extracurriculars with >=5 student enrollment		9	8	25	25	18
Economically Disadvantaged % (School overall) *		65%	80%	42%	82%	37%
Racial Demographics (School Overall)						
African-American		99%	96%	13%	18%	26%
Non-Hispanic White		1%	3%	72%	32%	60%
Hispanic/ Latine		--	1%	7%	48%	5%
Other±		--	--	8%	2%	9%

** Diversity measures were calculated for all courses or activities with at least 5 students enrolled. Higher scores indicate greater diversity

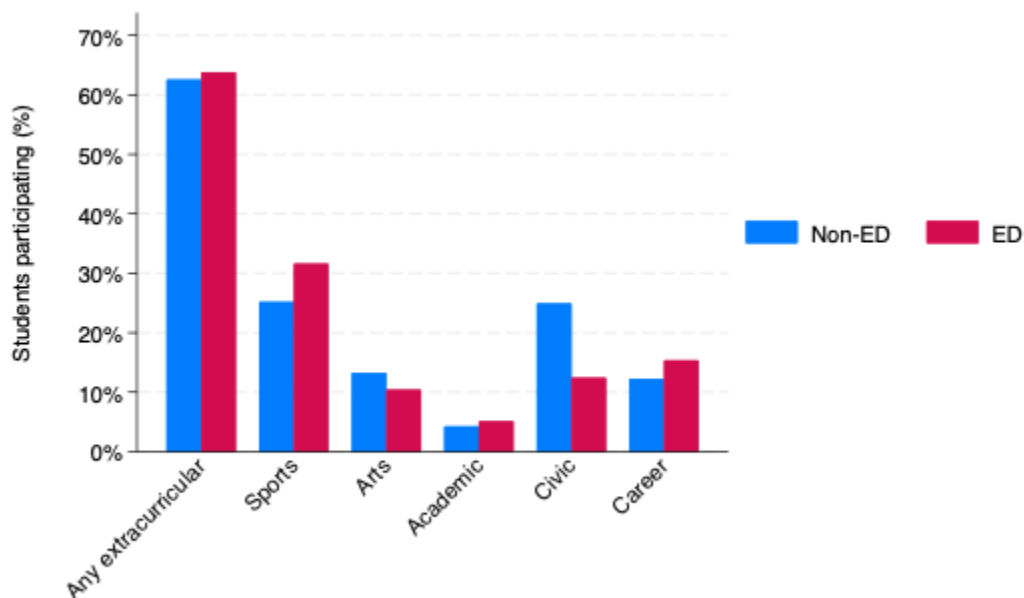
* Students were classified as economically disadvantaged according to the State of Michigan Department of Education classification

±Due to small percentages, Asian, Middle Eastern, and Native American or Pacific Islander categories were combined into a single 'Other' category

Figure 1 shows overall differences in extracurricular involvement by type between students

classified as economically disadvantaged and non-economically disadvantaged. We find that in schools overall extracurricular participation is generally similar between socioeconomic groups. However, there are significant differences in participation between economically disadvantaged and non-economically disadvantaged students in types of extracurriculars, including for sports, in which economically disadvantaged students participated at higher rates than non-economically disadvantaged students (49.7% vs. 40.2%), and civic activities, in which economically disadvantaged students participated at substantially lower rates (19.4% vs. 39.8%). No statistically significant differences were observed for arts, academic, or career-related activities (see Appendix 5 for chi-square tests).

Figure 1. Extracurricular Participation by Economically Disadvantaged (ED) Status.



Organizational Mechanisms of Friendship Formation

Next, we discuss our pooled ERGM coefficients across the five schools to illuminate

the key mechanisms driving friendship ties. Overall, we find that friendship formation was driven primarily by shared organizational experiences, rather than residential proximity, shared aspirations, or socioeconomic or racial similarity. After accounting for endogenous network processes predicting friendship formation, such as triadic closure, shared extracurricular activities had the largest estimated coefficient, followed by shared core courses, shared elective courses, and shared middle schools (feeder school patterns). Importantly, these mechanisms operated similarly for same-class and cross-class friendships, suggesting that bridging ties emerge through the same opportunity structures that facilitate friendship formation more generally.

Table 5. Random-Effects Pooled Meta-Analysis of ERGM Coefficients, by coefficient (standard error), odds ratio, and p value.

	Model 1: Base			Model 2: Extracurricular × Cross-class			Model 3: Core courses × Cross-class			Model 4: Elective × Cross-class		
	β (SE)	OR	p	β (SE)	OR	p	β (SE)	OR	p	β (SE)	OR	p
Edges	-6.994*** (0.465)	0.00	<0.001	-7.495*** (0.358)	0.00	<0.001	-7.511*** (0.340)	0.00	<0.001	-7.522*** (0.374)	0.00	<0.001
GWESP	1.697*** (0.164)	5.46	<0.001	1.860*** (0.260)	6.42	<0.001	1.869*** (0.256)	6.48	<0.001	1.862*** (0.262)	6.44	<0.001
Shared Core Courses	0.405*** (0.070)	1.50	<0.001	0.434*** (0.060)	1.54	<0.001	0.448*** (0.065)	1.57	<0.001	0.435*** (0.059)	1.54	<0.001
Shared Elective Courses	0.244*** (0.072)	1.28	<0.001	0.244*** (0.070)	1.28	<0.001	0.245*** (0.070)	1.28	<0.001	0.241** (0.080)	1.27	0.002
Shared Honors Courses	0.334 (0.236)	1.40	0.158	0.360 (0.244)	1.43	0.139	0.352 (0.239)	1.42	0.140	0.351 (0.238)	1.42	0.140
Shared Extracurriculars	0.883*** (0.128)	2.42	<0.001	0.982*** (0.116)	2.67	<0.001	0.940*** (0.084)	2.56	<0.001	0.949*** (0.087)	2.58	<0.001
Shared Extracurriculars × Cross-class	—	—	—	-0.148† (0.080)	0.86	0.066	—	—	—	—	—	—
Shared Core Courses × Cross-class	—	—	—	—	—	—	-0.028 (0.042)	0.97	0.503	—	—	—
Shared Elective Courses × Cross-class	—	—	—	—	—	—	—	—	—	0.002 (0.033)	1.00	0.941
Shared Middle School	0.256** (0.094)	1.29	0.007	0.276** (0.089)	1.32	0.002	0.274** (0.089)	1.32	0.002	0.278** (0.089)	1.32	0.002
Residential Distance	-0.009 (0.007)	0.99	0.173	-0.008 (0.006)	0.99	0.192	-0.009 (0.007)	0.99	0.185	-0.009 (0.007)	0.99	0.181
Attendance Rate	0.456* (0.208)	1.58	0.029	0.589** (0.186)	1.80	0.002	0.583*** (0.173)	1.79	<0.001	0.591** (0.186)	1.81	0.001

Gender Homophily	0.703*** (0.123)	2.02	<0.001	0.742*** (0.099)	2.10	<0.001	0.741*** (0.100)	2.10	<0.001	0.742*** (0.099)	2.10	<0.001
Race Homophily	0.205 (0.168)	1.23	0.224	0.204 (0.167)	1.23	0.221	0.202 (0.167)	1.22	0.226	0.202 (0.168)	1.22	0.229
Class Homophily	0.055 (0.038)	1.06	0.148	0.050 (0.030)	1.05	0.103	0.047 (0.048)	1.05	0.335	0.093** (0.031)	1.10	0.002
Postsecondary Aspiration Homophily	0.008 (0.093)	1.01	0.932	-0.036 (0.079)	0.96	0.646	-0.034 (0.080)	0.97	0.667	-0.040 (0.079)	0.96	0.613

Note: Standard errors are shown in parentheses.. † p < .10, * p < .05, ** p < .01, *** p < .001.

