

From Superdiversity to Consolidation: Implications of Structural Intersectionality for Interethnic Friendships

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ABSTRACT:

This study advances a theoretical framework of consolidation as a measure of structural intersectionality and applies it to study interethnic friendships in Western European classrooms. Results show far fewer interethnic friendships in more consolidated classrooms (in which students from different ethnic backgrounds also tend to differ in socioeconomic status). This implies that the salience of ethnic boundaries is contingent on the joint configuration of socioeconomic status and ethnicity within social contexts. As populations and social settings are increasingly characterized by multidimensional configurations of attributes that range from superdiversity to consolidation, scholars should analyze multiple axes of differentiation to understand the conditions under which intergroup boundaries are brighter.

INTRODUCTION

Interethnic friendships, especially within school and classroom settings, have the potential to anchor relationships across social differences (Hallinan and Williams 2006; Kao, Joyner, and Balistreri 2019; McFarland et al. 2014). The literature on interethnic friendships has transformed knowledge on the opportunities (Kruse and Kroneberg 2019; Moody 2001; Mouw and Entwisle 2006) and motivations for friendships (Goodreau, Kitts, and Morris 2009; Kossinets and Watts 2009; Zeng and Xie 2008). However, scholars are only beginning to understand the ways in which interethnic friendships depend on the compositional characteristics of social settings, such as diversity or inequality (Moody 2001; Smith et al. 2016). In this paper, I analyze the implications of *consolidation* (a compositional characteristic of social settings that refers to the extent to which multiple attributes are correlated at the context-level) for interethnic classroom

friendships. I also argue that more attention to consolidation is necessary to improve research on ethnic boundaries (Brubaker 2004; Wimmer 2013) as well as any type of social boundary that can be studied using an intersectional lens.

In the process of studying the implications of consolidation for interethnic friendships, I am inspired by intersectional theories in which social attributes “operate not as unitary entities, but as reciprocally constructing phenomena that in turn shape complex social inequalities” (Collins 2015:2). While there are excellent qualitative accounts of intersectionality at the individual level, there are fewer quantitative and structural accounts of intersectionality (McCall 2005). This study helps fill this gap and, thus, deepens analyses of inequality by contributing a framework of consolidation as *structural intersectionality*, which synthesizes theories of intersectionality with the writings of Blau and Schwartz (1984). Blau and Schwartz contribute the concept of consolidation, which they define as the lack of intersection between different attributes (i.e., if most low-status individuals are minorities and most high-status individuals are majorities). However, they focus on how consolidation can make a focal attribute (such as ethnicity) simply a “byproduct” of other attributes (such as socioeconomic status) that affect the outcome additively and independently from the focal attribute (Blau and Schwartz 1984:87; Stark and Flache 2012).¹ This prevents a fully intersectional approach, which considers social attributes jointly rather than additively.

While the framework advanced here is likely to prove useful in many domains outside of the study of interethnic friendships or even ethnic boundaries, I argue that using consolidation to

¹ An implication of this argument is that interaction effects in individual level analyses are sufficient to understand consolidation. For example, some studies consider the separable and individual level implications of various attributes for interethnic friendships in school settings (Kao et al. 2019; Quillian and Campbell 2003; Smith, Maas, and Van Tubergen 2014). However, this does not explain how the correlation of social attributes can accentuate differences between groups at the context-level.

capture structural intersectionality is especially likely to improve studies that center on the salience of ethnic boundaries. There is wide theoretical consensus on the importance of intra-ethnic heterogeneity for the study of ethnic integration (Alba and Nee 2003; Drouhot 2021; Portes and Zhou 1993). Not only are ethnic groups far from internally homogenous blocs (Brubaker 2004; Wimmer 2013), it is increasingly apparent that the extent to which ethnicity is an organizing factor in life is often contingent on other forms of differentiation such as social disadvantage (Wimmer and Soehl 2014). Yet thus far, ideas on boundaries are primarily in the realm of cultural sociology, while measurements of differentiation such as consolidation are primarily used by demographers and computational social scientists – in this study, I bring the two together. I posit consolidation as a measure of the salience of ethnic boundaries, and use this framework to analyze the conditions for interethnic friendships.

