Integrators and Coordinators: Native-Immigrant Connectors in Classroom Friendships

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Highlights.

- This article analyzes *integrators* (who connect immigrants and natives), and *coordinators* (who broker within their own group) in classroom friendships
- Integrator positions partly reflects high ego-network diversity despite high levels of network segregation
- Natives and immigrants are equally likely to be integrators
- Among natives, integrators are more open to immigrant cultures than coordinators and non-connectors
- Among immigrants, integrators express stronger national identification than coordinators

Keywords. Friendship networks; Brokerage; Network Position; Immigrant Integration

Abstract. Despite the large sociological literature on the importance of network position, few studies consider how network position can aid or hinder immigrant integration. This study first defines and identifies two types of connectors in networks — *integrators,* who connect between immigrants and natives, and *coordinators,* who connect within their own group — and then analyzes how the attitudes of integrators, coordinators, and non-connectors differ in adolescent classroom networks. Using data on 16,008 students nested in 771 networks, the analyses show that network segregation creates opportunities for being an integrator: individuals who have diverse personal networks despite the broader context of network segregation are more likely to be integrators. Natives and immigrants are equally likely to have a strong integrator position. Among natives, having a stronger integrator position predicts greater acceptance of the cultures of immigrants, whereas having a strong coordinator position predicts the opposite. Among immigrants, integrators tend to express stronger identification with their country of residence, whereas coordinators tend to express weaker identification. Outside of implications for network position, ego-network diversity predicts neither outcomes on identification nor attitudes towards immigrant cultures. Overall, these findings on network connectors help to advance research that extends social networks analyses to understand immigrant immigration.

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1. INTRODUCTION

Understanding the conditions that encourage immigrant integration has become a top priority for social scientists in recent years (Drouhot and Nee 2019; Heath, Jacob, and Richards 2019; Kasinitz et al. 2008; Portes, Aparicio, and Haller 2016). The idea that interpersonal networks can promote integration goes back to classical theory (Gordon 1964), and there is a growing body of empirical findings that supports this idea (Brown 2006; Hagan 1998; Kalter and Kogan 2014; Lancee 2012). Moreover, the broader structure of crosscutting ties between natives and immigrants is likely to enhance the conditions for integration: crosscutting ties can reduce inequality (DiMaggio and Garip 2011), dampen polarization (DellaPosta, Shi, and Macy 2015), and improve intergroup attitudes (Powers and Ellison 1995; Zhou et al. 2019). At the same time, the strong tendency of "birds of a feather to flock together" in networks limits crosscutting ties (Lazarsfeld and Merton 1954; Mcpherson and Smith-Lovin 1987; McPherson, Smith-Lovin, and Cook 2001; Wiertz 2016). This tendency – called homophily – is often present in interpersonal networks between "natives" and immigrants (Leszczensky and Pink 2019; Smith et al. 2016; Van Tubergen and Smith 2018). The prevalence of homophily suggests that individuals who *connect* natives and immigrants within social settings are critical to promoting integration and building successful societies.

Despite the importance of individuals who connect or bridge immigrants and natives within interpersonal networks, scholars have infrequently studied these types of connector positions. Sociologists and social network scholars have long known that it is not just who you are directly connected to that shapes social outcomes but also who your ties are connected to, yet studies of immigrant integration rarely build on this insight. For example, existing studies of immigrant integration show that there are both advantages to immigrants being directly connected to natives (Aguilera 2005; Aguilera and Massey 2003; Brown 2006; Kalter 2011; Kalter and Kogan 2014; Lancee 2012) and advantages of being directly connected to co-ethnics (Amuedo-Dorantes and Mundra 2007; Bankston and Zhou 1995; Chiswick and Miller 1996; Hagan 1998; McMillan 2019), but seldom analyze implications of being in connector positions "*between*" natives and immigrants in networks. Overall, broader insights on network position have so far remained relatively disconnected from the literature on immigrant integration.

In addition, existing studies on networks and integration have a lopsided focus on the ties and characteristics of immigrants. While immigrants are likely to be connectors due to their diverse personal networks, natives could also connect between natives and immigrants — and such native connectors could also play an essential role in the integration process. An asymmetrical understanding of the potential implications of networks for integration is surprising since scholars in general agree that integration is a two-way street that not only depends on the reception of receiving societies (Alba 2005; Modood 2011; Waters 1999), but also impacts natives, and changes receiving societies (Alba and Nee 2003; Jiménez 2017). A few exceptions, in which scholars consider how immigration shapes natives' outcomes, have helped to establish that contact with immigrants is not detrimental to natives' educational attainment (Conger 2015; Hermansen and Birkelund 2015). However, these studies focus on simple social exposure rather than the structure of network ties. They also do not consider the potential link between network position and other key integration outcomes – such as natives' attitudes towards immigrants and their imported cultures.

To address these gaps in the literature, I advance a framework for studying connectors within and between natives and immigrants that is inspired by Gould and Fernandez's (1989) typology of brokers. Specifically, I define and identify two fundamental types of connectors — *integrators* and *coordinators*. *Integrators* connect between immigrants and natives, and *coordinators* connect within their own group (i.e., between natives and natives, or between immigrants and immigrants). I then use this framework to analyze connectors within adolescent classroom friendships. Because school and classroom networks comprise well-defined populations, they are frequently used to analyze network structure (Goodreau, Kitts, and Morris 2009; Leszczensky and Pink 2019; McFarland et al. 2014; Moody 2001; Smith et al. 2016). In addition, friendships in educational contexts are an immensely salient part of adolescent social life (Coleman 1961; Cotterell 2007) with strong implications for a host of adolescent outcomes (Bearman, Moody, and Stovel 2004; Schaefer, Kornienko, and Fox 2011), and later outcomes related to intergroup friendships and intermarriage in adulthood (Emerson, Kimbro, and Yancey 2002; Kao, Joyner, and Balistreri 2019). To study connectors in classroom friendship networks, I use data from the CILS4EU (the Children of Immigrant Longitudinal Survey of Four European Countries) project (Kalter et al. 2016), which is uniquely suited for this study because it contains sociocentric (whole-network) data on classroom friendships, because it stratifies sampling by the immigrant population to ensure sufficient numbers of immigrants to study, and because it contains data on several attitudinal measures of integration.