Shared Extracurricular Activities

Among the organizational opportunity structures included in the pooled ERGM, shared extracurricular participation had the strongest positive association with friendship formation. On average, the odds of friendship for students who shared at least one extracurricular activity were 2.4 times higher ($p < .001$) than otherwise similar pairs of students who did not share an extracurricular activity. The interaction between shared extracurricular participation and cross-class status was small, negative, and only marginally significant, suggesting that while extracurricular activities continue to be important opportunities for fostering cross-class friendships, the relationship might be somewhat stronger among same-class pairs.

Our student interviews help to explain why extracurricular activities foster and strengthen friendships, including friendships across class. Sports activities and clubs fostered friendships by creating opportunities for repeated interaction through teamwork, shared goals, and sustained participation over time. For example, one student (White, female, low-income) in a club that introduces students to future careers in medicine, reported making a close friendship with another student (White, female, high-income) in the club. She reported that “it was a lotta teamwork” and “really fun,” and that she grew much closer to her friend through the collaborative culture of the club.

Similarly, many interviewees described sports as creating regular opportunities, often daily, to develop close relationships with their peers. The routine and regularity of sports practices seemed to offer a built-in opportunity for students to form ties. In team sports (e.g. basketball, soccer, volleyball, football, cheerleading, softball), the collaborative environment encourages teamwork and requires students to get to know and trust their teammates. In such a

focused, team-oriented, close-contact environment, young people can build meaningful connections with their teammates that also go beyond the sport and extend to academic support. One higher income Black male student described how one of his teammates, a low-income Black male student, was like a “brother” to him. He added: “We're on the team together and we sit, and coach said, ‘Y'all brothers on the team.’ Basically, he was not eligible for the season, so I ended up helping him with his work so he could be eligible and play.” In this case, the higher income student helped the lower income student with his schoolwork so that he could play on the team. As demonstrated in the interviews, these relationships built within the sport or extracurricular activity often transfer outside of the physical activity and, in this case, the ties formed there also extended to supporting academics.

Students also emphasized the importance of the physical location of the extracurricular activities. Club spaces, football fields, or rehearsal spaces provided and monitored by the school, and designed for student use, functioned as “third spaces” within schools where students could interact outside of formal classroom instruction. These spaces were particularly important for cross-class friendships because they provided opportunities to spend time together even when students rarely visited one another’s homes. As one Black low-income male student described, his closest friend, a White higher income male, was from the football team, but they did not go to one another’s houses: “I don’t really go to his house,” he said. Instead, they primarily spent time together during football practices. Thus, extracurricular activities appear to foster friendship not only through shared interests, but also by creating structured, recurring opportunities for interaction that allow relationships to develop and deepen over time.

Shared Academic Experiences

Shared academic experiences were also strongly associated with friendship ties. Sharing more past core courses (log-transformed) was associated with higher odds of friendship (OR=1.5, $p<.001$). The estimated log-linear relationship indicates that sharing a first core course was associated with approximately 50% higher odds of friendship, while a second shared course increased the odds by an additional 19%, a third by 13%, and a fourth by about 10%. These findings suggest that repeated exposure across multiple classes compounds opportunities for interaction and trust-building, with the largest gains associated with the first few shared classes and progressively smaller increases thereafter. The number of shared elective courses over the past two years (9th and 10th grade) was also a significant predictor of friendship (OR=1.28, $p<.001$).³ Shared honors courses were not statistically significant in the pooled models, perhaps because of inconsistent identification and offering of honors courses across schools.⁴ The interaction terms with cross-class ties were not significant, suggesting that these mechanisms operate similarly across same-class and cross-class pairs.

Our interviews revealed how courses foster friendships, primarily through repeated exposure, seating assignments, and group activities. Many interviewees reported not knowing a student previously, then becoming close friends after sharing a class with them. Sitting next to

³ In our school level analyses (see Appendices), these likelihoods were weakest for the two urban, charter schools in the sample which also had the highest average number of shared electives between observed dyads overall. This may reflect smaller enrollment and a more limited number of elective offerings which would offer less niche contexts for students to bond over compared to schools with more diverse elective offerings.

⁴ The log-transformed odds ratios for shared honors courses were not significant in the pooled models. There were significant, positive associations in some schools, however. See appendices for school-level models.

someone in class, working on the same group project, or studying together were the in-classroom factors most frequently reported that further contributed to friendship forming. One interviewee (Black, male, high-income) reported becoming close friends with his peer (Black, male, low-income) simply because they “sit at the same table at Physics.” Respondents also described the compounding effects of sharing multiple courses, which meant seeing a classmate multiple times a day across different subjects and allowed for even greater opportunities for friendship formation. One student (White, female, high-income) described how sharing four different back-to-back classes with her friend (White, female, low-income)—“third-hour AP Government, fourth-hour Yearbook, fifth-hour AP Lang, sixth-hour Chemistry”—brought them closer together. Another student (Black, female, low-income) described how seeing her friend (Black, female, high-income) in multiple classes deepened their friendship: “Because I saw her so often, we talked more and then we really got to know each other. This year, too, I have a class with her, and she sits next to me and we talk.”

District-Level Feeder Patterns

We also found that opportunity structures beyond the school itself shaped friendship formation, especially in the case of school district feeder patterns, which reflect school assignment, catchment/boundary zones, and school choice. Students who attended the same middle school had higher odds of friendship in high school (OR=1.29, $p<.01$). District plans and policies around school assignment thus also structure later friendship networks by influencing which students repeatedly encounter each other across schools and structural moves.

Our qualitative data, too, showed these preexisting relationships with friends—in middle

school—were a major driver of friendships in high school. Several students shared that friends they met in middle and elementary school became closer to them by the time they entered high school together. This suggests that these early relationships provided strong foundations for durable cross-class ties in high school but also suggests that middle and elementary schools may be important contexts for fostering friendships and cross-class tie formation. For example, one student (White female, higher income) described knowing her friend (White female, low-income) since elementary school, which provided a foundation for their relationship: “I met her in elementary school. We always knew each other, but this year we’ve had a lot of classes together and we share a lot of experiences together, which makes us closer. I would say I’ve known her my whole life, but this year is the time that I’ve got really close to her.” Many students also mentioned the loyalty, comfort, and longevity of these pre-high school relationships. For example, one student (Black, female, high-income) described meeting her best friend (Black, female, low-income) in first grade, showing how pre-high school relationships can persist through school change. Cross-class contact in earlier school years seems to have positive long-term social effects.

Residential Proximity

Distance between home addresses was not statistically significant in predicting friendship formation in the pooled ERGM models, after accounting for the within-school conditions⁵. Our survey and interview data help to explain why this might be the case. In

⁵ Residential distance was significantly associated with friendship formation only in Schools D and E. Although statistically significant, the effect was modest ($OR \approx 0.97$) and substantially smaller than the effects of shared school experiences. Because this association was observed only in two schools and no consistent contextual explanation emerged across sites, it should be interpreted cautiously.

surveys, many students reported meeting their friends in classes at schools, suggesting that schools are the most common point for initiating these peer friendships, not neighborhoods. Students also described interacting with friends most often in class, at lunch, or outside of school. However, when meeting outside school, they most often met “somewhere else outside school” rather than visiting one another’s homes. This suggests that residential addresses may play a smaller role in driving friendships. (See Appendix Table 4 with survey results.) Several students explicitly noted that although they rarely visited friends’ houses, they regularly interacted during school or afterschool activities. Few students at the charter school reported seeing friends outside of school. At School D, one student (Hispanic, Female, high income) described meeting her friend (White, Female, low income) through classes in freshman year but noted that they connected outside of school: “We usually hang out at the parks after school,” as well as cafes, where they would “just have coffee, donuts, chit chat and hang out.” Perhaps due to a lack of physical residential proximity, or to have more independence from their families, students found ways to interact with one another at local parks, cafes, malls, and movie theaters that were closer to the school site.