While I analyze the effects of several types of consolidation (e.g., consolidation between socioeconomic status and ethnicity, and between religious affiliation and ethnicity), my main focus is on consolidation of ethnicity and socioeconomic status (SES) for several reasons. First, existing empirical studies argue that relative to ethnicity, SES plays only a small role in within-school friendships (Kao et al. 2019; Quillian and Campbell 2003; Smith, Maas, and Van Tubergen 2014) – however these studies have not considered consolidation. Second, ethnic minorities in Western Europe are largely immigrants and children of immigrants whose social mobility is constrained by familial SES, which is often low due to the social origins of families who originally came through guest worker programs (Alba and Foner 2015; Drouhot and Nee 2019). Here a lack of interethnic friendships has particularly negative consequences under consolidation between ethnicity and SES. When resources and opportunities are differentially distributed among groups, and there is also little intergroup mixing, initial inequality is

exacerbated by network externalities (DiMaggio and Garip 2011). Although “ethnic capital”, such as intra-ethnic friendships, can offer a safety net, “bridging” ties to the majority and connections to the mainstream are usually required for upward mobility (Alba and Foner 2015:53, 64; Kalter 2011; Kasinitz, Matsumoto, and Zeltzer-Zubida 2011). Last but not least, consolidation between SES and ethnicity plays a central role in theories of “ethclass” (Gordon 1978), which argues for the joint lens of ethnicity and SES, and may also be relevant to theories of intergroup dynamics (Allport 1954) if it signals challenges to the optimal conditions for intergroup contact.

To study interethnic friendships within classroom settings, I use the first wave of the Children of Immigrants Longitudinal Survey of Four European Countries (CILS4EU), a large-scale survey of 14-year-old students conducted in 2010 in Germany, the Netherlands, Sweden, and England. The CILS4EU is uniquely suited for this study because it provides a stratified random sample of classrooms with many ethnic minorities (Kalter et al. 2016). This is critical since other datasets are often too homogenous to study intergroup dynamics (Wimmer and Lewis 2010:598). The CILS4EU also contains information on nearly all possible friendships within each classroom. This improves measurement of ethnic homophily, defined as the extent to which levels of intra-ethnic friendships exceed expectations based on chance and the observed structure of ties (Goodreau et al. 2009; Kossinets and Watts 2009; McFarland et al. 2014; Smith et al. 2016).

I find that interethnic friendships are less common in more *consolidated* classrooms (in which students who differ in ethnicity also tend to differ in SES) and more prevalent in classrooms that are in a sense *superdiverse* (they contain students of many different combinations of SES and ethnicity). Using exponential random graph models (ERGMs) (Hunter

and Handcock 2006; McFarland et al. 2014; Smith et al. 2016; Snijders and Baerveldt 2003), I show that ethnic homophily is particularly high in classrooms where students differ in terms of both ethnicity and SES, net SES-homophily and other explanations for friendships. Findings support long-standing theories of integration and intersectionality in a new way—they show that the intersection of SES and ethnicity has greater implications for interethnic friendships than existing empirical research suggests (Kao et al. 2019; Quillian and Campbell 2003; Smith, Maas, and Van Tubergen 2014). While consolidated contexts create a “perfect storm” of conditions that amplifies ethnic distinctions, superdiverse contexts could facilitate ethnic integration.

Beyond friendships in educational settings, the strategy that I use in this paper should also change how scholars study the joint and contextual implications of multiple characteristics in any setting in which there is data on the composition of contexts. Consolidation is likely to be increasingly pertinent to scholars and policy-makers as schools, communities, and societies diversify in different ways (Castles and Miller 2013). In postindustrial societies, some populations and groups become superdiverse, apparent, for example, from the increased representation of different combinations of ethnicity and SES (Meissner 2015; Vertovec 2007). In contrast, other populations and groups are consolidated rather than superdiverse, due to rising levels of inequality in the world (Alba and Foner 2015:47–49), combined with durable ethnic stratification (Bonilla-Silva 1997; Heath, Rethon, and Kilpi 2008; Schnepf 2007; Telles and Ortiz 2008). When populations are diverse in different ways, consolidation rather than unidimensional diversity may hold the key to explaining divergent integration outcomes.