My analyses show that the combination of network segregation (within sociocentric networks) and network diversity (among direct ties) creates opportunities for being an integrator. Although friendship networks in classrooms are usually small and relatively dense, friendship segregation between natives and immigrants produces a social divide, and thus generates opportunities for certain individuals – integrators – to bridge the gap. In addition, immigrants and natives are equally likely to be integrators, and the implications of being an integrator differ for natives and immigrants. Among natives, integrators are more accepting of the imported cultures of immigrants. Among immigrants, integrators identify more strongly with their country of residence. However, high personal network diversity (having direct ties to many natives and immigrants) does not predict these outcomes, which underscores the distinction between network positions in social settings and the contents of first-order ties. Overall, I anticipate that my strategy for studying connectors in the context of immigrant integration will encourage future research and data projects that synergize studies of social networks and studies of immigration.

2. THEORY AND BACKGROUND

2.1 NETWORK POSITION AND IMMIGRANT INTEGRATION

Existing studies that use interpersonal networks to study immigrant integration seldom analyze individuals' *positions* within the structure of social networks. There is ample discussion on the effects of immigrants' co-ethnic relationships; however, this discussion is based on studies of either direct ties or studies on aggregate contact. Some studies show that co-ethnic networks can increase earnings (Aguilera 2005; Aguilera and Massey 2003), provide informal resources such as job training (Bailey and Waldinger 1991), and form a safety net in the labor market (Kasinitz,

Matsumoto, and Zeltzer-Zubida 2011), especially for recent immigrants (Hagan 1998) or for immigrant groups that are already well established in their destination countries (Kalter and Kogan 2014; Modood 2011). Other studies document a negative effect of co-ethnic contact on forms of integration, such as on mainstream language proficiency, where contact is measured using the relative number of co-ethnics in communities (Van Tubergen and Kalmijn 2009) or ethnic enclaves (Chiswick and Miller 1996; Vervoort, Dagevos, and Flap 2012). These studies predominantly focus on ego-network composition rather than network structure in social settings.

Some scholars speak of the tension between immigrants' "bonding" co-ethnic ties versus their "bridging" ties to natives (Putnam 2000), yet here scholars often equate "bridgingness" with having many direct ties to natives. For example studies argue that bridging ties to natives in Germany (Lancee 2012) and in the Netherlands (Lancee 2010) have positive labor market returns for employment, occupational status, income. Similarly, studies argue that immigrants' bridging ties to natives are critical for immigrants' socioeconomic mobility (Kalter 2011; Kalter and Kogan 2014). Outside of structural outcomes, studies also show that levels of identification with the receiving society are higher among immigrants who have "bridging" ties to natives (Lubbers, Molina, and McCarty 2007; Phinney et al. 2006; De Vroome, Verkuyten, and Martinovic 2014). For example, Lubbers, Molina, and McCarty (2007) find that having more heterogenous personal networks relates to plural definitions of belonging among immigrants. For the most part, these studies base their network analyses on survey questions on direct ties or personal networks, without observing the larger structure of the whole (sociocentric) network.

An exception to this tendency is the growing literature on transnational ties of immigrants who are connected to a distinct set of alters across national borders. For example, Bilecen and Cardona (2018) analyze the joint effects of holding a bridging network position and transnational activities on access to financial resources and receipt of social support – this suggests a specific benefit of bridging across borders but does not explicitly consider a group-specific measure of bridgingness. Similarly, Vacca et al. (2018) observe higher levels of acculturation among immigrants in Spain and Italy whose personal networks span geographic borders and connect otherwise disconnected alters. However, it remains an open question whether bridgingness between immigrants and natives within networks is meaningful in the many contexts in which bridging ties do not cross geographic borders (such as within school settings or other bounded networks and contexts).

Another limitation of existing studies of network position and immigrant integration is that they primarily link networks to immigrants' outcomes and attitudes, without considering implications of native-immigrant ties for natives. With the exception of a few studies that interrogate the potential negative effects of contact with immigrants for natives' educational performance – which have importantly helped to dispel the idea that contact with immigrants hampers the success of natives (Conger 2015; Hermansen and Birkelund 2015) – studies rarely comment on the link between networks (and especially network position) on natives' outcomes. This reflects a tendency among scholars to focus on just one of the two sides involved in immigrants' integration (Antonsich 2012), a surprising oversight since most scholars agree that integration goes in both directions, in which natives and immigrants are both changed in their connections with each other, and in which the context of reception matters for integration (Alba and Nee 2003; DeWind and Kasinitz 1997; Jiménez 2017; Waters 1999). When it comes to

network position, natives who are "between" immigrants and natives may have increased opportunities for cultural adaptivity and translation via their unique access to diverse social information, and may select into their unique network positions due to their openness towards cultural differences. Either way, scholars should not overlook the potential for certain natives to hold connector positions that bridge across "cultural holes" (Pachucki and Breiger 2010).

2.2. INTEGRATORS AND COORDINATORS

In analyzing connector positions between natives and immigrants, I draw from the broader sociological literature on network position and *brokerage.* Brokerage positions are nonredundant connector positions in networks (Freeman 1977, 1979; Gould and Fernandez 1989). The vast literature on brokers, especially in the field of organizational behavior, shows that brokers benefit in many ways, such as in increased job referrals, more favorable peer assessments, and better chances of getting promoted at work (Stovel and Shaw 2012). Brokerage can encourage the receipt and transfer of novel information, especially via exclusive access to diverse sources of information, and can also allow individuals to be less constrained by their ties to better direct the flow of information (Burt 1992, 2004; Goldberg et al. 2016; Gould and Fernandez 1989; Kellogg 2014). Yet brokerage is not without challenges. Within adolescent friendship networks, brokerage can sometimes flag aggression towards other students (Faris and Felmlee 2011) or other negative psychosocial outcomes (Borowski et al. 2017). Within police networks, brokerage predicts higher risk of police violence towards civilians (Zhao and Papachristos 2020). And within firms, brokerage between workers imposes identity-based challenges despite offering information-based benefits (Goldberg et al. 2016).

