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## Tied Together: Adolescent Friendship Networks, Immigrant Status, and Health Outcomes

**Cassie McMillan**

Pennsylvania State University

### Abstract

The current study seeks to further our understanding of the social integration of adolescent immigrants by directly analyzing the composition of their friendship networks. Using statistical network analysis, I first consider whether adolescents are more likely to befriend peers who share their immigrant generation status in a large, diverse sample of seventh through twelfth graders from the National Longitudinal Study of Adolescent and Adult Health ( $n = 67,586$ ). Next, I test whether having a higher proportion of same-generation friends can protect immigrant youth from experiencing negative health outcomes and adopting risky behaviors. Results indicate that adolescents are more likely to form friendships with peers who share their immigrant generation status, and that this tendency is particularly strong for first-generation respondents. Furthermore, immigrant youth with greater proportions of same-generation friends are less likely to report several negative health behaviors and outcomes. My findings suggest that same-generation friendships can serve as a protective mechanism for immigrant youth, which may help explain the existence of an immigrant health paradox.

### Keywords

Adolescent Immigrants; Social Networks; Immigrant Paradox; Smoking; Drunkenness; Depression

### Introduction

During the latter half of the twentieth century, the United States began to receive growing numbers of immigrants who were not only from a greater selection of origin countries, but who also settled in increasingly diverse destination communities (Bohn and Pugatch 2015; Hirschman and Massey 2008; Singer 2004). In response to these demographic trends, scholars, policy makers, and educators have developed a revitalized interest in understanding how migrants are incorporated into their destination societies, as well as the implications of this integration for their general health and well-being. Yet as a result of growing diversity, both in terms of immigrants' individual-level characteristics and the communities where they settle, this task has become increasingly complex (Zhou 1997).

Scholars have long relied on theories of assimilation to better understand the lived experiences of immigrants, and this theoretical discourse has evolved to explain recent migration trends. Gordon's classic assimilation theory (1964) argues that one of the key components of this process is structural incorporation, which occurs when immigrants and their children are integrated into the destination society's social networks, institutions, and organizations. Previous work considers whether immigrants are incorporated into the economic markets and education systems of their destination countries (Alba and Nee 2009; Bean et al. 2003). However, it remains unclear if first-generation migrants, or those born outside of the country where they currently reside, are socially integrated into their receiving country's friendship networks (Brown 2006; Kao and Joyner 2006). Furthermore, it is also unknown whether this integration is associated with positive or negative consequences for individual health and well-being.

I reconsider this debate by first directly measuring the relational patterns of immigrant youth in a large, diverse sample of over one hundred friendship networks from the National Longitudinal Study of Adolescent and Adult Health (Add Health). Friendships are often characterized by homophily on race, gender, and age, meaning that individuals tend to form ties with those with whom they share similar characteristics and attributes (Goodreau et al. 2009; McPherson et al. 2001; Moody 2001). However, to the best of my knowledge, no previous work has rigorously investigated whether these relationships also tend to be homogenous by immigrant generation. Through the implementation of Exponential Random Graph Models (ERGMs), I test whether peers from the same immigrant generation are significantly more likely to form friendships with one another while controlling for other properties that guide friendship formation. High levels of such homophily would suggest that, as the result of exclusion, avoidance, or other barriers, immigrant youth are unlikely to be socially integrated into the networks of their native-born peers.

To better understand the implications of homophily on immigrant generation status, I further consider whether immigrants who report greater proportions of same-generation friends are less likely to report negative health-related outcomes and behaviors. On average, there exists an immigrant health advantage for adolescent migrants and first-generation youth tend to report less participation in delinquency than their native-born peers (Bersani 2014; Cervantes et al. 2013; Gordon-Larsen et al., 2003; Lee and Martinez 2009). Previous work argues this paradoxical advantage exists, in part, because of the communities where immigrants settle (Eschbach et al. 2004; Lee and Liechty 2015), but it remains unclear what aspects of these destinations provide migrants with such protections. Accordingly, I consider a specific mechanism that may help account for the exceptionally positive health of immigrants – the composition of their friendship networks – and test whether having more same-generation friends is positively associated with multiple indicators of well-being. By further understanding which resources help immigrant youth best navigate American society, we will be better equipped to prepare these young people for successful, healthy futures.

## Background

### Homophily and Immigrant Generation Status

According to the principle of homophily, social contact is more likely to be observed among those who are similar than those who are different (McPherson et al. 2001). Homophily characterizes all types of social relationships, including adolescent friendships. Adolescents tend to befriend peers who share their race and gender (Goodreau et al. 2009; Shrum et al. 1988), take similar academic classes (Frank et al. 2013), and are involved in the same extracurricular activities (Schaefer et al. 2011b).

There are several reasons why homophily defines adolescent friendships. First, individuals often have inherent preferences to form ties with similar peers. For instance, people tend to be more effective at communicating with those with whom they share the same attitudes and cultural understandings (Rogers and Bhowmik 1970). At the same time, social ties are more likely to connect those who are physically close and have frequent contact, yet geographic space and social structures segregate individuals based on a variety of characteristics (Mouw and Entwisle 2006). Adolescent tie formation frequently occurs within schools that are structured by grade levels and systems of academic tracking, leading adolescents to spend more time with those of similar ages and levels of ability (Felmlee and Faris 2016; Kubitschek and Hallinan 1998). Taken together, individual preferences and structural factors both explain why we should expect to observe homophily in adolescent friendships.

However, despite overwhelming evidence for adolescent friendship homophily on a variety of attributes, research has yet to consider whether these friendships are also characterized by immigrant generation homophily. In other words, it is unclear whether first-generation immigrants are more likely to befriend first-generation peers and whether second- and later-generation adolescents tend to select friends who share their immigrant generation status.<sup>1</sup> While it has not been their primary aim, some previous work suggests that adolescent friendships tend to be homogenous by immigrant generation. Rosenbloom and Way (2004) collected a sample of interviews from minority students attending a public high school in New York City. The authors point to evidence for intra-ethnic boundaries, particularly between first-generation and later-generation Chinese students. In their interviews, Chinese students drew a clear distinction between foreign- and native-born co-ethnics by pointing to differences in attitude and acculturation. When asked about their friendships, Chinese students reported that they not only tended to befriend other Chinese students, but also held a preference for friends who shared their immigrant generation status. Additionally, there is evidence that American marriages tend to be characterized by homophily on immigrant generation status. While marriages between foreign- and native-born co-ethnics are more common than those that cross ethnic or racial lines, there still exists a strong tendency for American marriages to be endogamous with respect to immigrant generation (Qian and Lichter 2007). Overall, previous research suggests that, in addition to race and ethnicity, immigrant generation status should also serve as a social boundary that governs the formation of adolescent friendships (Hypothesis 1).

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<sup>1</sup>Here, I define second-generation youth as children of at least one foreign-born parent and later-generation adolescents as the children of two native-born parents (following Bersani 2014).

## Implications of Friendship Homophily for Social Integration

In Milton Gordon's *Assimilation in American Life* (1964) he outlines his classic assimilation theory which argues that assimilation is a multi-stage process. The first stage, known as acculturation, occurs when immigrants adopt the cultural patterns of a destination society. This is followed by structural assimilation, which emerges when an immigrant group gains acceptance into the host society's institutions, organizations, and social networks.

According to Gordon's argument, structural assimilation is "the keystone of the arch of assimilation" (Gordon 1964 p. 81). In other words, Gordon posits that after an immigrant group structurally assimilates, the other stages of assimilation, such as intermarriage and the decline of prejudice, will inevitably follow.

Despite the importance of structural assimilation, limited previous work has studied whether immigrants are socially integrated into the networks of their native-born peers (Brown 2006). Some research has considered spatial assimilation as a proxy for social integration, finding that first-generation immigrants are more likely to live in racially segregated neighborhoods than their native-born peers (Iceland and Scopilliti 2008; South et al. 2008). While living in racially diverse neighborhoods could imply increased interaction between immigrants and the native-born, measures of spatial integration often fail to fully capture patterns of social integration and data on social ties can more directly test for these processes (Brown 2006).

However, when studies of social incorporation take advantage of data on relational ties, they tend to only consider how immigrant generation relates to racial homophily. There is overwhelming evidence that racial homophily characterizes all types of social relationships (Goodreau et al. 2009; McPherson et al. 2001) and this tendency is even greater for first-generation immigrants (Brown 2006; Kao and Joyner 2006). However, we should not assume that same-race friendships are an adequate substitute for measuring same-generation friendships. It is entirely plausible, for instance, that a Mexican immigrant would only report friendships with other Hispanics, friendships that would be considered racially homogenous. This information alone does not indicate whether the immigrant's friends are native-born. It is likely that some, if not all, of these friends were born within the United States, a finding that would suggest that the migrant is socially integrating into the friendship networks of their native-born peers.