How Organizational Mechanisms Influence Cross-Class Friendships

As noted throughout the findings, we did not find that the key organizational mechanisms, aside from a marginally significant finding for the interaction between cross-class ties and extracurricular activities, operated differently for same-class or cross-class ties. These mechanisms were important for supporting both same-class and cross-class friendship formation. However, we also wanted to understand the relative contribution of these key organizational opportunity structures—shared extracurriculars, shared courses, and shared

electives—to cross-class tie formation by conducting counterfactual simulations.

We found that removing the effect of all three organizational opportunity structures reduced the number of simulated cross-class friendships across schools to varying degrees. Setting the shared course effect to zero produced the largest decline in simulated cross-class friendships across schools (a 68% average reduction), followed by shared elective courses (a 42% average reduction) and shared extracurricular participation (a 23% average reduction). This suggests that, although ERGM results show that shared extracurricular participation has stronger tie-formation effects, the required nature of core and elective coursework allows their comparatively moderate effects to accumulate across many more student pairs, resulting in a greater overall contribution to cross-class friendship formation. However, the relative importance of organizational opportunity structures differed across schools. Cross-class tie formation in school A, where a smaller number of extracurricular activities was offered, relied most heavily on shared core classes, whereas School D showed the greatest cross-class tie-formation dependence on extracurricular participation and elective coursework. These exploratory findings suggest that the prevalence of different organizational opportunity structures was associated with the extent of cross-class friendship formation across schools.

Table 6. Cross-Class Ties, Baseline Simulations vs. Counterfactual Simulations

Baseline Simulations				Counterfactual Simulations								
				No Shared Extracurricular Effect			No Shared Core Courses Effect			No Shared Elective Courses Effect		
	Total	Average	Density	Total	Average	Density	Total	Average	Density	Total	Average	Density
A	485.24 (21.34)	7.03 (0.31)	0.112 (0.005)	420.41 (23.67)	6.09 (0.34)	0.097 (0.005)	39.22 (26.56)	0.57 (0.38)	0.009 (0.006)	337.52 (32.28)	4.89 (0.47)	0.078 (0.007)
B	183.83 (14.70)	3.31 (0.26)	0.094 (0.008)	165.59 (16.39)	2.98 (0.30)	0.085 (0.008)	129.71 (12.81)	2.34 (0.23)	0.066 (0.007)	78.14 (13.04)	1.41 (0.23)	0.040 (0.007)
C	687.72 (33.62)	6.28 (0.31)	0.059 (0.003)	587.52 (32.07)	5.37 (0.29)	0.050 (0.003)	204.70 (22.64)	1.87 (0.21)	0.017 (0.002)	450.76 (34.69)	4.12 (0.32)	0.038 (0.003)
D	561.62 (38.90)	3.42 (0.24)	0.035 (0.002)	182.30 (23.41)	1.11 (0.14)	0.011 (0.001)	87.89 (11.79)	0.54 (0.07)	0.006 (0.001)	180.29 (24.52)	1.10 (0.15)	0.011 (0.002)
E	946.62 (33.48)	4.17 (0.15)	0.020 (0.001)	864.57 (31.91)	3.81 (0.14)	0.018 (0.001)	361.96 (29.68)	1.59 (0.13)	0.007 (0.001)	741.69 (38.16)	3.27 (0.17)	0.015 (0.001)

Note: Numbers denote cross-class tie totals, averages, and density and their standard deviations in parentheses across 100 simulated networks using the base ERGM models for each school vs. 100 simulations each of a counterfactual where the effect of shared extracurriculars, core courses, and electives were set to 0.

Discussion

We examined the high school friendship networks of 11th graders in five high schools in metro Detroit, merging social network data with administrative records, and conducting follow-up interviews with 28 students across four of the schools. We sought to understand the mechanisms through which friendships were created or sustained, particularly how those mechanisms could yield access to bridging capital (through cross-class friendships) in the school environment. We found that organizational structures within schools (e.g., course patterns, extracurricular activities) and districts (e.g., school feeder patterns) were key drivers of high school friendships, while residential proximity played a limited role. We found that shared extracurricular activities and shared courses were primary school-based mechanisms through which these ties formed, by creating opportunities for repeated interaction.

Importantly, we found little evidence that cross-class friendships require distinct social processes than same-class friendships. Apart from a marginally significant finding for extracurricular activities, the organizational mechanisms associated with friendship formation operated similarly for same-class and cross-class pairs. This suggests that the primary barrier to bridging ties is unequal opportunity for sustained interaction between students from different socioeconomic backgrounds in schools.

Our findings reveal the importance of organizational mechanisms in mediating the link between demographic diversity and cross-class friendships in schools. We build on prior research that shows that individual students who are in sports and arts clubs have more intergroup friendships (Malacarne, 2017). Our work explores this relationship at the dyad level, where we find that sharing extracurricular activities with another student increases the

likelihood of a friendship between the pair. This increased likelihood is in part because having a shared interest likely makes it easier to form ties across social differences. Yet, our qualitative findings suggest that it is also because these school activities foster sustained interactions (practices, meetings, events), along with a shared purpose and teamwork. These “third spaces” provided an important context for interaction, including across social class. Of course, it is important to note that extracurricular participation in many schools is itself socially stratified, even the more affordable school-based options. For example, while overall extracurricular participation between lower and higher-income students was similar in our sample, we found that lower income students participate in some forms of extracurricular activities, especially civic activities (i.e., National Honor Society, student government and leadership committees) at significantly lower rates than higher-income students, potentially due to associated costs, transportation barriers, or additional obligations, such as childcare or paid work. However, we note that in almost all of the schools in our sample, students’ exposure to socioeconomic diversity in courses was comparable to that in extracurricular activities. If participation barriers are reduced, students enrolled in those activities are likely to form cross-class friendships.

We also found that academic course-taking patterns played a major role in driving friendships. There was a cumulative effect of shared core and elective courses, which supports prior research that found that friendship ties are far higher among students with shared courses (Frank et al., 2013). Our study extends this work by showing that these same organizational structures also support cross-class friendships. Elective courses could be spaces, like extracurricular activities, for interest-based connections across differences. However, we found

that honors courses had a more mixed relationship, and their role in facilitating or inhibiting friendships varied by context. Our work thus relates to prior research that shows that tracking and organizational structures can serve as a constraint on cross-class ties (Gamoran, 1987; Kogachi & Graham, 2021; Lucas, 1999; McFarland et al., 2014; Oakes, 1985; Tyson, 2014), but the effects of tracking on social tie formation may vary by school context (Carbanaro, 2005; Malacarne, 2017). If same-class and cross-class students are co-enrolled in courses, course placement can foster friendship formation. However, if courses are socioeconomically stratified, the net effect may be to increase same-class ties. There were also diminishing returns to shared course-taking. Because of a log-linear relationship between shared past core courses and the likelihood of tie formation, each additional shared course contributes less to tie formation than the previous one. Therefore, students need not share all their courses to reap the benefits of shared classes in supporting friendship ties.

We also found that organizational structures beyond the high school itself shaped friendship formation, particularly district feeder patterns. Students who attended the same middle school had higher odds of forming friendships in high school, indicating that district school assignment policies and patterns can shape friendship even after structural school moves (e.g., from elementary to middle school, or middle school to high school). This again supports the idea that repeated interaction over time, like in shared courses and extracurricular activities, can drive friendships.

We were surprised to observe that some structural factors, such as residential proximity, did not appear to shape friendship formation in most schools, after accounting for within-school organizational opportunities. Students primarily reported meeting friends through

classes, extracurricular activities, lunch, and other school-based settings rather than through their neighborhoods. Even when they connected with their friends, they typically met in parks, shopping malls, or other public spaces, rather than in one another's homes. Although residential segregation likely shapes where students end up attending school, our findings suggest that once students attend the same school, organizational opportunities may be more influential than geographic proximity in driving friendships. This is particularly encouraging because schools are often more diverse than neighborhoods or family networks (Malacarne, 2017), suggesting that schools can partially counter structural constraints like proximity or residential segregation and create opportunities for interaction across social class. At the same time, while the greater reliance on digital communication or third spaces (malls, parks, etc.) to meet up and connect may reduce the importance of physical proximity (Mouw & Entwisle, 2006), there may be lost opportunities if youth are meeting up at school and out-of-school spaces but not at one another's homes. Without home-based interactions, there may be less opportunity to benefit from information or influence from broader networks, such as a friend's family members, older siblings, or other adults in or visiting the home.