While this active literature clearly establishes the distinctiveness of brokers, studies of immigrant integration seldom analyze brokers. A few exceptions primarily concern the negative implications of brokerage on social strain and the feeling of being "caught between worlds" (Mollenhorst, Edling, and Rydgren 2015), or the implications of transnational brokerage across borders (Bilecen and Cardona 2018; Vacca et al. 2018). In contrast, studies have not yet examined the potential benefits of native-immigrant brokerage within social settings and in countries of residence. Several studies suggest (but do not test) that positive integration outcomes might be traceable to brokerage. Theories of selective acculturation argue that immigrants benefit in many ways from maintaining ties to a minority community while also assimilating into the mainstream (Friberg 2019; Portes, Fernández-Kelly, and Haller 2009; Portes and Zhou 1993). In *Brokered Boundaries,* Massey and Sánchez (2010) write that members of immigrant families act as translators and interpreters between cultures of origin and cultures of destination, which can catalyze integration, as seen for example, for bilingual immigrant children who take on roles as cultural or linguistic interpreters or translators for their families (Orellana and Bowman 2003; Orellana, Dorner, and Pulido 2003). More generally, these insights build on the relationship between culture and connectivity: brokerage relations between natives and immigrants may imply opportunities for roles and activities that bridge across "cultural holes" (Pachucki and Breiger 2010).

Although these studies offer theoretical intuition on why brokerage might be linked to positive integration outcomes, they do not formally analyze brokerage position. To advance a framework for analyzing connectors between natives and immigrants, I distinguish between two

types of brokers: *integrators* and *coordinators*. I am primarily interested in *integrators*, who I define as individuals who nonredundantly connect natives and immigrants. Integrators are in a position where they are able to help manage and communicate different types of cultural information. This typology builds on the literature on brokerage, which has shown that the effects of brokerage are most salient when they connect individuals from different social groups (Mollenhorst et al. 2015; Neal et al. 2019). As Gould and Fernandez (1989) argue, the implications of brokerage depend on the roles that brokers take on, and this in turn depends on how much brokers differ or are similar to the people they connect.[2] Integrators who connect natives and immigrants are in a different network position and that carries different role-opportunities from other types of brokers (such as *coordinators* who are a kind of broker in which the brokerage relationship is completely internal to a group).

Studying integrators alongside coordinators helps to distinguish the concept of bridging between ethnic groups from the concept of being a connector more generally who bridges a non-ethnic divide. In theory, one could define many more types of brokers beyond just integrators and coordinators, but my main theoretical interest is on native-immigrant connectors, and so I include coordinators primarily to draw a sharp theoretical contrast with integrators. Moreover, studying other types of brokers (such as "itinerants" or "liaisons") presents a set of practical as well as theoretical issues. Compared to coordinators, itinerants — who connect other individuals who are both outside of the connector's group — and liaisons — who connect individuals who are neither in the same group nor in the connector's group (Gould and Fernandez 1989) — are likely to be relatively rare in interpersonal networks due to the prevalence of homophily (Lazarsfeld and Merton 1954; Marsden 1988; McPherson et al. 2001).[3] In fact, to study liaisons, three different types of groups are required and there must be pathways between all three groups. In smaller or more homogenous networks, opportunities for liaison brokerage may never arise.

2.3 THE CASE OF NATIVE-IMMIGRANT CONNECTORS IN ADOLESCENT CLASSROOM FRIENDSHIPS

I analyze integrators and coordinators in a strategic setting, that of adolescent classrooms. Studies of friendships in adolescent schools and classrooms have generated novel insights into a wide range of adolescent behaviors from dating to drinking (Bearman et al. 2004; Kreager and Haynie 2011) and have transformed knowledge on network features, such as homophily (tastes for similarity), which can characterize networks and drive tie formation (Goodreau et al. 2009; Hallinan and Williams 2006; Moody 2001; Zeng and Xie 2008). For example, studies using the case of adolescent friendship networks were integral to establishing the conditions that exacerbate ethnic homophily, and homophily between natives and immigrants (Kruse and Kroneberg 2019; Leszczensky and Pink 2019; Smith et al. 2016; Van Tubergen and Smith 2018).

[2] Gould and Fernandez (1989) differentiate between "gatekeepers" and "representatives." Gatekeepers are individuals to whom members of another group reach out. Representatives themselves reach out to outsiders. I consider both gatekeepers and representatives integrators because both are connectors between groups.

[3] Gould and Fernandez (1989) identify itinerants and liaisons as most relevant to transaction networks. For instance, stockbrokers can be viewed as itinerants and publishing companies can be viewed as liaisons. However, in the case of interpersonal friendship networks, coordinators are the most relevant counterpoint to integrators.

School and classroom settings are also frequently used to study networks because they are well-demarcated — every individual within a bounded social setting has an opportunity to potentially form a tie with every other individual. Data on the whole network can then in theory be collected (using strategies such as a name generator that is given to every student) and this is critical for research on network structure. In addition, adolescence is a formative life stage in which classroom friendships become of increasing significance (Coleman 1961; Cotterell 2007). These friendships have the potential to anchor later relationships across social differences, promoting inclusive attitudes, future friendships, and romantic relationships across ethnic groups (Ellison and Powers 1994; Emerson et al. 2002; Kao et al. 2019).

Nevertheless, having a connector position in the context of schools and classrooms is a less frequently studied phenomenon. A few existing studies provide valuable intuition on the meaning of brokerage in adolescent classrooms. According to Faris and Felmlee (2011), brokerage in schools and classrooms relates to specific communication patterns, experiences, and behaviors. Individuals who sit at the intersection of social circles are likely to have access to different social options after school (among small cliques that have few crossovers), relatively exclusive access to diverse sources of social and personal information, as well as the ability to disseminate this information. In that leisure activities and social information can have a cultural flavor, an extension of these ideas suggests that connecting between natives and immigrants could mark distinctive attitudinal outcomes relevant to immigrant integration.

3. RESEARCH QUESTIONS

In this paper, I first explore the relationship between an integrator position in classroom networks, and related concepts such as diversity within direct ties, as well as the extent of network segregation between natives and immigrants in the classroom network as a whole. Second, I assess whether natives and immigrants differ in their propensity to be integrators, coordinators, and non-connectors. Third, I analyze the relationship between being an integrator in classroom networks and two key attitudinal outcomes and markers of integration: identification with the countries of residence and acceptance of immigrants' imported cultures. This empirical agenda purposefully selects integration outcomes that characterize both natives and immigrants, and does not rule out the possibility that both parties can be integrators.

4. DATA AND METHODS

This research uses the CILS4EU (Kalter et al. 2016), which began in the 2010–2011 school year in England, Germany, the Netherlands, and Sweden.[4] Researchers conducted the CILS4EU sampling in two stages – they first randomly sampled schools stratified by region, school type, school size, and percentage of students with an immigrant background, oversampling schools with many immigrants.[5] Oversampling of schools with immigrants is beneficial to help ensure sufficient numbers of immigrants to be studied.