Motivated by Gordon's notion of structural assimilation, I specifically consider whether the friendship choices of first-generation adolescents are characterized by homophily on immigrant generation. As a result of exclusion, personal preferences, and structural factors (Jiménez 2008; Tsai 2006), I expect that, when compared to native-born youth, first-generation adolescents are more likely to report same-generation friendships (Hypothesis 2). Such a finding would suggest that first-generation respondents are unlikely to be socially integrated into the friendship networks of their native-born peers since most of their relational ties are with fellow migrants. I also expect that, due to boundary blurring (Alba and Nee 2009), the salience of immigrant generation in defining friendship patterns will wane with each passing generation. Boundary blurring occurs when the social distinctions

between groups become increasingly less distinct as a result of frequent, equal-status interactions. For second-, third-, and later-generation youth, immigrant generation is likely to be a less discernible social boundary, and thus, homophily on immigrant generation should play a decreased role in governing their formation of friendships.

### **Immigrant Generation Homophily and the Immigrant Paradox**

Despite being newcomers and having, on average, lower socioeconomic statuses than their native-born peers (Park and Myers 2010), immigrants tend to report higher measures of health, well-being, and prosocial behavior. While much research on this immigrant paradox utilizes samples of adult migrants (e.g., Eschbach et al. 2004; Palloni and Arias 2004; Riosmena et al. 2013; Riosmena et al. 2017), a growing body of work finds that the paradox similarly characterizes the behaviors and outcomes of adolescents. For instance, when compared to their later-generation peers, first-generation youth tend to report lower levels of depression (Cervantes et al. 2013) and are less likely to experiment with alcohol (Bacio et al. 2013) or tobacco (Gordon-Larsen et al., 2003).

Two primary processes account for the immigrant paradox. First, individuals who self-select into migration tend to report exceptionally positive measures of health and low predispositions to delinquency (Beiser et al. 2002; Landale et al. 2000; Martinez et al. 2015; Sampson 2008). Then, after arriving in their destinations, migrants often benefit from sociocultural protections that are provided by the solidarity and social capital of their communities (Eschbach et al. 2004; Lee and Liechty 2015). While scholars have extensively theorized about factors that can help explain the immigrant paradox, they have yet to consider whether migrants' social networks can further elucidate the phenomenon's existence.

Previous empirical work finds that the protective sociocultural factors that adolescent migrants experience in their new communities and schools can help account for their paradoxical outcomes (Bersani et al. 2014; Lee and Liechty 2015). If newcomers settle in migrant communities that promote healthy, prosocial behaviors, this can buffer "negative acculturation," or the adoption of harmful behaviors, such as poor diets, excessive alcohol consumption, and cigarette smoking (Lara et al. 2005; Van Hook et al. 2012). For instance, first-generation Latino adolescents tend to report lower odds of depression when they live in areas with high migrant densities (Lee and Liechty 2015). Immigrant enclaves also buffer the risk of drinking and smoking for some migrant youth (Kulis et al. 2007) and foreign-born adolescents who attend schools with many fellow migrants report lower rates of delinquency (Gieling et al. 2010). Yet other empirical studies find no evidence that migrant communities afford first-generation youth these protective benefits (e.g., Frank et al. 2007).

Part of the reason that previous work yields mixed findings on the role of sociocultural protection in defining the immigrant paradox is that we have a limited understanding of the mechanisms through which this protection can boost immigrant health and well-being (Abraído-Lanza et al. 2005; Lee and Liechty 2015). While migrant and co-ethnic communities promote positive modes of incorporation for immigrant youth (Portes and Rumbaut 1996; 2001), it remains unclear how these communities encourage foreign-born adolescents to abstain from unhealthy, delinquent behaviors. Indeed, spatial research has

found evidence for a positive “barrio advantage” for both adolescent and adult migrants alike (e.g., Cagney et al. 2007; Eschbach et al. 2004; Kimbro 2009; Lee and Liechty 2015). However, these studies are unable to conclude *why* having high proportions of foreign-born neighbors is positively associated with indicators of well-being. For instance, it is unclear if these neighborhoods provide migrant youth with greater social support, offer unique community resources, or simply isolate these adolescents from the negative influences of native-born peers.

The current study seeks to extend our understanding of how sociocultural protection is associated with immigrants’ health-related outcomes by focusing on one potential mechanism: friendships with same-generation peers. For adolescent immigrants, friendships with fellow migrants likely reinforce positive, healthy behaviors. Lee and Zhou (2015) find in their interviews with first- and second-generation Asian American adolescents that individual well-being and success are directly influenced by the cultural frame respondents adopted. The interviewees’ parents immigrated to the United States with what Lee and Zhou term “success frames,” or cultural frames that are characterized by strict definitions of success including high academic achievement and abstinence from delinquency. Similarly, Portes and Zhou (1993) argue that when first-generation Mexicans maintain strong ties to the language and values of their home country, they are often “protected” from the negative influences of their native-born peers. As a result, contact with fellow immigrant peers will likely reinforce the cultural frames of first-generation adolescents and should encourage their participation in prosocial, healthy behaviors.

To better understand the mechanisms through which sociocultural protection can help account for the immigrant paradox, I examine whether immigrant youth with greater proportions of same-generation friends are more likely to report positive health behaviors and outcomes (Hypothesis 3). Furthermore, I test whether same-generation friendships are associated with health benefits for adolescent immigrants while controlling for the generational composition of their schools. Attending a school with more immigrant peers not only offers more opportunities for first-generation adolescents to make same-generation friends, but also situates them in an environment that has been shown to provide sociocultural protection (Eschbach et al. 2004; Gieling et al. 2010; Kimbro 2009; Lee and Liechty 2015). As a result, controlling for the proportion of the student body who identify as first- and second-generation allows me to tease apart whether directly observed friendships are a mechanism that can help account for the existence of a “barrio advantage.”

For my primary analysis, I focus on three health-related behaviors that are shaped by the immigrant paradox: smoking cigarettes, getting drunk, and expressing symptoms of depression. As opposed to other health-related outcomes (e.g., chronic disease or mortality), these three outcomes are relatively common difficulties that adolescents experience in their daily lives (Avenevoli et al. 2008; Cooper et al. 1994; US Dept. of HHS 2012). In sensitivity analyses, I consider five additional health behaviors to increase the generalizability of my findings and include models that test whether Time 1 friendship patterns can predict Time 2 health outcomes.

## Methods

### Data and Sample

This research is based on the National Longitudinal Study of Adolescent and Adult Health (Add Health). Add Health is a multi-wave study that is nationally representative and includes over 90,000 respondents. The first wave was collected in 1994–95 during students' seventh through twelfth grade years and there have since been four follow-up waves. 132 schools were selected for the initial wave of data collection and all students who attended these schools were asked to complete in-school surveys (Bearman et al. 1997).

To construct my measures of friendship, I limit my sample to data collected from the in-school surveys at Wave I of the study. At this wave, all students in each of the 132 schools were asked to nominate their closest friends, allowing for the creation of global friendship networks. Global networks refer to social networks where all actors in the population of interest have the opportunity to participate and can theoretically report friendship ties to any other actor in their network. I exclude certain schools from my final analyses because of their unique structures, including a single-gender school, school with no grade levels, and special-education school ( $n = 3$ ). Since I utilize analytical methods that rely on relatively high within-network response rates, schools with a response rate lower than 75% are also excluded ( $n = 20$ ) (following Moody 2001 and Schaefer et al. 2011b). Finally, I omit schools where the entire student body is third- or later-generation youth ( $n = 2$ ). Due to the extreme homogeneity in these schools, we cannot observe any meaningful homophily on immigrant generation status. My final, primary sample includes 107 of the Add Health schools and 67,586 students.<sup>2</sup>

I also include two sets of sensitivity analyses that rely on additional waves of data from Add Health. In the first set, I use a subsample of 12,869 students who were also selected to participate in the Wave I in-home survey. While the Wave I in-home survey limits my sample size, it asked participants to report on a broader range of behaviors, allowing me to test whether I am capturing a consistent relationship across a variety of health-related outcomes. For the second set of sensitivity analyses, I analyze a further subsample of 9,054 adolescents who participated in the Wave II in-home survey. The second wave of Add Health was collected one year following the first wave of data collection, enabling me to construct measures of Time 2 health outcomes.