Overall, our work supports scholarship that shows that proximity and exposure to different subgroups is necessary but insufficient for fostering cross-class ties (Thijs & Verkuyten, 2014; Tropp & Prenevost, 2008), and that organizational contexts can deeply shape network tie formation (McFarland et al., 2014). Our work builds on prior research on bridging ties by extending beyond racial homophily to explore the mechanisms driving cross-class ties, or socioeconomic homophily, research that scholars have called for (Malacarne, 2017). We also found that socioeconomic homophily varied across school contexts. There were significant

same-SES friendship preferences in Schools D (a public suburban school) and E (a public suburban magnet program), which were the two largest schools in the sample, but no significant evidence of socioeconomic homophily in the other schools. This pattern is consistent with theories of structural sorting, which find that larger schools often feature greater internal differentiation (tracking, programmatic sorting, extracurricular niches), which can intensify within-group clustering (e.g., Oakes, 1985). Although our small number of schools prevents us from systematically explaining this variation, these differences underscore that attending a socioeconomically diverse school does not necessarily translate into cross-class friendship. Students from different socioeconomic backgrounds require opportunities for sustained interaction within shared organizational contexts, such as courses and extracurricular activities, to form friendships. Our findings suggest that these mechanisms operate similarly for cross-class and same-class friendships. If students do have the opportunity to form such ties in schools, the conditions that facilitate general friendship ties are the same conditions that foster cross-class ties.

Our work has limitations. Our work is cross-sectional and cannot make causal claims about the directionality of the conditions and network ties. For example, while we find that extracurricular activities and shared electives foster tie formation, students may also select into these due to their shared interests, which may be driving the friendship ties. We focus on a single grade level (11th grade) in a specific region (Detroit metropolitan area). And our work is focused on school-based friendships; it may also be that students have friendships with neighbors who do not attend their school. While our work contributes to calls for scholarship to focus on older adolescents (e.g., Diehl & Tunzi, 2021), future research could explore

longitudinal ties across childhood age groups (e.g., from elementary through high school), given the importance of school feeder patterns and the cumulative exposure across schools in a district.

Despite these limitations, our results have several important implications for school design and policy. Schools can create organizational structures, scheduling changes, and course sequencing that can increase cross-class contact and relationships. For example, our finding about extracurricular activities suggests that further investment in accessible programming after school in the arts, sports, and career/academics, is a key equity and integration strategy. Furthermore, our work also suggests that schools and school systems more systematically track these data (e.g., participation rates, rosters, etc.) so that researchers and policymakers can understand the extent of within-school integration in extracurricular programming. Since shared courses were also a key factor driving friendships, class scheduling and assigned seating can also serve as policy levers for bridging tie formation. Several students noted that their schools used assigned seating in classes, which could be leveraged to foster relationships across social class differences, as research shows that seat assignments can foster diverse friendships (Rohrer et al., 2021). Schools could also go further than simply offering the environmental context or opportunities for cross-class social ties to form; they could provide explicit instruction to young people about how to leverage those connections, such as encouraging help-seeking and help-giving, creating spaces for conversations about college and career pathways, etc. This training could be integrated into social-emotional learning curricula. Furthermore, our findings suggest that school integration policies remain critical, despite persistent residential segregation. Indeed, it is important to foster exposure to diversity in early

grades, since attending the same feeder school can boost the chances of forming friendships in subsequent schools. Since the school-based mechanisms driving friendship formation operated similarly for both same-class and cross-class ties, creating opportunities for students from different socioeconomic backgrounds to attend school together, share courses, and participate in extracurricular activities remains important. By identifying actionable conditions that support bridging ties, our findings can inform efforts for school leaders and policymakers to create socially cohesive school environments that foster bridging ties, equity, and economic mobility.

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Appendix 1. Youth Interview Protocol

Youth Interview Protocol

Pre-Interview Prep:

- Review the participant's survey records and tailor protocol accordingly

Introduction

Thank you for participating in this activity today. Before we start, I would just like to remind you

- *This interview is anonymous and confidential.*
- *You can ask to pause or stop at any time.*
- *I would like to audio-record the interview so that I can use the recording to transcribe what we discuss. I will make the transcript anonymous and then delete the recordings. Is it okay if I record this interview?*
- *We have a \$50 gift card for your time [provide gift card].*
- *Ok, I'm going to start the recorder now if that's okay.*

Get to Know You (use judgment about how long to spend on these to build rapport)

1. First, we would just love to learn more about you. Tell me a little about yourself (what are your hobbies, where you're from, etc.)
2. Tell me about your school. How long have you been there?
 - a. Where did you go to middle school - was it in this district?
 - b. What about elementary school?
3. Is your school in your neighborhood?
 - a. How do you get to school each day?
 - b. Do your neighbors go to school with you?
4. Tell me about your family.
 - a. Do you have siblings?
 - b. Who lives in your household?
 - c. [For any adults in the household:] You mentioned you live with X and Y [adults] are they working outside the home? If so, what do they do?
 - d. [For adults in the household:] Did they go to college? Complete a degree?

Social Ties

Now I want to ask about your friendships

5. When you took our survey in the fall, we asked you about your friends in 11th grade. Would you say that your closest friends are in your grade at your school?
 - a. If not, tell me about your closest friends.
 - b. How did you meet?
 - c. Where do they go to school, if not in your school?
6. Now we are going to talk about the people you listed on the survey you completed. We will ask you about both the friends you listed as your best or closest friends as well as others. *Use the prompts below for guidance.*
 - a. In the survey you completed a few weeks ago, you mentioned that the following people in 11th grade were your closest friends / best friends of yours at the school:

- i. [List names]
 - ii. Is there anyone else you want to add that maybe you forgot to list on the survey or became a close friend since then?
 - b. *If more than 2 best friends are listed, select 2 prioritizing cross-class and cross-race ties. If no cross ties, ask them to select the 2 best friends they want to talk about today.*
 - c. First, I want to talk about [X best friend]. *[Repeat for others]*
 - i. How did you meet this person?
 - ii. You mention you see them [x frequency]. Where do you usually hang out?
 - iii. What do you typically do together?
 - iv. Tell me about the last time you saw this person. What did you discuss or chat about?
 - v. You mentioned that they are/are not in the same class as you. Can you say more about that?
 - 1. If in class, do you sit together, do homework together, talk about class?
 - 2. If not, why do you think X is not in your class?
 - vi. Are you in any shared activities/extracurricular activities with this person?
 - vii. Do you ever talk to them about school? What do you talk about? Can you give an example?
 - viii. Do they ever help you with school? Can you give me an example? How did that help?
 - ix. You mentioned you sometimes spend time at this friend's house. Do you spend any time with their parents or other family members?
 - 1. If so, do you ever talk to them about school or what you're doing after high school?
 - 2. What do their parents or other family members do for a living?
 - x. Only if new ties are added (not on survey): How would you describe their race/ethnicity? Are they the same or different race as you?
 - 1. Gender?
 - 2. Age?
 - 3. Do you think their family has more or less money than yours? What makes you think that?
7. In the survey you completed a few weeks ago, you also mentioned that the following people were friends of yours at the school in 11th grade that you hang out with a lot. [List names]
- a. Is there anyone else you might have forgotten to select on the survey –any other people you would consider friends?
 - b. *Select 2 people to probe on from survey. Prioritize cross-class and cross-race ties if available. If not, randomly select 2.* For each individual, probe for:
 - i. How did you meet this person?
 - ii. You mention you see them [x frequency]. Where do you usually hang out?
 - iii. What do you typically do together?
 - iv. Tell me about the last time you saw this person. What did you discuss or chat about?