[4] The survey excludes Bavaria but includes the remaining 15 German states.
[5] Immigrants are defined here to include both first- and second-generation immigrants.

Within selected schools, researchers randomly selected two classrooms of 14-year-old students. The classroom setting is essential in the European school context, where friendships usually form within the classroom, which consists of a group of 10-30 students who move through the school day as a unit across different academic subjects.[6] Then, within selected classrooms, all students were surveyed, with an overall response rate of approximately 85%, on their best friendships. During this survey, students were asked to nominate their best friend and up to five additional best friends from a roster of classmates. This allowed researchers to reproduce *global networks* within the classroom in which all individuals in the population of interest can theoretically report ties to any other individuals in their network.

The analyses of sociocentric data require relatively high participation rates to guard against issues of missing data (Kossinets 2006). A typical cutoff is that at least 75% of the network must have participated in the network survey (Moody 2001; Schaefer, Simpkins, et al. 2011), and participation rates at the student level were approximately 81% here. In the analytic sample, I retain all classroom contexts that are not completely homogenous and that have sufficient networks data (n = 16,008 students, nested in 771 classroom networks).

4.1 MEASURING STRENGTH OF CONNECTOR POSITIONS

I study individuals who are likely in connector roles by analyzing connector positions. In line with Burt (1992), being a connector in this study is only proxied by a strong connector position. Specifically, I use modified measures of betweenness centrality that account for group membership. Broadly defined, betweenness refers to the number of times a node falls on the shortest paths (geodesic distance) between all other possible pairs of individuals in a network (Borgatti and Everett 2006), where a node's betweenness centrality is defined relative to its connected component. In this case, the connected component usually refers to the whole network. Outside of a handful of isolates, most classroom networks did not have a disconnected component.

The betweenness *B(v)* of a focal vertex (node) *v* in a graph *G* with a set of vertices *V* is typically defined as:

$$B(v) = \sum_{s \neq v \neq t \in V} \frac{\sigma_{st}(v)}{\sigma_{st}} \quad (1)$$

where σ_{st} is the total number of shortest paths from vertex *s* to vertex *t* and $\sigma_{st}(v)$ is the number of those paths that go through vertex *v*, with no restrictions on group membership for the vertices involved. However, to distinguish between integrators and coordinators, it is necessary to also account for the group membership of each vertex. Let the group membership of vertex *v* be given by v_g (which can take on two values: immigrant or native).

In this case, for all vertices with nonzero betweenness, I define integrator and coordinator betweenness as follows:

$$B_{integrator}(v) = \sum_{s \neq v \neq t \in V} \frac{\sigma_{st}(v)}{\sigma_{st}}, \text{ for all } s_g \neq t_g \quad (2)$$

$$B_{coordinator}(v) = \sum_{s \neq v \neq t \in V} \frac{\sigma_{st}(v)}{\sigma_{st}}, \text{ for all } s_g = t_g = v_g \quad (3)$$

[6] Prior studies estimate that among adolescents' top 10 best friends in schools, 14% are across classrooms, while 86% are within classrooms (Leszczensky and Pink 2015).

When the focal vertex *v* is never "between" two other eligible vertices for a specific type of betweenness (either because such a tie does not exist or eligible vertices do not exist), then the type of betweenness in question is defined as zero.

For ease of interpretation, the main results scale the above measures by their standard deviation over the full sample (so that a one-unit increase reflects a one standard deviation increase in the overall distribution). In the sensitivity analysis, I measure connector positions in alternate ways. First, to account for potential diminishing marginal effects and skewness, I use log transformed measures rather than scaling by their standard deviations. Second I use k-betweenness, which only considers paths of length k or less (Everett and Valente 2016), and consider short paths (k = 3) to assess sensitivity to the removal of brokerage via longer paths.[7]

4.2 ANALYTIC STRATEGY

First, I predict the strength of connector positions using ordinary least squares regressions. These analyses involve two separate models that predict the strength of integrator and coordinator positions using in-degree centrality, out-degree centrality, ego-network diversity, network segregation, the interaction effect between ego-network diversity and network segregation, classroom diversity, classroom size, country fixed effects, and several demographic characteristics including gender, immigrant status, and parental occupational status, proxied by ISCO-08 combined with ISEI rankings (Ganzeboom, De Graaf, and Treiman 1992).

These analyses define ego-network diversity as the extent to which there are similar numbers of natives and immigrants in individuals' first-order ties, and classroom diversity as the extent to which there are similar numbers of natives and immigrants in classrooms. While this strategy does not capture diversity in its most accurate sense (ethnic heterogeneity), it is the measure of heterogeneity that is most relevant to (and thus necessary to distinguish from) an integrator position that connects between natives and immigrants. Similarly, network segregation is defined by taking the log odds ratio of a group-status (native or immigrant) by friendship-status cross-tabulation.[8]

Second, after accounting for the network characteristics and classroom ecologies that might promote strong connector positions, I use connector positions to predict two attitudinal outcomes: openness towards immigrant cultures and strength of identification with countries of residence. In particular, I analyze agreement with the statement that "the [survey country] people should be open to the customs and traditions of immigrants," with responses on a five-point Likert scale, as well as responses to the question on "how strongly do you feel [survey country member]?" with responses on a four-point Likert scale. In the main results, I use ordinary least squares regressions[9] that predict the attitudinal outcomes using the same set of covariates above, as well as the key covariates, which are the measures on the strength of integrator and

[7] Sensitivity analyses in Table A-1 in the appendix show that results remain substantively similar when using log transformations (Model 2a) or modified 3-betweenness scores (Model 2b).
[8] This measure of network segregation does not mechanically depend on classroom composition (Moody 2001).
[9] Results were robust to alternate specifications. Sensitivity analyses that use ordinal logistic regressions led to substantively similar results (comparing Models 1a and 1b in Appendix Table A-1).

coordinator positions. I conduct these analyses separately for natives and immigrants, and introduce a covariate that accounts for generational status when analyzing the immigrant sample.