### Measures

**Immigrant generation status**—I measure immigrant generation status by using respondents' answers to two survey questions. All students were asked whether they were born in the United States. Those who indicate that they were born outside of the US are coded as first-generation immigrants.<sup>3</sup> Respondents were also asked whether their resident

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<sup>2</sup>There are some minor differences between students in the retained sample compared to those who were omitted. For instance, in the analyzed sample there is a slightly lower proportion of first-generation (8.77%) and second-generation youth (9.84%) than there are among the omitted cases (11.28% and 13.01%, respectively). Yet even in lieu of such differences, omitting these 25 schools is unlikely to substantively bias my findings; if anything, the omission should produce more conservative estimates. This is because schools with higher percentages of first- and second-generation students and lower percentages of whites are *more* likely to exhibit patterns discussed in the Results.

mothers and fathers were born in the United States. Students who were born in the US, but report at least one foreign-born parent are coded as being second-generation (following Bersani 2014).<sup>4</sup> I code native-born respondents with no foreign-born parents as being third-plus generation.

**Friendship**—Respondents were also asked to nominate their five closest male and female friends, allowing each respondent to make up to ten friendship nominations. Because the methods of analysis require global network data, I only consider within-school friendship nominations. Following work by Goodreau et al. (2005) and Schaefer et al. (2011b), I only include reciprocated friendships for my analyses, or those friendships in which each member of the pair nominated one another. Mutual friendships represent stronger and more intimate relationships than unreciprocated social ties (Vaquera and Kao 2008).

To test my third hypothesis regarding the association between immigrant generation homophily and health outcomes, I also construct an individual-level variable that accounts for the proportion of mutual same-generation friendships reported by each respondent. Here, the denominator is a count of the mutual friendships in which the respondent is involved and the numerator is the number of these friendships that are with same-generation peers. To account for the fact that respondents have different numbers of friends, I include two controls: a count variable that measures the number of mutual friends reported by each respondent and a dummy variable that indicates whether the respondent is a friendship isolate (i.e., he or she has no in-school, mutual friendships).

**Health Outcomes**—To better understand the relationship between the generational composition of adolescents' friendship groups and their individual well-being I utilize three dependent variables in my primary analyses: smoking, drunkenness, and depression. Students were asked how often they smoked cigarettes and got drunk in the past 12 months. Since the majority of respondents in my sample abstained from smoking and getting drunk (see Table 1), I code those respondents who report any past-year participation as one and those with no past-year participation as zero (following Adams and Schaefer 2016; Fang et al. 2003; Osgood et al. 2014).<sup>5</sup> I calculate depression scores by averaging students' responses to four survey questions regarding measures of past-month depression.<sup>6</sup> Students' responses to each of the four questions include 0 = *never*, 1 = *rarely*, 2 = *occasionally*, 3 = *often*, and 4 = *every day*. In sensitivity analyses, I include five additional outcomes:

<sup>3</sup>A small proportion (0.60%) of my sample report being born outside of the United States to two US-born parents. In supplemental analysis, I drop these respondents from my sample and observe the same substantive trends reported in the results (analyses available upon request).

<sup>4</sup>In supplemental analysis, I test whether conclusions vary for second-generation respondents with two foreign-born parents and second-generation respondents with one foreign-born parent and one-native born parent. Since I find no significant differences between the two groups (analyses available upon request), I aggregate them to increase my sample size (following Rumbaut 2004).

<sup>5</sup>In supplemental analyses, I consider different measures of respondents' tobacco and alcohol use. These alternative metrics include definitions that are either more problematic (e.g., smokes every day versus smokes less than everyday) or less risky (e.g., had at least one drink in the past year versus had zero drinks). Overall, results are substantively similar (analyses available upon request).

<sup>6</sup>Depression-related survey items were collected by asking respondents "in the last month, how often did you feel depressed or blue," "did you cry a lot," "did you have trouble eating, or a poor appetite," and "did you have trouble falling asleep or staying asleep." Previous research notes that many commonly used survey instruments do not capture equivalent mental health concepts across all racial/ethnic groups and immigrant generations (Perreira et al. 2005). Since my sample is diverse, I consider an alternative version of my depression measure that only contains those survey items in the five-item version of the CES-D (following Perreira et al. 2005). These analyses show the same trends as those presented in the Results (available upon request).



marijuana use, other illicit drug use, self-rated health, obesity, and exercise, as well as dependent variables that capture health behaviors during the second wave of the study. I provide details about the construction of these measures in the Appendix.

**Individual-Level Control Variables**—I include several controls in all my analyses that are associated with both friendship formation and adolescent health behaviors. Since substance use and depression vary by race and ethnicity (Osgood et al. 2015; Riolo et al. 2005), I construct a measure for race by considering students' responses to two questions: one asks about Hispanic ethnicity and the other asks how respondents racially identify. Responses are recoded into five categories: Hispanic (any race), white (non-Hispanic), black (non-Hispanic), Asian/Pacific Islander (non-Hispanic), and other (non-Hispanic). I include controls for gender (1 = *girl*), student's grade level, and parents' highest level of education. Parents' highest level of education is scored as 0 = *less than high school*, 1 = *high school graduate*, 2 = *some college*, and 3 = *bachelor's degree or higher*. If a respondent's parents had differing levels of education, I code the variable as the higher education level. Additionally, I include a binary variable to account for family structure where 1 = *respondent currently lives in a two-parent household*. Since low academic performance tends to be associated with substance use and depression, I also create a measure of respondents' GPA by averaging their self-reported past-year grades in English, math, science, and social studies (1 = *D*, 4 = *A*). Finally, I construct a variety score to control for respondents' delinquency by summing the number of delinquent activity types that each respondent admitted to participating in during the past year (following Sweeten 2012). To create this score, I use students' responses to three questions about delinquent behaviors that do not involve substance use, resulting in a measure that varies from 0 to 3.<sup>7</sup> To account for missing data across all schools, I use multiple imputation (using chained equations) to estimate ten datasets. I utilize all of my independent and dependent variables to inform the missing data model and impute for all missing measures. In my final analyses, I include cases where I imputed on the dependent variable (following Johnson and Young 2011).<sup>8</sup>

**School-Level Variables**—I include two school-level variables to account for the generational composition of each school's student body. One measure indicates the proportion of the student body defined as first-generation and the other measures the proportion defined as second-generation. I also include an indicator for the proportion of the student body that identifies as being a racial minority (i.e., the proportion of students who do not identify as non-Hispanic whites), as well as a count for the number of students that attended each school. Finally, I include two binary controls: one indicates whether a school was public (1 = *public*, 0 = *private* or *Catholic*) and the other notes where each school is located (1 = *urban*, 0 = *suburban* or *rural*) (following Moody 2001).

<sup>7</sup>The delinquency variety score considers three items in which respondents were asked how many times in the past year they lied to their parents, skipped school without an excuse, and got into physical fights.

<sup>8</sup>In analyses not shown here, I estimate my models using the unimputed sample, as well as an imputed sample where I drop those cases with missing data on the dependent variable. Overall, I uncover the same trends as those presented in the results.

## Plan of Analysis: Exponential Random Graph Models

To test for my first and second hypotheses I employ Exponential Random Graph Models (ERGMs), which provide an ideal means to test for various forms of friendship homophily in social networks (Hunter et al. 2008; Robins et al. 2007). ERGMs employ a statistical analysis that compares the dyadic, or pairwise, patterns observed in an actual network to what would be expected by chance. Using Markov chains Monte Carlo (MCMC), ERGMs are fit by a random algorithm that takes a sample of all possible networks drawn from a probability distribution and uses this sample to approximate the true likelihood function (Hunter 2007). In other words, ERGMs can determine whether the network processes observed in an actual network are statistically significantly different from what would be expected to occur randomly. Another benefit of ERGMs is that they allow one to control for endogenous structural processes, including phenomena like the tendency for respondents to nominate their friends' friends (i.e., transitivity). Failing to control for these endogenous processes can bias estimators of friendship homophily by making them artificially high. Finally, unlike traditional statistical models, ERGMs allow one to analyze data at the level of the dyad without violating dependence assumptions (Robins et al. 2007).

Though the underlying estimation procedures are fundamentally different, ERGM parameters can be conceptualized as being similar to the parameters in a logistic regression (Robins et al. 2007). ERGM coefficients can be exponentiated and interpreted like log odds. Since the unit of analysis is the relationship, not the individual, an exponentiated ERGM coefficient estimates how a one unit change for a given indicator relates to the odds that a friendship tie exists between two individuals. More details on the estimation procedures that underlie ERGMs are available in the Appendix.