STRUCTURAL INTERSECTIONALITY AND ETHNIC BOUNDARIES

Social categories have implications that are greater than the sum of their parts. The idea of a joint impact of two or more social attributes on social dynamics is familiar to feminist scholars of

intersectionality (McCall 2005). For example, the experience of being a black woman is not the sum of average experiences of being black and being a woman (Crenshaw 1989). Warikoo and Carter (2009:381) note that contemporary studies on the implications of race and ethnicity in school settings often rely on additive (noninteractive) models that ignore the joint configuration of race or ethnicity with other attributes, such as SES. I am, in a sense, arguing for an intersectional approach to studying classroom friendships: differing in SES and ethnicity is not the sum of differing in SES and differing in ethnicity.

However, this study also stands out from other studies that use intersectional approaches because it underscores intersection at the context-level. Intersectional scholars agree that the addition of unitary attributes is less valuable than simultaneous impacts of multiple attributes, but scholars differ in definitions of intersectionality (Collins 2015), and especially in methodological strategies (Nash 2008). McCall (2005) writes that while qualitative research embraces intersectionality through case-studies, intersectionality is regrettably underutilized in quantitative studies because of disagreements on how to conduct “intracategorical” analyses² and because there are fewer intuitive measures at the context-level. For example, the average-case focus of mainstream regression methods (Abbott 1988) tends to reproduce a general linear reality because it views forms of differentiation (i.e. “covariates” like ethnicity or SES) as fixed and independent, which reifies intergroup differences while flattening intragroup differences. While some regressions include interaction terms between different attributes at the individual-level,

² Intersectional scholars differ in the extent to which they (a) reject categorization, (b) unpack the social categories that can come together within one group (e.g. high-SES minorities, low-SES minorities, etc.) or (c) analyze the implications of interdependencies among social attributes themselves (McCall 2005:1786–87). My approach is most aligned with (c), where categories are not rejected or analyzed within a single group but are seen as imperfect anchor-points for joint-classification and structural-analyses. Whereas low consolidation implies a two-dimensional array of different ethnicity-SES combinations, high consolidation implies that the distribution of ethnicity and SES are redundant with one another and can be collapsed into a unitary classification scheme.

this is different from accounting for intracategorical variation at the context-level when comparing between different contexts.

I argue that consolidation, as defined by Blau and Schwartz (1984), captures the configuration of social attributes at the context-level, providing a much-needed structural measure of intersection within social groups, rather than within individuals. Structural intersectionality also harkens to Vertovec's (2007) theorizing on heterogeneity at the intersection of multiple social categories of difference within superdiverse immigrant minority groups, in which there is increasing internal differentiation along other attributes outside of ethnicity. I draw a parallel between Vertovec's superdiversity, which refers to the relative *abundance* of intersectionality (e.g., where many combinations of ethnicity and SES exist in a context), and consolidation, which represents the relative *lack* of intersectionality (e.g., where ethnicity and SES are highly correlated in a context).

The framework of consolidation as structural intersectionality can be applied widely, even outside the study of ethnicity or integration, but may especially improve studies on ethnic integration due to the theorized importance of within-category heterogeneity, including not only heterogeneity within specific minority groups but also within the "mainstream" majority (Drouhot 2021; Portes and Zhou 1993; Zhou 1997). Scholars increasingly understand that ethnic boundaries are not inherent but dependent on other forms of differentiation (Wimmer and Soehl 2014). I argue that consolidation, rather than ethnicity alone, predicts interethnic friendships. My perspective of consolidation as structural intersectionality sharpens the quantitative study of ethnic boundaries and follows in the tradition of Brubaker (2004) and Wimmer (2013). It helps resist ethnic groupism, which treats ethnic groups as "internally homogeneous, externally bounded groups" (Brubaker 2004:164).