5. RESULTS

Figure 1 provides an example of a classroom network on which the analyses are based. Each node in this network represents a student, where white nodes represent immigrants and gray nodes represent natives. Edges represent ties – ties are directional due to unreciprocated friendship nominations.[10]

[Figure 1 About Here]

The node labeled "C," who happens to be a student with a native background, has a strong coordinator position that connects other students with a native background. If node "C" were to be removed, other natives in this network would become more disconnected from each other, or connected through a greater number of steps or longer "path" in the network. In comparison, the node labeled "I" has a strong integrator position in the network. This node happens to be a student with an immigrant background, whose ties help bridge other immigrants and natives in the broader structure of ties: the presence of node "I" in the network shortens the number of steps it takes to go between immigrants and natives in this network.

To describe the conditions that may promote certain connector positions, as well as the individuals that tend to hold such positions, I use two separate ordinary least squares regressions to predict the strength of integrator and coordinator positions. Table 1 shows the results of these analyses. The positive coefficients on in- and out-degree centrality in ego-networks are consistent with the idea that simply having more ties promotes opportunities for any kind of connector position (Models 1 and 2). The more ties individuals have, the more likely it is that some of those ties put them "between" other individuals.

[Table 1 About Here]

Yet while having more ties promotes connector positions, beyond the number of ties, the content and context of ties predict specific types of connector positions, such as the strength of an integrator position. For example, more diverse networks and classrooms appear to promote strong integrator positions (main effects of the two diversity covariates in Model 1), whereas less diverse networks and classrooms appear to promote coordinator brokerage (main effects in Model 2). Outside of individuals' direct connections - network segregation in the overall classroom network may increase opportunities for coordinators who connect within their own group (main effect of network segregation in Model 2), and also increase opportunities for

[10] Proxying friendships using friendship nominations help capture social hierarchies and aspirational friendships (Ball and Newman 2013; Dijkstra et al. 2010; Lee and Butts 2018) that may have real implications for communication flows, social dynamics, and the nature of connector positions. While this oversimplifies the analysis of friendships, which many define as reciprocated (Kitts and Leal 2021), sensitivity analysis show that results are substantively similar when analyzing reciprocated nominations only (Model 3 in Appendix Table A-1).

integrators who have high personal network diversity despite the segregated network structure (interaction effect in Model 1).

The results in Figure 2 elaborate on this interaction between network segregation and ego-network diversity in relation to the strength of integrator positions. Figure 2 shows the predicted strength of an integrator position based on Model 1 in Table 1, varying only ego-network diversity and network segregation (with high and low network segregation defined as being at the top 5th percentile and bottom 5th percentile cut-offs for network segregation respectively), and holding all other covariates at means or modal categories.

[Figure 2 About Here]

Under low network segregation, having a diverse personal network is only slightly associated with a stronger integrator position. Yet under high network segregation, having a more diverse personal network predicts a much stronger integrator position between natives and immigrants in the network. These results illustrate the similarities and differences between the concept of having a strong integrator position and the concept of having a highly diverse personal network. Overall, a connector position in networks is related to having many ties, having diverse ties, having diverse classmates, etc., but is not perfectly encapsulated by any of these concepts. Broader network context and the content of individual ties come together to define opportunities for different kinds of connector positions.

Lastly, connectors within classroom networks show very little demographic differences from non-connectors (net of diversity and network structure). Boys and girls are equally likely to be integrators, coordinators, and non-connectors in the network. Importantly, natives and immigrants are equally likely to be integrators: while natives are more likely to be coordinators that connect within their own group (Model 2), natives and immigrants are equally likely to connect between other natives and immigrants (Model 1). Finally, those with higher SES tend to have slightly weaker integrator positions, and those in German and Dutch classrooms also tend to have weaker integrator positions than their counterparts in England. While some of these demographic differences require further study to unpack, these differences (and in some cases the lack thereof) help shed light on the kinds of individuals that are more likely to be in specific connector positions. Among the key findings are that natives and immigrants are equally likely to be in strong integrator positions.

Having established that (1) a strong integrator position is related to but also distinct from existing network concepts, and (2) that both natives and immigrants can be integrators, I now use integrator positions to predict social attitudes. First, I analyze support for the statement that "the [survey country] people should be open to the customs and traditions of immigrants." The results in Table 2 predict responses to this question separately for natives and immigrants.

[Table 2 About Here]

Connectors, especially native connectors, stand out in their attitudes towards immigrant cultures. For example, native integrators tend to express more support for openness to immigrant cultures than their non-integrator counterparts (Models 1 and 2). In addition, net of being in a

connector position, related covariates do not predict natives' openness to immigrant cultures. There is for example no independent effect of ego-network diversity or network segregation on levels of support for natives' openness to immigrant cultures (Model 2). Turning to the effects of a coordinator position, native coordinators that connect between other natives in the classroom network tend to express less openness to immigrant cultures than non-connectors. To summarize, among natives, being an integrator predicts more openness to immigrant cultures while being a coordinator predicts less openness to immigrant cultures. However, connector positions do not predict immigrants' belief that natives should be open to the customs and traditions of immigrants (Models 3 and 4).

Figure 3 illustrates and summarizes the key patterns that relate connector positions to attitudes towards immigrant cultures by showing predicted levels and 95% CI for the attitudinal outcome, varying connector position and immigrant status. Predictions are based on Model 2 in Table 2. The example in Figure 3 defines integrators as those at the top 5th percentile in the strength of their integrator and coordinator positions, and holds all other covariates at means and modal categories.

[Figure 3 About Here]

These results reinforce the idea that natives' support for immigrant cultures coincide strongly with the type of their connector position. To reiterate, in comparison to native non-connectors, native integrators are significantly more supportive of openness to immigrant cultures, and native coordinators are slightly less supportive of openness to immigrant cultures. When natives form a bridge between other natives and immigrants in classroom friendship nomination networks, they are distinctive in their strong support for openness to immigrant cultures. In contrast, immigrants show strong support for the idea that natives ought to be open to immigrant cultures, regardless of their network position.

The final set of analyses in Table 3 predicts strength of identification with countries of residence using the same set of control covariates as in the prior analyses, and using the strength of integrator and coordinator positions. Results show that connector positions relate to identification among immigrants but not natives. Among immigrants, native-immigrant integrators tend to identify more strongly with their country of residence than coordinators who connect between other immigrants.

[Table 3 About Here]

Here the biggest predictor of identification is unsurprisingly generational status, where first generation immigrants express weaker national identification. Differences between integrators, coordinators, and non-connectors are robust to such generational differences, as well as the other controls (including the number of out-going ties, which is positively associated with identification, and network segregation, which is negatively associated with identification). Network diversity within ego-networks in contrast does not predict identification, which again demonstrates the need to distinguish between ego-network diversity and connector positions.