**Parameters**—I include two types of parameters in my ERGMs: the first relates to structural processes endogenous to the network and the second relates to homophily on specified individual-level attributes. Four of the included parameters account for structural processes. First, the *base log-odds of friendship* parameter accounts for the likelihood that a friendship exists between any two actors in the network and can be understood to serve a similar role as an intercept. I include a parameter to measure *friendship skew* to account for the fact that while most people in my sample report relatively few friends, a small minority have many friends. Finally, the *open triads* and *closed triads* parameters work concurrently to model the tendency for friendships to be transitive. The open triad parameter controls for the necessary preconditions for a transitive friendship to form (e.g., *a* is friends with *b* and *b* is friends with *c*, but *a* and *c* are not friends). The closed triad parameter measures the tendency for triadic closure in open triads (e.g., for a friendship to form between *a* and *c*). Only the closed triad parameter is interpreted when estimating the tendency for triadic closure, but it is necessary to include the open triad parameter to decrease bias (Hunter 2007).<sup>9</sup>

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<sup>9</sup>Base log-odds of friendship refers to the edges parameter, friendship skew is the geometrically weighted degree parameter, open triads is the geometrically weighted dyad-wise parameter, and closed triads is the geometrically weighted edgewise parameter (see Snijders et al. 2006). For all terms that require a decay parameter, I use a weight of 0.25 (following Goodreau et al. 2009 and Schaefer et al. 2011b).

The second type of parameters I include in my ERGMs test for homophily on several individual-level attributes. These ERGM parameters either assume that homophily is uniform or differential. Uniform homophily assumes that the tendency for friendships to form between same-attribute peers is equal across all distinct groups, while differential homophily allows for these tendencies to vary. In the following ERGMs, I test for homophily with regard to immigrant generation status, race, gender, parental education, and grade level. I use both uniform and differential parameters to test for homophily on immigrant generation status, but only uniform parameters to test for homophily on the control variables.

**Meta-Analysis**—ERGMs can only analyze a single network at a time, so it was necessary to run these analyses on each of the 107 networks separately. Of the 107 networks, six were unable to reach convergence or produce adequate goodness of fit statistics and were therefore excluded from the meta-analysis. These six networks have substantially lower levels of heterogeneity on immigrant generation status and race, but are otherwise similar to the 101 networks that reached convergence (see further discussion in Results).

For the 101 networks that reached convergence and produced satisfactory fit statistics, I aggregate the findings from each ERGM by employing a two-level random effects meta-analysis. Following previous work (e.g., Snijders and Baerveldt 2003), I calculate the sample-wide mean for each ERGM coefficient by estimating a random intercept model where I fix the level-one variance to equal the coefficient's squared standard error and the school serves as the second level. This averaging process takes into account the different levels of precision across all models by giving greater weight to those with more precise estimates (Lubbers and Snijders 2007).

### **Plan of Analysis: Multi-Level Models**

To test whether immigrant generation homophily is negatively associated with adolescent health behavior (Hypothesis 3), I estimate multi-level models (MLMs) to account for the nested structure of the data. I construct two-level MLMs where the first level represents the student and the second represents the school. For each of my dependent variables, I estimate separate MLMs using multi-level logistic regression models for each binary outcome and multi-level regression models for continuous measures. Additional details about my modeling strategy are included in the Appendix.

## **Results**

### **Descriptive Results**

While the majority of students in my sample are third or later-generation, there is still a substantial minority of first-generation (8.77%) and second-generation youth (9.84%) (see Table 1). Additionally, there is a fair amount of racial diversity in my sample, with 44.09% of all students identifying with minority racial or ethnic groups. Unsurprisingly, first- and second-generation immigrants are significantly more likely to report Hispanic and Asian ethnicities than the third- and later-generation students in my sample.

Compared to third- and later-generation youth, first- and second-generation adolescents are about twice as likely to have parents who did not complete high school. Additionally, first-generation respondents are significantly more likely to be in advanced grade levels and live outside of two parent homes. Yet even though these characteristics are associated with increased participation in risky health behaviors (Barret & Turner 2005; King et al. 2018), first- and second-generation youth are significantly less likely to report past-year smoking and drunkenness and first-generation youth report significantly lower average depression scores. Taken together, these findings complement prior work that documents an immigrant paradox for the health behaviors of adolescents.

On average, 76.03% of each student's friendships are with peers who share their generation status. To illustrate this tendency, a friendship network from school #77 (i.e., Sunshine High School) is plotted in Fig. 1. On the left of the friendship network, there is a cluster of first-generation immigrants. Several small clusters of second-generation adolescents surround the upper right side of the graph and many third- and later-generation students are situated in the lower right of the network. While immigrant generation homophily characterizes many of the adolescent friendships at Sunshine High School, Fig. 1 suggests that cross-generation friendships are also numerous. For example, there is a cluster of adolescents near the center of the network who also report cross-generation friendships.

## ERGMS

To investigate my descriptive findings further, I use ERGMS to statistically test for homophily on generation status. The first ERGM presented in Table 2 provides statistical evidence for my first hypothesis: immigrant generation homophily characterizes adolescent friendships even after controlling for other, well-established forms of homophily and structural factors. The positive and significant parameter for immigrant generation homophily ( $b = 0.189, p < 0.001$ ) suggests that, after accounting for all controls, respondents are 1.21 times more likely to befriend peers who share their same immigrant generation status than those who do not. The controls I include in the model are also in the expected directions. The parameter for base log-odds of friendship is negative and significant ( $b = -6.398, p < 0.001$ ), reflecting the fact that students tend to be friends with only a small proportion of their peers. Friendship skew is also negative ( $b = -1.544, p < 0.001$ ), highlighting the tendency for respondents to make fewer additional friendship ties as they report greater numbers of friends. Both of the transitivity controls are significant and the positive closed triad parameter gives evidence for a tendency towards transitive friendships ( $b = 1.544, p < 0.001$ ). Finally, I find support for several other types of homophily, including homophily on race, gender, grade, and parents' education status, complementing patterns found in prior literature.<sup>10</sup>

To test whether first-generation immigrants have the strongest tendency to form friendships that are homophilous on immigrant generation (Hypothesis 2), I include a second model that tests for differential homophily on immigrant generation status. As expected, first-generation

<sup>10</sup>As mentioned previously, six schools in my sample were unable to produce adequate fit statistics and were thus excluded from the meta-analyses presented in Table 2. However, supplemental analyses suggest, that homophily on immigrant generation status is also likely to characterize the excluded networks (analyses available upon request).

immigrants have a particularly strong tendency to report friends who share their same generation status ( $b = 0.915, p < 0.001$ ). After accounting for all included controls, a first-generation immigrant is 2.49 times more likely to form a friendship with another first-generation immigrant than they are to befriend a native-born peer. The tendency to report same immigrant generation friends is weaker for second-generation adolescents, but second-generation youth are still significantly more likely to report friends who also have immigrant parents ( $b = 0.652, p < 0.001$ ). Finally, I find evidence for generation homophily among third-plus generation students, but this tendency is minimal ( $b = 0.198, p < 0.001$ ). While homophily on immigrant generation status is most pronounced among first-generation adolescents, it remains a significant predictor of friendship formation for all generations in my sample.

### MLMs

I next test whether friendship homophily on immigrant generation status is associated with smoking, drunkenness, and depression in the full, in-school sample (Hypothesis 3). When respondents of all immigrant generations are considered, there are no significant associations between a respondent's proportion of same-generation friends and their odds of reporting negative health outcomes (see Model 1 in Tables 3, 4, and 5). The coefficient for the proportion of first generation students, however, is negative and significant for all three behaviors. This finding suggests that students who attend schools with high proportions of foreign-born youth tend to report lower rates of smoking, drinking, and depression.