- v. You mentioned that they are/are not in the same class as you. Can you say more about that?
 - 1. If in class, do you sit together, do homework together, talk about class?
 - 2. If not, why do you think X is not in your class?
- vi. Are you in any shared activities/extracurricular activities with this person?
- vii. Do you ever talk to them about school? What do you talk about? Can you give an example?
- viii. Do they ever help you with school? Can you give me an example? How did that help?
- ix. Only if new ties are added: How would you describe their race/ethnicity? Are they the same or different race as you?
 - 1. Gender?
 - 2. Age?
 - 3. Do you think their family has more or less money than yours? What makes you think that?
- c. Is there anything else you want to share about your friends?

School Context

Now I want to ask you some questions about school.

- 8. What do you like about school?
- 9. What do you dislike about school?
 - a. Academically?
 - b. Socially?
- 10. What activities do you do in school? [Build on previous responses, i.e., “You mentioned that you do dance in school. What other activities do you do, if any?”]
- 11. What activities do you do outside of school?
- 12. What’s your favorite extracurricular (sports, music, art, etc.)?
- 13. Do you feel safe at school?
 - a. What makes you feel safe/unsafe?
- 14. Have you ever observed or experienced any bullying at school?
 - a. What did that look like?
 - b. [IF TIME:] What happened between the students?
 - c. [IF TIME:] How did the school respond?
 - d. [IF TIME:] Has that affected your friendships?
- 15. Have you ever observed or experienced racism at your school?
 - a. Can you tell me about that?
 - b. Thank you for sharing that. How did it make you feel?
 - c. How did the school respond?
 - d. Has that affected your friendships?

Post-High School Aspirations and Plans

Now I want to ask about your post-high school plans.

- 16. What are your plans after you finish high school?
 - a. If college, probe for where?

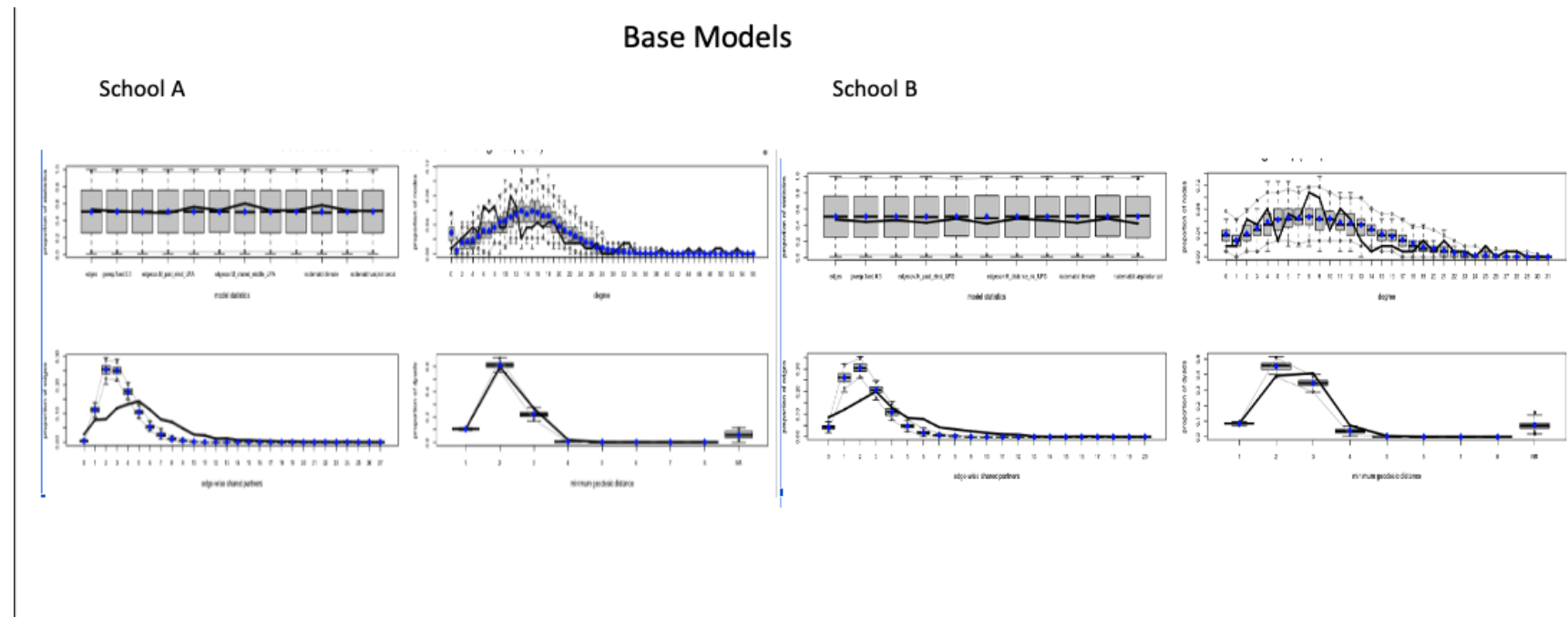
17. What do you think most of your friends plan to do?
 - a. Where?
18. What have your parents or guardians told you about what you should do after high school?
19. Is there anyone else you've talked to or gotten advice from about what you should do after high school? If so, who was that? How did you meet? What did you discuss?

Appendix 2. Codebook: Youth Social Networks and Educational Opportunity

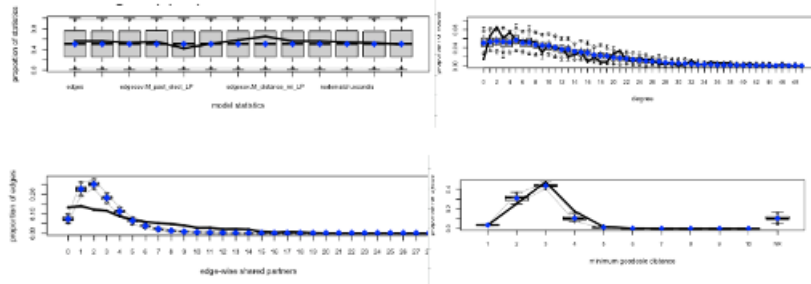
Code	Description	Example Quote
Social Resources and Mechanisms		
Codes related to what resources are “flowing” through networks or the results of network ties. The WHAT of connections		
Information and/or Influence	Information sharing (e.g., school options, college choices, enrollment processes – forms, timing, FAFSA, eligibility, advanced courses, teacher quality, etc.). helping with homework. Peer, family or mentor influence, e.g., shared aspirations, encouragement to join a club	She told me about a school that I could apply to. They encouraged me to go with them to the first meeting of X club. My neighbor is a lawyer and encouraged me to pursue college and law school. My friend’s family took me on a trip.
Financial	Financial, such as providing money for an emergency expense	
In-Kind	Carpooling, providing meals, assistance with filling out paperwork	Sometimes I ride with them to school, so I don’t have to take the bus.
Emotional Support	Care, compassion, and understanding, particularly related to problems	My friend comforted me when I got suspended.
Negative tie	Any negative interactions described	Ex. They bullied me
Type of Connection of Participant		
Codes capturing the nature of the relationship between the participant and the reference individual. The WHO of a tie.		
Family	Familial relationships to the participant. Include anyone they identify as family	I usually lean on my brother when I need help with school.
Friend or peer	Peer who is not a relative (at school or out of school)	My best friend comes over a lot My friends are all XYZ
Other	Any other kind of connection to the participant beyond family and peers	My teacher sometimes gives me advice about X
Spatial Dimension/Location		
Codes to capture the places where connections were formed or occur. Where kids hang out with one another. The WHERE.		
School-based ties	Ties that are formed or strengthened in school (extracurriculars, classes, lunchtime, etc.)	
Ties in classes	Ties formed or strengthened in class	We have a class together Last year we had all the same classes, but this year we take more electives, so I never see him.
Ties in extracurriculars	Ties formed or strengthened in school-based extracurricular activities (e.g., after school)	We are in a play together and see each other in after school rehearsals
Ties formed elsewhere	Ties formed or strengthened at lunch, etc.	We see each other at lunch We see each other at the bus stop
Connections in people’s homes	Ties formed or strengthened at home	My older sister gives me a lot of advice at dinner My friend comes over on Tuesdays to hang out
Other spaces	Other places where ties form or are strengthened (e.g., off campus after school activities, neighborhood, parks, malls)	Every week we go to a park near the school to hang out