6. DISCUSSION

While sociologists increasingly use social networks to understand immigrant integration and well-being, prior studies usually focus on either the effects of immigrants' direct ties to natives (Aguilera 2005; Aguilera and Massey 2003; Kalter 2011; Kalter and Kogan 2014; Lancee 2012), or direct ties to co-ethnics (Amuedo-Dorantes and Mundra 2007; Kalter and Kogan 2014; McMillan 2019; Modood 2011). Since studies seldom look beyond direct ties, they do not touch on a salient part of the integration process: the connectors between natives and immigrants within social settings. In extending work on brokerage that primarily originates from the field of organizational behavior (Burt 1992, 2004; Gould and Fernandez 1989; Kellogg 2014; Neal et al. 2019) to analyze immigrant integration, I show that *integrators* — those whose friendships put them "between" natives and immigrants in classroom networks — differ attitudinally from *coordinators*, as well as from those who are not connectors within classroom networks. I recommend that future studies on "bridging" ties should utilize group-specific measures of bridgingness and analyze network structure rather than infer bridgingness between natives and immigrants based on incomplete observations of networks.

Despite a large literature on the tendency for ethnic homophily in networks (Goodreau et al. 2009; Leszczensky and Pink 2019; Moody 2001; Smith et al. 2016; Van Tubergen and Smith 2018), the importance of network position for integration outcomes is seldom scrutinized, and little is known on the implications of having these kinds of network positions, especially in how they related to existing network concepts. I find that a strong integrator position is linked to having a more diverse ego-network despite a broader context in which natives and immigrants have few crosscutting ties. Yet while a strong integrator position reflects both the content of direct ties and the network structure as a whole, the attitudinal implications of holding a strong integrator position are not perfectly encapsulated by ego-network diversity and sociocentric network segregation. Intergroup classroom contact (via classroom composition), network contact in direct networks (in ego-networks), network contact in the context as a whole (network segregation), and network position (as an integrator or coordinator), all have distinct implications for the attitudes studied here. This finding problematizes an oversimplified understanding of the relationship between native-immigrant contact and integration outcomes.

In this study, I analyze the link between an integrator position in networks and attitudinal integration outcomes among both natives and immigrants. This relational approach sharpens scholarly understanding of integration as a two-way process (Alba and Nee 2003; Jiménez 2017; Waters 1999) and avoids a view of integration that too often fixates on the ties and outcomes of immigrants while neglecting the role of natives (Antonsich 2012). My relational framework leads to a crucial set of findings: natives and immigrants are equally likely to be integrators. Both have distinctive characteristics when they are integrators in networks, though these distinctive features of integrators differ between natives and immigrants. Among natives, integrators tend to be more open to the cultures of immigrants than coordinators and non-connectors. Among immigrants, integrators tend to express stronger identification with their countries of residence, compared to coordinators.

Several questions related to brokerage and immigrant integration remain outside the scope of this study, though they provide promising direction for future research. Due to space

constraints and the challenges of changing classroom composition, I do not analyze network formation here. Thus, I do not disentangle the selective qualities about certain people that may lead them to take on integrator roles, from the effects of an integrator role, which may change how people approach the world by directing the flow of social knowledge, which is often imbued with cultural information. Both mechanisms are probable, and future studies should disentangle the two by leveraging strategies for studying network formation (Hunter 2007; Snijders 1996) and network change (Snijders 1996; Steglich, Snijders, and Pearson 2010). In addition, future studies on native-immigrant connectors should broaden both the range of integration outcomes and the range of connector types studied. Here, I focus on just two types of brokers – integrators and coordinators – because my main focus is on integrators who connect natives and immigrants, whereas coordinators are defined strategically to contrast with integrators. Yet future studies should unpack coordinator brokerage as an end to itself. Doing so would likely offer important theoretical and empirical insights, such as into the effects of liaison brokerage between immigrants of different ethnicities or generations. Overall, this paper brings a relational lens to understand immigrant integration and provides a blueprint for importing other network-based insights and methods into the study of immigrant integration.