However, as can be seen in the second set of models, same-generation friendships are associated with unique benefits for foreign-born adolescents across all three health outcomes. After controlling for all included variables, immigrant youth who only report first-generation friendships have 18.45% lower odds of reporting past-year smoking ( $b = -0.204, p < 0.05$ ) (see Table 3, Model 2). Even though all first-generation respondents have lower odds of smoking than their later-generation peers ( $b = -0.102, p < 0.05$ ), reporting friendships with other first-generation adolescents is associated with even less risk of using cigarettes. First-generation students who only nominate other immigrants as friends also have a 36.56% lower odds of reporting past-year drunkenness ( $b = -0.455, p < 0.001$ ) (see Table 4, Model 2). Finally, same-generation friendships are significantly associated with lower depression scores for first-generation youth ( $b = -0.095, p < 0.01$ ) (Table 5, Model 2). For example, a first-generation respondent who only befriends fellow migrants is expected to report a depression score that is roughly 0.1 points lower than a first-generation migrant with no foreign-born friends. The association between same generation friendship and the three health behaviors is not statistically significant for second- and third-plus generation respondents (see Fig. 2).<sup>11</sup>

Even though same-generation friendships are significantly associated with better health outcomes for foreign-born youth, there remains a protective association of school contexts

<sup>11</sup>I estimated additional MLMs for each outcome variable that test for differences by race and ethnicity (analyses available by request). I find some evidence that immigrants of certain ethnicities benefit from immigrant generation homophily. Compared to white first-generation youth, first-generation Cubans and Filipinos have even lower odds of smoking when they report larger proportions of same-generation friendships. No other interactions were statistically significant, which suggests that same-generation friendships are associated with healthy behaviors for first-generation youth from all ethnic backgrounds in my sample.

characterized by high proportions of first-generation peers. Students who attend schools with high proportions of first-generation students tend to report lower odds of smoking ( $b = -1.223, p < 0.05$ ), reduced risks of getting drunk ( $b = -1.697, p < 0.05$ ), and decreased depression scores ( $b = -0.338, p < 0.001$ ). For instance, students who attend the school with the highest proportion of first-generation students in my sample (58.6% of the student body) have 51.16% lower odds of smoking, 63.01% lower odds of getting drunk, and are expected to report average depression scores that are 0.23 points lower. Note that these associations hold irrespective of an individual's generation status and the generation statuses of their friends. Overall, these findings suggest that same-generation friendships are likely to explain some, but not all, of the protection migrant youth receive from living and attending school in areas with high densities of first-generation immigrants.

**Sensitivity Analyses**—In sensitivity analyses, I first test whether same-generation friendships are positively associated with a broader range of health behaviors for foreign-born adolescents. I use a subsample of respondents who participated in the in-home survey during Wave 1 of Add Health, which decreases my sample size by roughly 80%, but allows me to consider a wider variety of health-related outcomes and behaviors. Overall, I find that, for first generation adolescents, same-generation friendships are significantly associated with some additional indicators of health and well-being, but not others (see Table 6). After controlling for all included variables, a first-generation respondent who only reports same-generation friends has 57.22% lower odds of reporting previous marijuana usage ( $b = -0.849, p < 0.01$ ), 65.90% lower odds of using other illegal substances ( $b = -1.076, p < 0.05$ ), and 242.47% greater odds of reporting excellent, very good, or good self-rated health ( $b = 1.231, p < 0.05$ ). The protective association of same-generation friendships is not significant, but in the expected direction, for immigrant respondents' rates of obesity ( $b = -0.081, p = 0.754$ ) and participation in at least five bouts of moderate to vigorous physical activity per week ( $b = 0.090, p = 0.587$ ).

Similar to the primary analysis, all of my sensitivity analyses include school-level controls for the proportion of the student body that is foreign-born. As a result, the positive associations between same-generation friendships, abstinence from substance use, and high measures of self-rated health exist beyond this contextual attribute. The school-level indicator for the proportion of the student body that is foreign-born is only significant in the marijuana model ( $b = -2.144, p < 0.01$ ). Regardless of their immigrant generation and friendship patterns, students who attend schools with large proportions of first-generation peers are less likely to report having ever used marijuana.

Additionally, I use a subsample of students who participated in the second wave of Add Health to test whether there are effects of adolescents' Time 1 friendship composition on their Time 2 health outcomes (see Appendix, Table A3). Overall, I find limited support that adolescent immigrants who report same-generation friendships at Time 1 have better health outcomes in the following year. For the first-generation students in my sample, reporting same-generation friends at Time 1 is only significantly associated with lower odds of reporting having ever smoked at Time 2 ( $b = -0.881, p < 0.01$ ). Additionally, the proportion of first-generation students in the Time 1 student body is only significantly related to greater odds of reporting five or more bouts of exercise at Time 2 ( $b = 1.165, p < 0.05$ ). However, it

is important to note that, due to data limitations, these models are unable to consider whether friendships remained intact and school compositions remained constant between the two waves of data.

## Discussion

From analyzing over one hundred different schools included in the Add Health dataset, this study aims to further our understanding of the social integration of adolescent immigrants by rigorously testing for homophily on immigrant generation. Adolescents do not randomly form friendships. Instead, a variety of different preferences, opportunities, and barriers guide the development of these relationships, which often results in the creation of homophilous friendships (Goodreau et al. 2009; McPherson et al. 2001; Schaefer et al. 2011b). The current study highlights a surprisingly understudied form of homophily – homophily on immigrant generation status – and relates this process to the social integration of immigrant youth.

In addition to selecting friendships that are homophilous on a variety of demographic factors, adolescents are more likely to befriend peers who share their same immigrant generation status. While the current study finds evidence for this homophily among first, second, and third-plus generation adolescents, immigrant generation homophily is particularly strong among foreign-born youth. This pattern suggests that generation status is a stark social boundary for adolescent immigrants that plays an important role in structuring their friendship choices. Foreign-born adolescents are significantly more likely to befriend fellow immigrants and this tendency exists even after controlling for a variety of structural and dyadic-level factors. Most notably, immigrant generation homophily exists above and beyond racial homophily, and for first-generation adolescents, the tendency to form friendships with other immigrants is even greater than that towards racial homogeneity. Such a finding is particularly noteworthy since prior research often highlights the strength of racial homophily when compared to homophily on other demographic characteristics (McPherson et al. 2001; Moody 2001).

Individual preferences and structural constraints likely explain why we observe particularly high amounts of same-generation friendships among first-generation immigrants. For instance, adolescents who are immigrants may be excluded from friendships with later-generation peers because of language barriers or discrimination (Gordon 1964; Tsai 2006). Immigrant generation status often operates as a social boundary where first-generation immigrants are more likely to be perceived as different by their later-generation peers (Alba and Nee 2009). Accordingly, native-born adolescents may have an inherent interest to avoid forming friendships that cross nativity boundaries. First-generation immigrant youth would then be left with few friendship options outside of those with fellow immigrants, resulting in particularly homophilous groups of foreign-born friends.

The abundance of same-generation friendships may also be the result of personal preferences among first-generation immigrant youth. It is likely that, when compared to later-generation adolescents, immigrants hold stronger personal preferences for friendships with same-generation peers. For instance, immigrant youth may particularly value

friendships with peers who share similar migration and assimilation experiences or who speak their same native language (Jiménez 2008). This preference would likely attenuate among later-generation adolescents, since their immigrant generation status is less salient to their individual identity (Alba and Nee 2009).

Finally, foreign-born youth may report more same-generation friends because of explicit structural boundaries, such as academic tracking and course taking patterns, which often result in the formation of homophilous friendships (Frank et al. 2013; Lee and Zhou 2015). Adolescents may be encouraged to take different classes based on their immigrant generation status, particularly if they are first-generation. For instance, first-generation immigrants are more likely to be placed in English for Speakers of Other Languages (ESOL) classes than their native-born peers (Tsai 2006). When classrooms are highly segregated by immigrant generation, it shapes students' opportunities to form friendships since individuals are more likely to befriend peers with whom they frequently interact. The analyses of the current study are unable to parse out whether patterns of exclusion, personal preferences, or institutionally created boundaries cause the observed homophily (Goodreau et al. 2009). However, I suspect that all three factors play a role in explaining why we observe more same-generation friendships among the first-generation respondents in my sample.

Additionally, I find evidence that, for foreign-born youth, homophily on immigrant generation is positively associated with six out of eight indicators of health and well-being. In the full, in-school sample, first-generation immigrants are less likely to smoke, have lower odds of getting drunk, and report lower depression scores when they nominate greater proportions of foreign-born friends. Within the in-home subsample, these homophilous friendships are associated with lower rates of using marijuana and other illicit drugs, as well as higher self-rated health. However, friendships with fellow migrants are not significantly associated with lower rates of obesity or inactivity for first-generation respondents.

Homophily on immigrant generation may be beneficial to first-generation adolescents for certain health outcomes, but not others, because of the unique resources provided by these friendships. Pairs of friends who are both first-generation immigrants may have parents who hold similar cultural values and the dyad may speak the same native language, factors which would likely reinforce their adherence to cultural success frames (Lee and Zhou 2015; Portes and Zhou 1993). Since success frames primarily focus around academic achievement and socioeconomic mobility (Lee and Zhou 2015), it is unsurprising that the reinforcement provided by same-generation friends to immigrant youth supports some healthy behaviors more than others. For instance, adolescent substance use is associated with greater risks of high school dropout (Townsend et al. 2007) and can jeopardize adolescents' odds of college acceptance, due in part to the risk of developing a criminal record (Custer 2016). However, evidence for an association between physical activity and academic success has been mixed (Coe et al. 2006; Tremblay et al. 2000). In fact, many schools have cut physical education classes as an effort to increase the academic performance of their students (Coe et al. 2006).