The extent of structural intersectionality, ranging from consolidation at the lowest end to superdiversity at the highest end, is likely to capture context-level dynamics such as the salience of social boundaries. Quite simply, this is because interpersonal dynamics and attitudes can generate their own momentum and have a life of their own once set in motion. Rather than being fully explained by individual tendencies acting in concert, the implications of consolidation are structural: ethnic boundaries as a whole may be brighter under higher consolidation. For example, while bright boundaries afford opportunities (and increase incentives) for individual-level boundary crossing to a small and select subgroup (Kruse and Kroneberg 2019),³ they increase the overall salience and divisiveness of the underlying distinction between ethnic groups (Alba 2005:40). While consolidation likely indicates brighter boundaries, superdiversity likely indicates blurrier boundaries in which ethnic categories are less clear and salient.

Although consolidation is engrained in theories and definitions of boundaries (Alba and Nee 2003), this study synthesizes theories of consolidation and boundaries, in order to assess their effects on outcomes such as interethnic friendships. To make the difference between the implications of individual-level and structural intersectionality concrete, consider the case of interethnic classroom friendships. In a more consolidated classroom (e.g., where most minorities are low SES and most majorities are high SES), even high-SES minorities may be less well socially integrated compared to their counterparts in unconsolidated classrooms, for instance due to spillovers in assessments of similarity or the potential for mutual support that may drive friendships (Kitts and Leal 2021), or in assessments of social status that may drive friendship

³ Kruse and Kroneberg (2019) show that when high-track schools are dominated by majorities, minorities who are nevertheless in high-track schools have a greater incentive to identify with and form friendships with the ethnic majority. This emphasizes opportunities and incentives for boundary *crossing* that are afforded to exceptional individuals moving from one group to another. In contrast, I emphasize boundary *blurring* at the context-level.

nominations (Ball and Newman 2013; Dijkstra et al. 2010; Lee and Butts 2018). Studies that analyze the pairwise effects of ethnicity and SES for friendships so far find that SES plays a small role in classroom friendships (Kao et al. 2019; Quillian and Campbell 2003; Smith, Maas, and Van Tubergen 2014), but these studies have not yet considered the contextual implications of SES via consolidation for dynamics between groups.

CONSOLIDATION BEYOND A BYPRODUCT

In the previous section, I point out that recent studies of intersectionality are missing a way to actually measure multidimensional social structure. In the current section, I show that Blau and Schwartz (1984) offer consolidation as a measure of multidimensional social structure, but that their arguments fall slightly short of a truly intersectional approach. Overall, I synthesize recent thinking on intersectionality with writings from Blau and Schwartz.

To be explicit, Blau and Schwartz (1984:87) typically ask us to imagine a polar case in which differences in attribute A (e.g., SES) prohibit interaction, but differences in attribute B (e.g., ethnicity) do not matter for interaction. Then, consolidation of A and B challenges interactions across categories of B as a byproduct of difficulties that A caused. While this argument, sometimes called “byproduct theory” (Stark and Flache 2012), elegantly captures constraints to opportunities for interaction (e.g., when students sort across different schools by SES), it is not the only way that consolidation shapes integration. If it were the only way, then individual-level analyses (e.g., how much sharing SES or sharing ethnicity shapes with whom I choose to interact) would actually be sufficient to analyze consolidation.

Empirical studies often follow this logic; that is, they test for a byproduct-like effect at the individual level. When estimates of interethnic friendships are unchanged in individual-level models with and without attribute A as a control, scholars rightly conclude that lack of

friendships across attribute B cannot be a byproduct of attribute A (Hallinan and Teixeira 1987; Mayer and Puller 2008; Quillian and Campbell 2003; Smith et al. 2014; Wimmer and Lewis 2010). For example, the implications of SES for friendships are usually quite low relative to the implications of ethnicity (Marsden 1988; McPherson, Smith-Lovin, and Cook 2001; Smith et al. 2014), meaning that no simple byproduct effect is possible.