Sometimes we just walk around downtown.		
Cross-Connectedness Using the social network survey data, identify whether the tie is cross-class, cross-race, or not. If yes, code all interactions/descriptions of the interaction with this code, in addition to other codes. Or, if the participant mentions that the social class, income, or race/ethnicity of the tie is different, use this code.		
Cross-class tie	All cross-class ties and interactions/content.	
Cross-race tie	All cross-race ties and interactions/content	
Social Tie Drivers and Barriers		
Within School Conditions	Conditions such as school culture, building, policies, or structures in the school promote or limit tie formation or depth. This can also include cultural factors, like bullying, racism, etc. (broader than classes, extracurriculars or seeing one another at lunch - coded above)	Everyone is always on their phones at lunch, and no one talks anymore
Outside School Conditions	Conditions such as distance, school choice, school closures (e.g., COVID) that promote or limit tie formation or depth, including school feeder patterns. (broader than “home” code above)	It seems like people mostly connect on Instagram, so no one goes to each other’s houses anymore We all went to the same middle school, so we knew each other before coming to high school
Other		
Post High School Plans	Career interests, college plans, etc. - anything they say about their future	
Anything else that doesn’t fit above	Always tag with a memo in Dedoose	

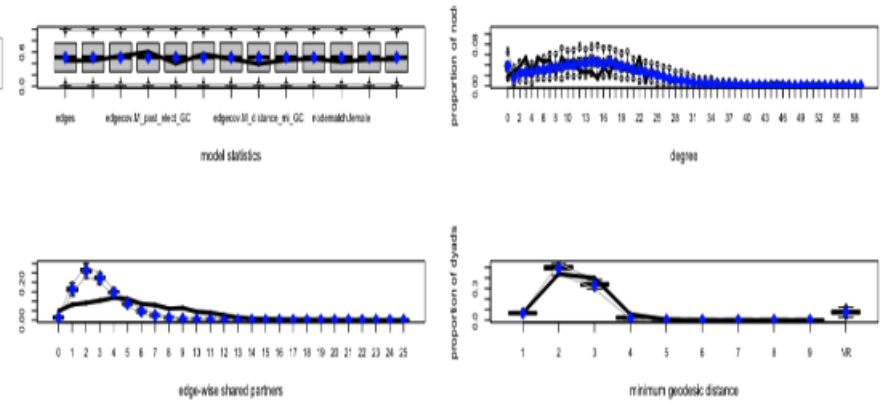
Appendix 3. Plots of ERGM goodness-of-fit statistics across final base models, by school



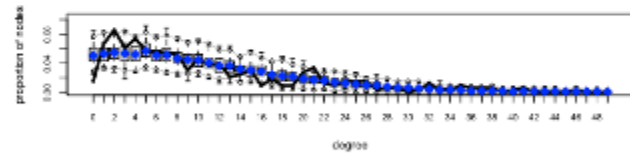
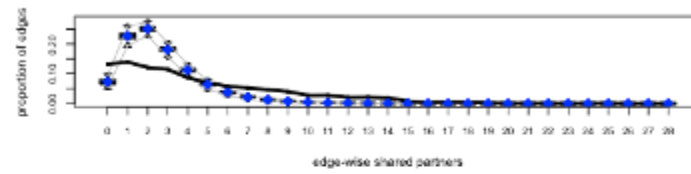
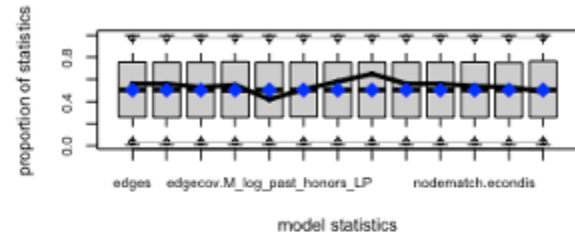
School C



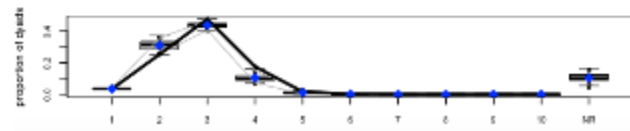
School D



School E



proportion of edges



proportion of statistics

Appendix 4. Student survey results, by school

	A	B	C	D	E
n	120	102	185	288	259
Mean number of friends	8.79	6.72	9.11	9.32	9.98
Mean number of best friends	2.69	2.26	4.15	4.6	3.59
Student aspirations (%)					
High school diploma or less	17.3	18.9	21.1	28	16.2
Some college or associate degree	17.3	13.3	12.7	17.1	7.9
Bachelor's degree	39.8	32.2	37.3	31.1	40.4
Graduate or professional degree	25.5	35.6	28.9	23.8	35.5
Where students met their friends (%)					
In class at school	74.5	75.2	61.2	59.9	56.6
Somewhere else in school	16.1	12.7	10.6	13.9	9.3
In an extracurricular	3	4.7	12.4	12.5	20.1
Outside of school	6.3	7.4	15.9	13.7	14
Where students interact with their friends (%)					
In one of classes	30.6	38.1	25.3	24.9	20.7
Lunch	31	30.1	23.6	25.2	24
In extracurricular	6.4	7.2	10.4	11.5	11.9
Outside school	32	24.6	40.7	38.3	43.4
<i>Been to their home</i>	7.3	4.7	10.6	9.6	11.4
<i>They have been to my home</i>	6.4	4.5	10	8.6	10.5
<i>Somewhere else outside school</i>	18.3	15.4	20.1	20.1	21.5

Appendix Table 5. Chi- Square Test of Extracurricular Type Participation by Economically Disadvantaged Status

Extracurricular type	Non-ED (%)	ED (%)	<i>p</i>
Sports	40.24	49.71	.021*
Arts	21.12	16.29	.131
Academic	6.77	8.00	.573
Civic	39.84	19.43	<.001***
Career	19.52	24.00	.192

† $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Appendix Table 6. School A ERGM Results (Directed), by coefficient (standard error), odds ratio, and p value.

	Model 1: Base			Model 2: Extracurricular X Cross-class Interaction			Model 3: Core X Cross- class Interaction			Model 4: Elective X Cross-class Interaction		
Edges	-	0.0	<0.001	-	0.0	<0.001	-	0.0	<0.001	-	0.0	<0.001
	5.763*			8.174**			8.133**			8.344**		
	**			*			*			*		
	(0.32)			(0.513)			(0.495)			(0.535)		
GWESP	1.893*	6.64	<0.001	2.744**	15.54	<0.001	2.748**	15.61	<0.001	2.758**	15.77	<0.001
	**			*			*			*		
	(0.126)			(0.214)			(0.208)			(0.209)		
Shared Core Courses	0.269*	1.31	<0.001	0.392**	1.48	<0.001	0.447**	1.56	<0.001	0.391**	1.48	<0.001
	**			*			*			*		
	(0.047)			(0.066)			(0.082)			(0.062)		
Shared Elective Courses	0.053*	1.05	0.009	0.060*	1.06	0.033	0.058*	1.06	0.035	0.009	1.01	0.825
	*			(0.028)			(0.028)			(0.04)		
	(0.02)											
Shared Honors	0.131*	1.14	0.02	0.167*	1.18	0.043	0.171*	1.19	0.045	0.168*	1.18	0.045
	(0.056)			(0.083)			(0.085)			(0.084)		
Shared Extracurricu lars	0.448*	1.57	<0.001	0.603**	1.83	<0.001	0.697**	2.01	<0.001	0.705**	2.02	<0.001
	**			*			*			*		
	(0.064)			(0.138)			(0.091)			(0.095)		
Extracurricu lar X Cross- class				0.203	1.22	0.327						
				(0.207)								
Core X Cross-class							-0.115	0.89	0.299			
							(0.11)					