TABLES AND FIGURES

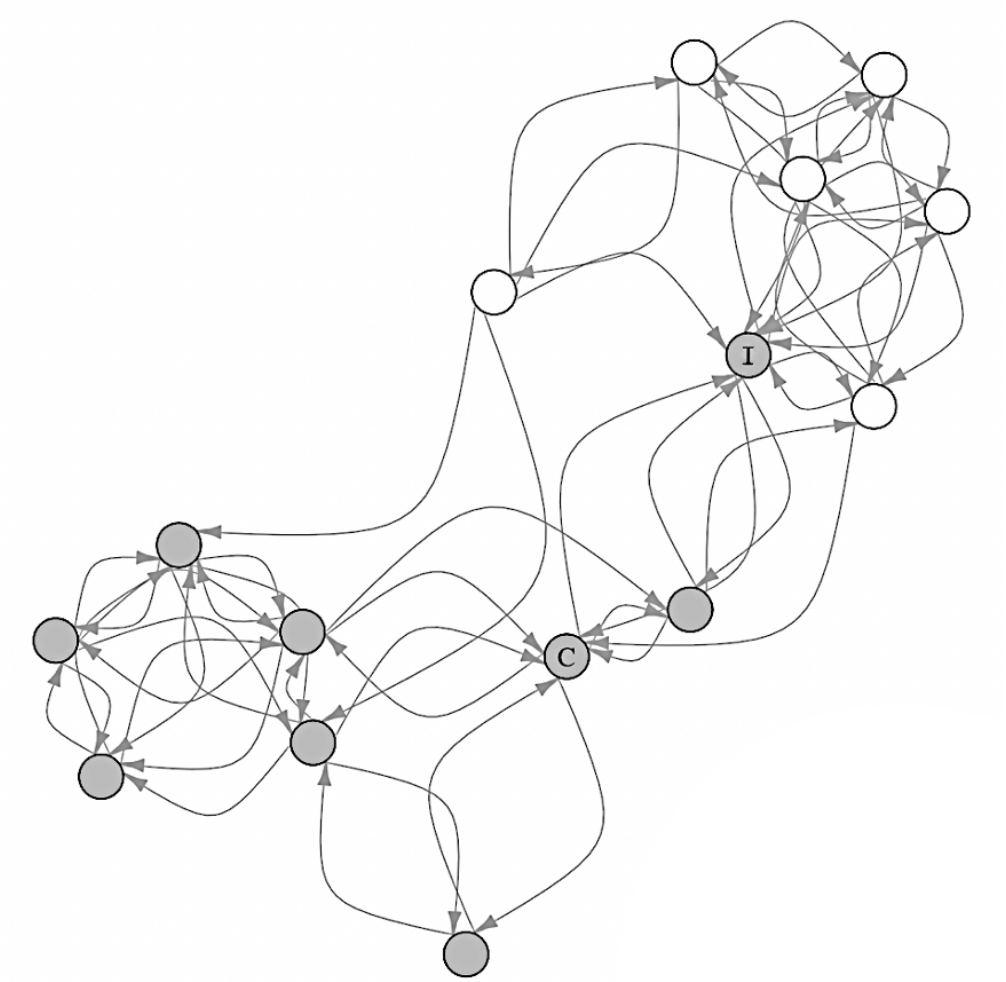

Figure 1. Examples of Connector Types in an Adolescent Friendship Network

Note: Colors of nodes represent native or immigrant status. The labels I and C refer to nodes with strong integrator and coordinator positions, respectively.

Table 1.
The Contextual Conditions and Individual Characteristics that Predict Strength of Integrator and Connector Positions

	Model 1. Integrator Position	Model 2. Coordinator Position
Network Context		
Ego-Network		
In-degree (popularity)	0.12***	0.13***
	(0.00)	(0.00)
Out-degree (sociality)	0.12**	0.11***
	(0.01)	(0.01)
Diversity	0.34***	-0.11***
	(0.03)	(0.03)
Network Segregation	0.02	0.05*
	(0.02)	(0.02)
Ego-Network Diversity x network segregation	0.22***	-0.04
	(0.05)	(0.05)
Classroom Context		
Classroom Diversity	1.69***	-1.45***
	(0.07)	(0.06)
Classroom Size	0.03***	0.03***
	(0.00)	(0.00)
Country (ref: England)		
Germany	-0.01	-0.12***
	(0.02)	(0.02)
Netherlands	-0.05*	-0.18***
	(0.02)	(0.02)
Sweden	-0.15***	-0.22***
	(0.02)	(0.02)
Individual Characteristics		
Gender	0.01	-0.12***
	(0.01)	(0.02)
Immigrant	0.03	-0.17***
	(0.02)	(0.02)
SES	-0.02*	-0.01
	(0.05)	(0.01)

Note: * $p < 0.05$ ** $p < 0.01$ ** $p < 0.001$; n = 16,008 students in 771 classrooms

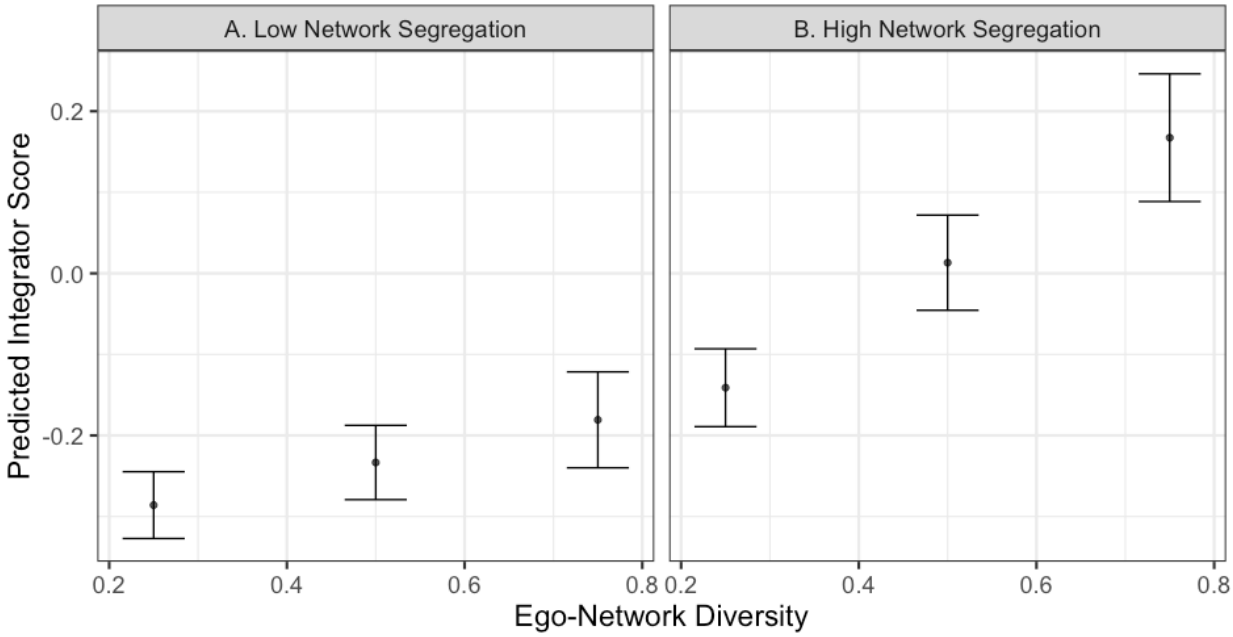

Figure 2. Joint Implications of Ego-Network Diversity and Network Segregation for Strength of Integrator Position

Note: Predictions are based on Model 1 in Table 1, varying only ego-network diversity and network segregation (with high and low network segregation defined at the 5th percentile and bottom 5th percentile cut-offs respectively), and holding all other covariates at means or modal categories. Bars are 95% CI.