It is important to note that when I uncover positive associations between same generation friendships and healthy behavior, this relationship exists even after controlling for measures of school context, including the proportion of the student body that is foreign-born. Previous



work has argued that migrant youth who settle in communities or attend schools with high proportions of foreign-born peers tend to report positive indicators of health and well-being (Gieling et al. 2010; Lee and Liechty 2015). For first-generation youth, maintaining friendships with same-generation peers is one mechanism that could provide such support since these relationships are associated with lower risks of reporting certain risky health behaviors.

Interestingly, for four of the eight health behaviors considered, the control for proportion of first-generation students remained positive and significant after including individual-level network measures. On the one hand, this result suggests that direct friendships with first-generation peers only partially explain the protective association of living or attending school in dense, migrant enclaves. Additional features of these communities, such as unique services or extracurricular activities, should further elucidate why these environments are associated with certain health benefits. On the other hand, it is important to note that the positive relationship between the proportion of foreign-born students and certain health behaviors characterizes the experiences of all students in my sample, regardless of their generation status or friendship choices. In other words, foreign- and native-born students are expected to experience certain health benefits if they attend schools with higher proportions of first-generation peers. Even when friendships are highly segregated by immigrant generation, there are reasons why we should expect these environments to have a positive impact on adolescent health outcomes. For instance, previous work finds that adolescent smoking, drinking, and depression are highly susceptible to influence from friends (e.g., McMillan et al. 2018; Osgood et al. 2015; Schaefer et al. 2011a). In school networks with large proportions of foreign-born students, it is likely that clusters of first-generation friends help impede the diffusion of these behaviors through the broader network, including to those students with whom they have no direct ties.

In additional sensitivity analyses, I test whether having greater proportions of same-generation friends at Time 1 decreased foreign-born adolescents' participation in risky health behaviors a year later at Time 2. I find that reporting same-generation friendships at Time 1 significantly reduced the Time 2 smoking behaviors of immigrant youth. This trend is noteworthy since previous work argues that immigrants' lower smoking rates account for a substantial portion of their mortality advantage over native-born peers (Blue and Fenelon 2011). However, Time 1 same-generation friendships were not significantly related to the other Time 2 health outcomes of interest.

There are several reasons that could explain why I find strong evidence for an association between same-generation friendships and health outcomes at Time 1, but few significant relationships between Time 1 friendships and Time 2 outcomes. First, it is important to note that, similar to the contemporaneous Time 1 findings, the proportion of same-generation friends reported by an adolescent immigrant at Time 2 is likely associated with multiple healthy, Time 2 outcomes. However, given that global friendship data is only available at the first wave for all but a small minority of schools in my sample, I am unable to test this hypothesis. Second, while it is possible that friend influence remains long-lasting for immigrants' smoking behaviors, foreign-born youth who initially report positive indicators of other health-related behaviors may be more likely to select same-generation friends, or

influence could be more contemporaneous. Detailed longitudinal data on friendship stability is necessary to examine such complex processes. Third, previous work finds that the majority of adolescent friendships last for no longer than one year (Faris and Felmlee 2018). Given that behavior homogeneity and relationship stability are positively correlated (Hafen et al., 2011; McPherson et al. 2001), I highly suspect that adolescent immigrants who took up risky health behaviors between the two time points were more likely to leave behind previous first-generation friends and develop ties to native-born youth. Finally, what we do know from the current project is that, for foreign-born adolescents, having first-generation friendships is significantly associated with a variety of better health outcomes, a relationship that likely derives from both peer influence and friend selection.

There are additional limitations to the current study that should be addressed. First, I was only able to consider within-school friendships. While some adolescents in my sample reported out-of-school friends, the Add Health survey did not collect any data on these individuals. However, it is unlikely that this limitation substantively biases my findings. Other settings where adolescents form friendships, such as their home neighborhoods and extracurricular activities, also tend to be segregated by immigrant generation (Kimbrow 2009; Lee and Zhou 2015). Out-of-school friendships should be particularly homogenous for first-generation youth, since previous work highlights the durability of ties between migrants and friends who remain in origin countries (Verdery et al. 2018). Additionally, the primary analysis of the current study relies on the in-school Add Health data, which did not ask immigrant respondents to report their age when they migrated to the United States. Future research should consider whether patterns of homophily on immigrant generation change as adolescent immigrants spend more time in the host country.

Despite these limitations, the current study makes important contributions to research on the structures of adolescents' social networks, as well as the literature on immigrants' health behaviors and delinquency. I find convincing evidence that homophily on immigrant generation status guides the formation of adolescents' friendships. This tendency is particularly strong for first-generation youth, suggesting that many immigrant adolescents are segregated from the networks of the native-born, which may preclude their social integration. Furthermore, same-generation friendships appear to have certain protective associations for foreign-born youth and, since I find a significant tendency for friendships to be homophilous by immigrant generation, this relationship can help account for the existence of an immigrant health paradox. The current study highlights the importance for schools and co-ethnic communities to continue offering classes and extracurricular activities that specifically cater to first-generation youth. Since institutional structures often shape the formation of friendships (Felmlee et al. 2018; Frank et al. 2013), such programs may help facilitate the development of same-generation social ties and further promote immigrant health. By considering how first-generation youth are embedded in their friendship networks, as well as the consequences of these positions, we can better understand the mechanisms that shape the behaviors and outcomes of adolescent immigrants.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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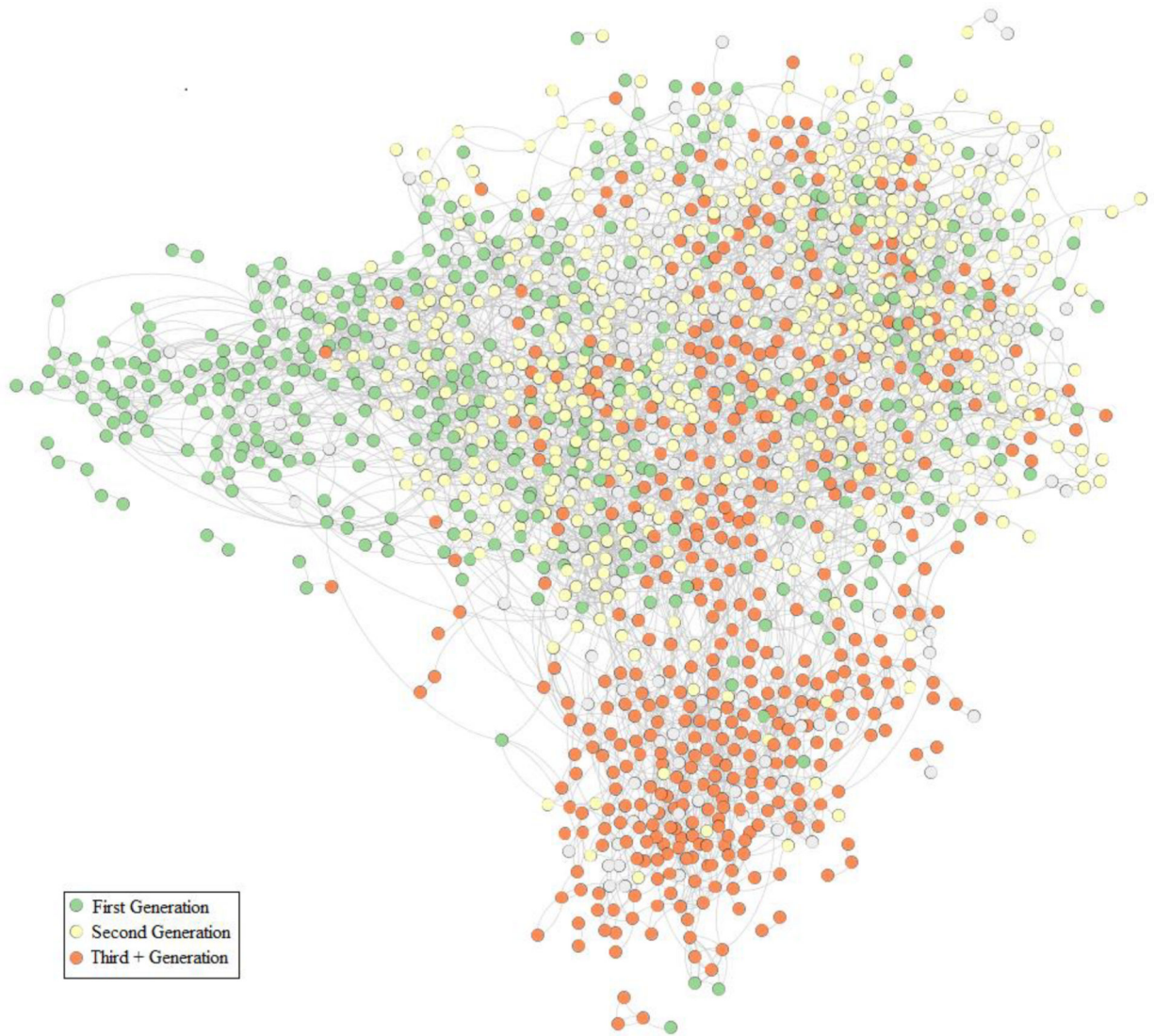
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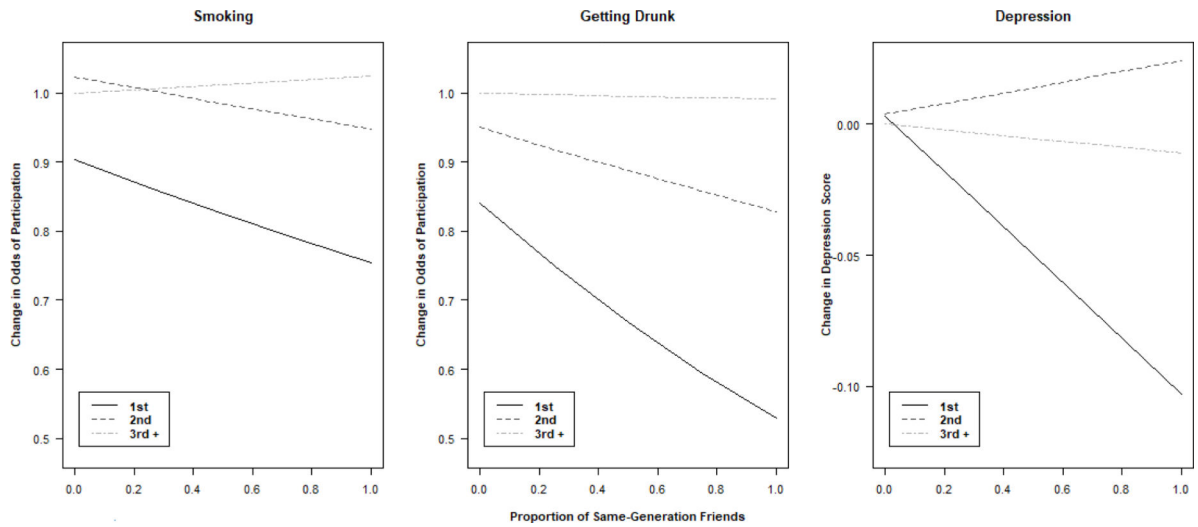
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**Fig. 1.** Friendship network at Sunshine High School by immigrant generation status. Circles represent students and curved lines represent friendships. For the purpose of this illustration, both reciprocated and non-reciprocated friendships have been graphed.