Elective X Cross-class										0.106† (0.062)	1.11	0.087
Shared Middle School	0.110* * (0.036)	1.12	0.002	0.193** * (0.054)	1.21	<0.001	0.198** * (0.055)	1.22	<0.001	0.198** * (0.056)	1.22	<0.001
Residential Distance	0.001 (0.004)	1.0	0.835	0.002 (0.006)	1.0	0.707	0.002 (0.006)	1.0	0.8	0.002 (0.006)	1.0	0.725
Attendance Rate	0.025 (0.161)	1.02	0.879	0.596* (0.258)	1.81	0.021	0.608* (0.252)	1.84	0.016	0.612* (0.266)	1.84	0.021
Gender Homophily	0.348* ** (0.044)	1.42	<0.001	0.521** * (0.058)	1.68	<0.001	0.517** * (0.059)	1.68	<0.001	0.519** * (0.059)	1.68	<0.001
SES Homophily	-0.053 (0.046)	0.95	0.249	-0.039 (0.072)	0.96	0.593	-0.155 (0.103)	0.86	0.13	0.189 (0.162)	1.21	0.243
Postseconda ry Aspiration Homophily	0.130* (0.061)	1.14	0.032	0.127 (0.079)	1.14	0.109	0.130† (0.078)	1.14	0.095	0.126 (0.078)	1.13	0.105

Note. Coefficients are shown with standard errors in parentheses. Odds ratios are exponentiated coefficients. † p < .10, * p < .05, ** p < .01, *** p < .001.

Appendix Table 7. School B ERGM Results (Directed), by coefficient (standard error), odds ratio, and p value.

	Model 1: Base			Model 2: Extracurricular X Cross-class Interaction			Model 3: Core X Cross- class Interaction			Model 4: Elective X Cross-class Interaction		
Edges	- 6.281** * (0.565)	0.0	<0.001	- 6.307** * (0.553)	0.0	<0.001	- 6.321** * (0.589)	0.0	<0.001	- 6.290** * (0.551)	0.0	<0.001
GWESP	1.618** * (0.144)	5.04	<0.001	1.616** * (0.143)	5.03	<0.001	1.623** * (0.14)	5.07	<0.001	1.622** * (0.14)	5.06	<0.001
Shared Core Courses	0.197* (0.092)	1.22	0.032	0.193* (0.094)	1.21	0.04	0.183 (0.112)	1.2	0.102	0.195* (0.094)	1.22	0.039
Shared Elective Courses	0.107** (0.034)	1.11	0.002	0.108** (0.037)	1.11	0.003	0.109** (0.036)	1.12	0.002	0.108** (0.04)	1.11	0.008
Shared Extracurriculars	0.751** * (0.108)	2.12	<0.001	0.765** * (0.144)	2.15	<0.001	0.750** * (0.11)	2.12	<0.001	0.750** * (0.108)	2.12	<0.001
Extracurricular X Cross-class				-0.046 (0.258)	0.96	0.859						
Core X Cross- class							0.032 (0.152)	1.03	0.832			
Elective X Cross-class										0.003 (0.061)	1.0	0.967
Shared Middle School	0.201 (0.123)	1.22	0.103	0.205 (0.127)	1.23	0.107	0.214† (0.129)	1.24	0.096	0.213† (0.128)	1.24	0.095
Residential Distance	0.000 (0.01)	1.0	0.993	0.001 (0.009)	1.0	0.934	0.001 (0.009)	1.0	0.931	0.001 (0.009)	1.0	0.909
Attendance Rate	0.519† (0.302)	1.68	0.086	0.532† (0.293)	1.7	0.07	0.522† (0.31)	1.69	0.092	0.514† (0.292)	1.67	0.079

Gender Homophily	0.511** * (0.08)	1.67	<0.001	0.518** * (0.08)	1.68	<0.001	0.514** * (0.078)	1.67	<0.001	0.518** * (0.079)	1.68	<0.001
SES Homophily	-0.030 (0.08)	0.97	0.705	-0.038 (0.091)	0.96	0.68	-0.007 (0.132)	0.99	0.958	-0.029 (0.152)	0.97	0.849
Postsecondary Aspiration Homophily	0.026 (0.112)	1.03	0.816	0.032 (0.109)	1.03	0.769	0.034 (0.116)	1.03	0.767	0.020 (0.112)	1.02	0.857

Note: B did not have sufficient honors course enrollment. Coefficients are shown with standard errors in parentheses. Odds ratios are exponentiated coefficients. † p < .10, * p < .05, ** p < .01, *** p < .001.

Appendix Table 8. School C ERGM Results (Undirected), by coefficient (standard error), odds ratio, and p value.

	Model 1: Base			Model 2: Extracurricular X Cross-class Interaction			Model 3: Core X Cross-class Interaction			Model 4: Elective X Cross-class Interaction		
Edges	-	0.0	<0.001	-	0.0	<0.001	-	0.0	<0.001	-	0.0	<0.001
	8.402**			8.396**			8.360**			8.397**		
	*			*			*			*		
	(0.329)			(0.338)			(0.332)			(0.345)		
GWESP	1.362**	3.9	<0.001	1.363**	3.91	<0.001	1.402**	4.06	<0.001	1.363**	3.91	<0.001
	*			*			*			*		
	(0.063)			(0.066)			(0.066)			(0.067)		
Shared Core Courses	0.538**	1.71	<0.001	0.536**	1.71	<0.001	0.524**	1.69	<0.001	0.539**	1.71	<0.001
	*			*			*			*		
	(0.046)			(0.046)			(0.052)			(0.045)		
Shared Elective Courses	0.356**	1.43	<0.001	0.355**	1.43	<0.001	0.357**	1.43	<0.001	0.382**	1.47	<0.001
	*			*			*			*		
	(0.026)			(0.025)			(0.024)			(0.03)		
Shared Honors	0.468**	1.6	<0.001	0.485**	1.62	<0.001	0.469**	1.6	<0.001	0.481**	1.62	<0.001
	*			*			*			*		
	(0.065)			(0.069)			(0.066)			(0.066)		
Shared Extracur riculars	1.139**	3.12	<0.001	1.227**	3.41	<0.001	1.133**	3.11	<0.001	1.158**	3.18	<0.001
	*			*			*			*		
	(0.057)			(0.064)			(0.054)			(0.059)		
Extracur ricular X Cross- class				-0.270*	0.76	0.038						
				(0.13)								
Core X Cross- class							0.035	1.04	0.69			
							(0.088)					

Elective X Cross- class										-0.085 (0.056)	0.92	0.134
Shared Middle School	0.251** * (0.051)	1.29	<0.001	0.255** * (0.049)	1.29	<0.001	0.237** * (0.05)	1.27	<0.001	0.252** * (0.052)	1.29	<0.001
Resident ial Distance	-0.002 (0.009)	1.0	0.852	-0.003 (0.009)	1.0	0.771	-0.002 (0.009)	1.0	0.838	-0.002 (0.009)	1.0	0.818
Attendan ce Rate	1.175** * (0.18)	3.24	<0.001	1.205** * (0.184)	3.34	<0.001	1.127** * (0.175)	3.09	<0.001	1.202** * (0.186)	3.33	<0.001
Gender Homoph ily	0.781** * (0.047)	2.18	<0.001	0.782** * (0.047)	2.19	<0.001	0.777** * (0.047)	2.17	<0.001	0.781** * (0.046)	2.18	<0.001
Race Homoph ily	0.428** * (0.045)	1.53	<0.001	0.426** * (0.044)	1.53	<0.001	0.420** * (0.045)	1.52	<0.001	0.427** * (0.044)	1.53	<0.001
SES Homoph ily	0.077 (0.047)	1.08	0.107	0.021 (0.054)	1.02	0.699	0.099 (0.082)	1.1	0.231	0.028 (0.056)	1.03	0.622
Postseco ndary Aspiratio n Homoph ily	0.192** (0.069)	1.21	0.005	-0.019 (0.059)	0.98	0.743	-0.018 (0.059)	0.98	0.758	-0.023 (0.06)	0.98	0.705

Note. Coefficients are shown with standard errors in parentheses. Odds ratios are exponentiated coefficients. † p < .10, * p < .05, ** p < .01, *** p < .001.