Table 2.
Connector Positions and Openness to the Cultures of Immigrants

	Natives		**Immigrants**	
	Model 1	Model 2	Model 3	Model 4
Connector Position				
Integrator	0.12***	0.06***	0.02	-0.01
	(0.01)	(0.02)	(0.01)	(0.02)
Coordinator	-0.06***	-0.03*	0.04	0.04
	(0.01)	(0.02)	(0.02)	(0.02)
Network Characteristics				
In-degree	---	0.00	---	0.01
		(0.01)		(0.01)
Out-degree	---	0.01	---	0.03**
		(0.01)		(0.01)
Diversity (ego-network)	---	0.06	---	0.06
		(0.04)		(0.05)
Network Segregation (sociocentric)	---	-0.03	---	0.04
		(0.02)		(0.03)
Demographic Background				
Girl	---	0.19***	---	0.09**
		(0.02)		(0.03)
SES	---	0.11***	---	0.01
		(0.02)		(0.01)
First Generation	---	---	---	-0.07*
				(0.03)

Note: Models 2 and 4 also control for classroom diversity, classroom size, and country fixed effects; * $p < 0.05$ ** $p < 0.01$ ** $p < 0.001$; n = 16,008 students in 771 classrooms

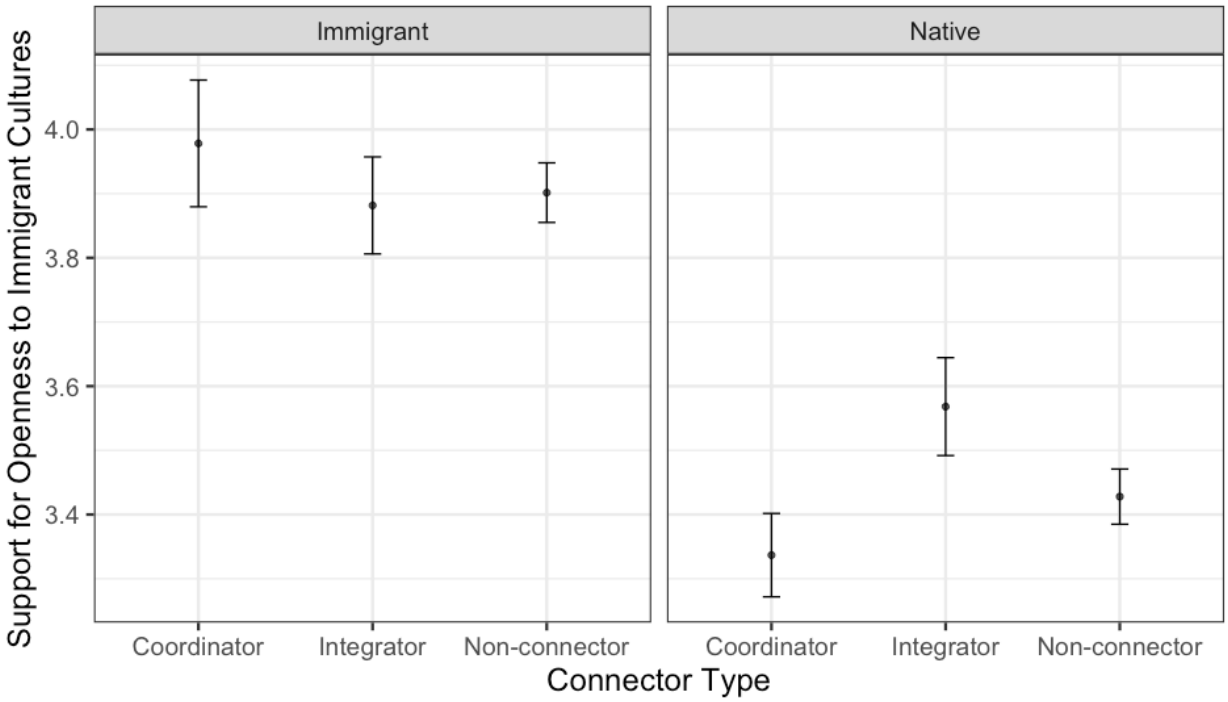

Figure 3. Support for Natives' Openness to Immigrant Cultures by Immigrant Status and Connector Type in Classroom Friendship Networks

Note: Predictions and 95% CI are based on Models 2 and 4 in Table 2, which predict openness to immigrant cultures varying immigrant status and connector status, while holding all other covariates at means or modal categories. In this figure, integrators and connectors are defined as at those in the top 5th percentile in integrator and coordinator positions strength, respectively,

Table 3
Connector Positions and the Strength of National Identification

	Natives		**Immigrants**	
	Model 1	Model 2	Model 3	Model 4
Connector Position				
Integrator	0.02	-0.01	0.01	0.03*
	(0.01)	(0.01)	(0.02)	(0.01)
Coordinator	0.01	-0.00	-0.07***	-0.09***
	(0.01)	(0.01)	(0.02)	(0.02)
Network Characteristics				
In-degree	---	0.00	---	-0.01
		(0.01)		(0.01)
Out-degree	---	-0.00	---	0.03***
		(0.01)		(0.01)
Diversity (ego-network)	---	-0.01	---	-0.06
		(0.03)		(0.04)
Network Segregation (sociocentric)	---	0.03*	---	-0.09***
		(0.01)		(0.02)
Demographic Background				
Girl	---	-0.05***	---	0.06*
		(0.01)		(0.03)
SES	---	0.01	---	0.05***
		(0.01)		(0.01)
First Generation	---	---	---	-0.36***
				(0.03)

Note: Models 2 and 4 also control for classroom diversity, classroom size, and country fixed effects; * $p < 0.05$ ** $p < 0.01$ ** $p < 0.001$; n = 16,008 students in 771 classrooms

APPENDIX

Table A-1
Sensitivity to Model Specification, Measurement of Connector Positions, and Measurement of Friendships

	Natives' Openness	Immigrants' National Identification
1a. Scaled Betweenness (OLS regressions)		
Integrator	0.06***	0.03*
	(0.02)	(0.01)
Coordinator	-0.03*	-0.09***
	(0.02)	(0.02)
1b. Scaled Betweenness (ordinal logistic regressions)		
Integrator	0.11***	0.07*
	(0.03)	(0.03)
Coordinator	-0.07**	-0.21***
	(0.02)	(0.04)
2a. Log-transformation		
Integrator	0.07***	0.06***
	(0.01)	(0.01)
Coordinator	-0.06***	-0.10***
	(0.01)	(0.01)
2b. 3-Betweenness		
Integrator	0.06***	0.04**
	(0.02)	(0.01)
Coordinator	-0.05***	-0.10***
	(0.01)	(0.02)
3: Log-transformation, reciprocated friendships only		
Integrator	0.05**	0.02
	(0.02)	(0.01)
Coordinator	-0.06***	-0.08***
	(0.01)	(0.01)

Note: All models control but do not report the effects of network characteristics, demographic background, classroom diversity, classroom size, and country fixed effects; * $p < 0.05$ ** $p < 0.01$ ** $p < 0.001$;
n = 16,008 students in 771 classrooms

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