**Fig. 2.** Change in individual odds of reporting smoking, change in odds of getting drunk, and change in depression score by proportion of same-generation friends and immigrant generation. Note that the experiences of second generation respondents are not statistically significantly different from the experiences of third-plus generation respondents (see Tables 3, 4, and 5).

Table 1.

Descriptive statistics (full sample:  $n = 67,586$ )

Individual Level:	All	1st Generation	2nd Generation	3rd + Generation
Smoke in Past Year	33.26%	24.26% *	31.33% *	35.03%
Drunk in Past Year	28.08%	19.82% *	26.04% *	29.70%
Depression Score	0.944 (0.836)	0.879 (0.838)	0.961 (0.844)	0.951 (0.827)
Gender (Girl)	50.39%	48.47% *	51.47%	51.81%
Race/Ethnicity				
White (NH)	53.73%	12.37% *	24.34% *	65.10%
Black (NH)	15.89%	4.40% *	5.04% *	17.61%
Hispanic	15.11%	49.16% *	41.66% *	6.83%
Asian (NH)	4.87%	25.80% *	18.21% *	0.75%
Other Race (NH)	8.22%	6.95% *	9.41% *	8.06%
Missing	2.18%	1.32%	1.35%	1.64%
Grade				
7th	14.83%	9.80% *	14.12%	14.55%
8th	14.28%	9.35% *	13.08% *	14.57%
9th	20.32%	17.88% *	19.42% *	20.92%
10th	18.80%	20.85% *	20.05% *	18.81%
11th	16.42%	20.82% *	17.32%	16.40%
12th	14.51%	19.50% *	15.36% *	14.27%
Missing	0.85%	1.79% *	0.65%	0.48%
Parents' Education				
Less than HS	7.45%	14.88% *	14.85% *	6.02%
HS Graduate	26.26%	15.02% *	21.44% *	30.56%
Some College	15.35%	8.89% *	12.61% *	17.92%
At least Bachelor's	35.11%	32.56% *	37.49%	38.29%
Missing	15.73%	28.65% *	13.60% *	7.22%
Mutual Friends	1.571 (1.716)	1.098 (1.457)	1.464 (1.630)	1.719 (1.761)
Isolates	37.45%	49.65% *	39.33% *	33.39%
GPA	2.801 (0.806)	2.759 (0.826)	2.832 (0.813)	2.826 (0.797)
Delinquency	1.518 (1.126)	1.424 (1.160)	1.571 (1.118)	1.518 (1.115)
Two-Parent Household	70.03%	67.18% *	83.85% *	74.66%
Immigrant Generation				
1st	8.77%			
2nd	9.84%			
3rd and Higher	72.02%			
Missing	9.37%			

<b>Individual Level:</b>	<b>All</b>	<b>1st Generation</b>	<b>2nd Generation</b>	<b>3rd + Generation</b>
<b>School Level:</b>	<b>Mean</b>	<b>SD</b>	<b>Min</b>	
Number of Students	631.64	(480.26)	25	
Prop Minority Students	0.434	(0.297)	0.073	
Public School	81.31%			
Urban	18.69%			
Proportion 1st Gen	0.059	(0.088)	0	
Proportion 2nd Gen	0.081	(0.083)	0	
Proportion 3rd + Gen	0.758	(0.166)	0.074	

Notes:

\* statistically significant differences from third-plus generation respondents according to a two-sample *t*-test ( $p < 0.05$ ).

<sup>†</sup> statistically significant differences from second generation respondents according to a two-sample *t*-test ( $p < 0.05$ ). Standard deviations presented in parentheses.

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**Table 2.**Meta-Analysis of Exponential Random Graph Models ( $n = 101$  networks)

	<b>Model 1</b>			<b>Model 2</b>		
	<b>Est.</b>	<b>SE</b>		<b>Est.</b>	<b>SE</b>	
Base Log-odds of Friendship	-6.398	0.120	***	-6.428	0.117	***
Same Immigrant Gen.	0.189	0.021	***			
Both 1 <sup>st</sup> Gen. <sup>a</sup>				0.915	0.088	***
Both 2 <sup>nd</sup> Gen. <sup>a</sup>				0.652	0.053	***
Both 3 <sup>rd</sup> + Gen.				0.198	0.021	***
Network Structure						
Friendship skew	-1.544	0.042	***	-1.545	0.041	***
Open Triads	-0.315	0.010	***	-0.313	0.010	***
Closed Triads	1.544	0.042	***	1.545	0.041	***
Homophily						
Same Race	0.549	0.044	***	0.555	0.041	***
Same Gender	0.767	0.024	***	0.767	0.023	***
Same Grade	2.107	0.061	***	2.105	0.060	***
Same Parent Educ.	0.233	0.015	***	0.239	0.016	***

Note:

\*\*\*  
 $p < 0.001$ , SE = standard error.

<sup>a</sup>For Model 2, ERGMs were unable to estimate coefficients for differential homophily for first and second-generation youth in networks with low rates of students who ascribed to these categories. As a result, the meta-analysis averages the ERGM coefficients of these parameters for 43 and 59 networks, respectively. In separate meta-analyses, I only average networks with the same coefficients (e.g., networks where homophily coefficients could only be estimated for 2<sup>nd</sup> and 3<sup>rd</sup>+ generation) and identical patterns are observed (analyses available upon request).