Appendix Table 9. School D ERGM Results (Directed), by coefficient (standard error), odds ratio, and p value.

	Model 1: Base			Model 2: Extracurricular X Cross-class Interaction			Model 3: Core X Cross-class Interaction			Model 4: Elective X Cross-class Interaction		
Edges	-	0.0	<0.001	-	0.0	<0.001	-	0.0	<0.001	-	0.0	<0.001
	7.215***			7.181***			7.226***			7.183***		
	(0.402)			(0.39)			(0.405)			(0.4)		
GWESP	2.246***	9.45	<0.001	2.255***	9.53	<0.001	2.248***	9.47	<0.001	2.243***	9.42	<0.001
	(0.122)			(0.12)			(0.121)			(0.119)		
Shared Core Courses	0.402***	1.5	<0.001	0.399***	1.49	<0.001	0.381***	1.46	<0.001	0.403***	1.5	<0.001
	(0.043)			(0.044)			(0.063)			(0.043)		
Shared Elective Courses	0.276***	1.32	<0.001	0.277***	1.32	<0.001	0.275***	1.32	<0.001	0.278***	1.32	<0.001
	(0.031)			(0.031)			(0.031)			(0.043)		
Shared Honors	1.105***	3.02	<0.001	1.120***	3.07	<0.001	1.110***	3.03	<0.001	1.104***	3.02	<0.001
	(0.304)			(0.285)			(0.289)			(0.295)		
Shared Extracurr iculars	1.059***	2.88	<0.001	1.170***	3.22	<0.001	1.051***	2.86	<0.001	1.061***	2.89	<0.001
	(0.06)			(0.079)			(0.061)			(0.061)		
Extracurr icular X Cross- class				-0.276*	0.76	0.031						
				(0.128)								
Core X Cross- class							0.048	1.05	0.611			
							(0.095)					
Elective X Cross- class										-0.003	1.0	0.964
										(0.066)		

Shared Middle School	0.109* (0.046)	1.12	0.017	0.106* (0.047)	1.11	0.024	0.109* (0.046)	1.12	0.019	0.111* (0.045)	1.12	0.013
Residential Distance	-0.031* (0.016)	0.97	0.045	-0.031* (0.016)	0.97	0.047	-0.031† (0.016)	0.97	0.055	-0.032* (0.015)	0.97	0.039
Attendance Rate	0.186 (0.207)	1.2	0.371	0.176 (0.199)	1.19	0.377	0.179 (0.206)	1.2	0.385	0.171 (0.204)	1.19	0.402
Gender Homophily	0.826*** (0.048)	2.28	<0.001	0.822*** (0.049)	2.28	<0.001	0.828*** (0.048)	2.29	<0.001	0.825*** (0.047)	2.28	<0.001
Race Homophily	-0.126** (0.042)	0.88	0.003	-0.123** (0.042)	0.88	0.003	-0.126** (0.042)	0.88	0.003	-0.127** (0.042)	0.88	0.003
SES Homophily	0.129* (0.051)	1.14	0.011	0.089 (0.055)	1.09	0.103	0.163† (0.086)	1.18	0.059	0.129† (0.066)	1.14	0.051
Postsecondary Aspiration Homophily	0.029 (0.062)	1.03	0.642	0.030 (0.06)	1.03	0.623	0.033 (0.063)	1.03	0.597	0.027 (0.061)	1.03	0.655

Note. Coefficients are shown with standard errors in parentheses. Odds ratios are exponentiated coefficients. † p < .10, * p < .05, ** p < .01, *** p < .001.

Appendix Table 10. School E ERGM Results (Undirected), by coefficient (standard error), odds ratio, and p value.

	Model 1: Base			Model 2: Extracurricular X Cross-class Interaction			Model 3: Core X Cross-class Interaction			Model 4: Elective X Cross-class Interaction		
Edges	-	0.0	<0.001	-	0.0	<0.001	-	0.0	<0.001	-	0.0	<0.001
	7.203**			7.239**			7.241**			7.270**		
	*			*			*			*		
	(0.327)			(0.34)			(0.329)			(0.344)		
GWESP	1.420**	4.14	<0.001	1.423**	4.15	<0.001	1.425**	4.16	<0.001	1.423**	4.15	<0.001
	*			*			*			*		
	(0.051)			(0.051)			(0.051)			(0.05)		
Shared Core Courses	0.572**	1.77	<0.001	0.571**	1.77	<0.001	0.605**	1.83	<0.001	0.568**	1.76	<0.001
	*			*			*			*		
	(0.04)			(0.04)			(0.048)			(0.038)		
Shared Elective Courses	0.430**	1.54	<0.001	0.420**	1.52	<0.001	0.424**	1.53	<0.001	0.425**	1.53	<0.001
	*			*			*			*		
	(0.034)			(0.032)			(0.032)			(0.043)		
Shared Honors	-0.134**	0.87	0.005	-0.134**	0.87	0.005	-0.131**	0.88	0.004	-0.134**	0.87	0.003
	(0.048)			(0.048)			(0.046)			(0.046)		
Shared Extracur riculars	1.005**	2.73	<0.001	1.031**	2.8	<0.001	0.997**	2.71	<0.001	1.003**	2.73	<0.001
	*			*			*			*		
	(0.067)			(0.09)			(0.07)			(0.068)		
Extracur ricular X Cross- class				-0.075	0.93	0.628						
				(0.154)								
Core X Cross- class							-0.085	0.92	0.216			
							(0.069)					
Elective X Cross- class										0.003	1.0	0.96
										(0.068)		

Shared Middle School	0.591** * (0.037)	1.81	<0.001	0.590** * (0.036)	1.8	<0.001	0.588** * (0.036)	1.8	<0.001	0.591** * (0.039)	1.81	<0.001
Residential Distance	-0.028** (0.01)	0.97	0.005	-0.027** (0.01)	0.97	0.009	-0.028** (0.01)	0.97	0.005	-0.028** (0.01)	0.97	0.004
Attendance Rate	0.391* (0.176)	1.48	0.026	0.410* (0.182)	1.51	0.024	0.430* (0.173)	1.54	0.013	0.426* (0.183)	1.53	0.02
Gender Homophily	1.041** * (0.047)	2.83	<0.001	1.045** * (0.044)	2.84	<0.001	1.044** * (0.042)	2.84	<0.001	1.044** * (0.046)	2.84	<0.001
Race Homophily	0.311** * (0.038)	1.37	<0.001	0.309** * (0.035)	1.36	<0.001	0.311** * (0.036)	1.36	<0.001	0.306** * (0.036)	1.36	<0.001
SES Homophily	0.117** (0.039)	1.12	0.002	0.111** (0.043)	1.12	0.01	0.057 (0.061)	1.06	0.355	0.125** (0.047)	1.13	0.008
Postsecondary Aspiration Homophily	- 0.322** * (0.052)	0.72	<0.001	- 0.314** * (0.052)	0.73	<0.001	- 0.313** * (0.052)	0.73	<0.001	- 0.316** * (0.053)	0.73	<0.001

Note. Coefficients are shown with standard errors in parentheses. Odds ratios are exponentiated coefficients. † p < .10, * p < .05, ** p < .01, *** p < .001.