**Table 3.**Logistic Multi-Level Model Predicting Students' Smoking ( $n = 67,586$ )

	<b>Model 1</b>		<b>Model 2</b>			
	<b>Coef.</b>	<b>S.E.</b>	<b>Coef.</b>	<b>S.E.</b>		
Proportion of Same Generation Friends	0.002	0.040	0.025	0.042		
First Generation	-0.137	0.043	**	-0.102	0.046	*
1st Gen. × Prop. Same Gen. Friends				-0.204	0.094	*
Second Generation	0.006	0.039		0.023	0.043	
2nd Gen. × Prop. Same Gen. Friends				-0.102	0.095	
Number of Mutual Friends	0.040	0.008	***	0.039	0.008	***
Friendship Isolate	0.132	0.038	**	0.134	0.038	**
Grade	0.109	0.008	***	0.109	0.008	***
Girl	0.279	0.019	***	0.279	0.019	***
Parent's Education	-0.014	0.011		-0.014	0.011	
Black	-0.924	0.039	***	-0.924	0.039	***
Hispanic	-0.169	0.036	***	-0.165	0.036	**
Asian	-0.411	0.059	***	-0.398	0.058	***
Other Race	-0.023	0.034		-0.023	0.034	
GPA	-0.487	0.014	***	-0.487	0.015	***
Delinquency	0.870	0.012	***	0.870	0.012	***
Lives in Two Parent Household	-0.154	0.022	***	-0.154	0.022	***
Number of Students <sup>a</sup>	0.007	0.008		0.007	0.008	
Proportion of Minority Students	-0.014	0.135		-0.014	0.135	
Public School	0.253	0.101	**	0.253	0.101	*
Urban	-0.074	0.092		-0.075	0.092	
Proportion of 1st Generation Students	-1.256	0.609	*	-1.223	0.609	*
Proportion of 2nd Generation Students	-0.186	0.636		-0.174	0.637	
Intercept	-1.795	0.143	***	-1.808	0.143	***
Variance – Level 1	0.108		***	0.108		***

Note:

\*  
 $p < 0.05$ \*\*  
 $p < 0.01$ \*\*\*  
 $p < 0.001$ .

White is the omitted category for race. Third and later-generation is the omitted category for immigrant generation.

<sup>a</sup> Coefficients and standard errors have been multiplied by 100 to ease interpretation.

Table 4.

Logistic Multi-Level Model Predicting Students' Drunkenness ( $n = 67,586$ )

	Model 1		Model 2			
	Coef.	S.E.	Coef.	S.E.		
Proportion of Same Generation Friends	-0.050	0.039	-0.009	0.040		
First Generation	-0.250	0.050	***	-0.173	0.052	**
1st Gen. × Prop. Same Gen. Friends				-0.455	0.105	***
Second Generation	-0.073	0.042		-0.051	0.044	
2nd Gen. × Prop. Same Gen. Friends				-0.128	0.105	
Number of Mutual Friends	0.080	0.008	***	0.078	0.008	***
Friendship Isolate	0.125	0.039	**	0.128	0.039	**
Grade	0.368	0.009	***	0.368	0.009	***
Girl	0.023	0.021		0.023	0.021	
Parent's Education	-0.040	0.012	***	-0.041	0.012	**
Black	-0.632	0.041	***	-0.631	0.041	***
Hispanic	-0.023	0.038		-0.016	0.038	
Asian	-0.775	0.067	***	-0.748	0.068	***
Other Race	0.037	0.038		0.037	0.038	
GPA	-0.355	0.015	***	-0.355	0.015	***
Delinquency	0.989	0.014	***	0.989	0.014	***
Lives in Two Parent Household	-0.255	0.024	***	-0.255	0.024	***
Number of Students <sup>a</sup>	0.013	0.010		0.013	0.010	
Proportion of Minority Students	-0.034	0.158		-0.034	0.158	
Public School	0.187	0.119		0.185	0.119	
Urban	-0.193	0.109		-0.194	0.109	
Proportion of 1st Generation Students	-1.759	0.720	*	-1.697	0.720	*
Proportion of 2nd Generation Students	0.876	0.750		0.888	0.750	
Intercept	-5.058	0.166	***	-5.081	0.166	***
Variance – Level 1	0.151			0.151		***

Note:

\*  
 $p < 0.05$ \*\*  
 $p < 0.01$ \*\*\*  
 $p < 0.001$ .

White is the omitted category for race. Third and later-generation is the omitted category for immigrant generation.

<sup>a</sup> Coefficients and standard errors have been multiplied by 100 to ease interpretation.

Table 5.

Multi-Level Regression Model Predicting Students' Depression ( $n = 67,586$ )

	<b>Model 1</b>		<b>Model 2</b>			
	<b>Coef.</b>	<b>S.E.</b>	<b>Coef.</b>	<b>S.E.</b>		
Proportion of Same Generation Friends	-0.017	0.012	-0.011	0.012		
First Generation	-0.016	0.015	0.003	0.016		
1st Gen. × Prop. Same Gen. Friends			-0.095	0.027	**	
Second Generation	0.008	0.018	0.004	0.015		
2nd Gen. × Prop. Same Gen. Friends			0.031	0.032		
Number of Mutual Friends	0.010	0.003	***	0.009	0.003	**
Friendship Isolate	0.022	0.012		0.021	0.012	
Grade	0.042	0.003	***	0.042	0.003	***
Girl	0.595	0.006	***	0.595	0.006	***
Parent's Education	-0.006	0.004		-0.006	0.004	
Black	-0.171	0.011	***	-0.171	0.011	***
Hispanic	-0.003	0.012		-0.003	0.013	
Asian	0.008	0.018		0.013	0.018	
Other Race	0.091	0.012	***	0.091	0.012	***
GPA	-0.057	0.005	***	-0.057	0.005	***
Delinquency	0.207	0.004	***	0.206	0.004	***
Lives in Two Parent Household	-0.059	0.007	***	-0.059	0.007	***
Number of Students <sup>a</sup>	0.002	0.002		0.002	0.002	
Proportion of Minority Students	-0.084	0.026	**	-0.085	0.026	**
Public School	-0.002	0.019		-0.002	0.019	
Urban	0.009	0.017		0.009	0.017	
Proportion of 1st Generation Students	-0.357	0.107	**	-0.338	0.107	**
Proportion of 2nd Generation Students	0.236	0.116	*	0.229	0.116	
Intercept	0.166	0.036	***	0.164	0.036	***
<i>Variance Components</i>						
Intercept	0.003		***	0.003		***
Level 1	0.571		***	0.571		***

Notes:

\*  $p < 0.05$ \*\*  $p < 0.01$ \*\*\*  $p < 0.001$ .

White is the omitted category for race. Third and later-generation is the omitted category for immigrant generation.

<sup>a</sup>Coefficients and standard errors have been multiplied by 100 to ease interpretation.

**Table 6.**Logistic MLMs for Wave I in-home subsample ( $n = 12,869$ )

	<b>Marijuana</b>	<b>Other Illicit Drugs</b>	<b>Self-Rated Health</b>	<b>Obesity</b>	<b>Exercise</b>
Proportion of Same Generation Friends	-0.038 (0.071)	-0.098 (0.093)	-0.057 (0.127)	0.044 (0.083)	-0.069 (0.062)
First Generation	-0.672 *** (0.117)	-0.567 ** (0.043)	-0.207 (0.203)	-0.431 ** (0.140)	-0.168 (0.093)
1st Gen. × Prop. Same Gen. Friends	-0.849 ** (0.272)	-1.076 * (0.508)	1.231 * (0.530)	-0.081 (0.260)	0.090 (0.165)
Second Generation	-0.312 ** (0.102)	-0.302 * (0.150)	-0.030 (0.175)	-0.046 (0.140)	-0.053 (0.089)
2nd Gen. × Prop. Same Gen. Friends	0.043 (0.182)	-0.089 (0.282)	-0.543 (0.290)	-0.058 (0.212)	0.014 (0.161)
Proportion of 1st Generation Students	-2.144 * (0.946)	-0.835 (1.072)	-0.281 (0.701)	-0.156 (0.658)	0.443 (0.557)
Proportion of 2nd Generation Students	3.547 ** (1.077)	3.261 * (1.327)	1.550 (1.070)	0.250 (0.781)	1.259 (0.675)
Variance – Level 1	0.204 ***	0.214 ***	0.119 *	0.068 ***	0.056 ***

Notes:

\*  
 $p < 0.05$ \*\*  
 $p < 0.01$ \*\*\*  
 $p < 0.001$ .

Coefficients are presented and standard errors are given in parentheses. All models include individual-level controls for grade level, gender, parent's education, race, GPA, delinquency, family structure, and measures of mutual friendship nominations. All models also include school-level controls for number of students, proportion of racial minorities, public schools, and urban environments. To account for missing data across all schools at the individual level, I use multiple imputation (using chained equations) to estimate ten imputed datasets.