Yet consolidation could also shape outcomes due to joint effects of multiple attributes at the context-level above and beyond the mechanical sum of implications of each attribute. Differences in social attributes can amplify each other in an interactive rather than additive way. Thus, individual-level analyses that do not explicitly account for consolidation should be interpreted with caution. For example, Kao finds that high-SES minorities in U.S. schools are not significantly more likely to be friends with majorities than are low-SES minorities (Kao et al. 2019; Wang and Kao 2007). Byproduct theory would conclude that SES does not matter. Yet byproduct theory does not address the potential contextual implications of consolidation. Relatively high-SES minorities within the U.S. could still be mostly represented in consolidated classrooms. Kao's findings may be consistent with the idea that context-level boundary blurring, which involves consolidation, is a better explanation for interethnic ties than individual-level boundary crossing.

Moody's (2001) study using the National Longitudinal Survey of Adolescent Health (Add Health) is an important exception because it explicitly accounts for consolidation at the context-level, but further studies are needed because of data constraints of Add Health. First, there are only roughly 100 contextual units available in Add Health (compared to 573 in the data used here). Second, U.S. schools in Add Health are relatively homogenous, despite rising diversity on multiple dimensions in modern societies. Last, while Moody's study has the perfect

methodological framework for capturing the context-level implications of consolidation, I am the first to elaborate on its distinct theoretical potential. Empirically, I expect that this will challenge the current idea that SES has few implications for classroom friendships beyond sorting.

CONSOLIDATION OF ETHNICITY AND SOCIOECONOMIC STATUS

Different types of consolidation are relevant for different types of social boundaries. The idea that consolidation of ethnicity and socioeconomic status (SES) is essential for the intensity of interethnic relations can be traced back to the idea that it is shared ethnic origins *in combination* with similar SES that tends to facilitate social interactions. According to Gordon (1978:99, 136), two ingredients are usually necessary for interactions to be easy and comfortable: (1) a sense of “peoplehood,” often related to ethnicity and national origin; and (2) similar tastes and interests, often derived from similar social class (or SES).⁴ Gordon illustrates this point by using an example of the children of lower-class Italian immigrants who are growing up in New York City’s Lower East Side (Gordon 1978:99). They are not affected by separable items consisting of an Italian ethnic background and low-SES, but rather by an interwoven combination of the two, where each has been somewhat transformed by virtue of its combination.

In addition, a logical extension of contact theory also implies that SES shapes intergroup dynamics. The original formulation of contact theory argues that the positive benefits of intergroup contact for intergroup attitudes are conditional on (1) common goals, (2) cooperation, (3) support of authorities, and (4) status equality (Allport 1954). Lower consolidation could signal how optimal conditions are in all four ways (Pettigrew and Tropp 2006:761).⁵ If this is the

⁴ Gordon coined the term “ethclass” to refer to the stratified segmentation of social space created by the intersection of ethnicity and social class (Gordon 1978:15–36; Rumbaut 2015:83–84).

⁵ There is some evidence that SES reflects higher social “status” in adolescent interactions (Malacarne 2017; Neugarten 1946). Even if this is not the case, lower SES among minorities could flag fewer common goals, less cooperation, and less institutional support for positive intergroup attitudes (e.g., among teachers).

case (and also assuming that positive interethnic attitudes form a stronger basis for interethnic friendships), contact theory implies that the benefits of classroom contact for interethnic friendships are not fully realized in classrooms with greater consolidation. Some scholars debate contact theory relative to other theories, such as conflict theory,⁶ and question the conditionality of the benefits of contact on status equality (Hewstone and Brown 1986; Pettigrew and Tropp 2006). Yet since few datasets so far capture the growing variation in configurations of ethnicity and SES (Wimmer and Lewis 2010:598), it remains a theoretical possibility that consolidation between ethnicity and SES imply sub-optimal conditions for contact.

To summarize, there are many reasons to believe that consolidation between ethnicity and SES should inform the propensity for friendships. Similarities on both attributes are usually needed to promote easy interactions. Differences in SES may also coincide with less optimal conditions for interethnic contact. When there is high consolidation, differences in SES are mostly between ethnic groups, and this combination of differences implies that ethnicity is likely to be less ambiguous, more salient, and more divisive.⁷ These arguments lead to the expectation that interethnic friendships are more common in consolidated classrooms. In other words, it leads to the hypothesis that: *Higher levels of consolidation between ethnicity and SES in classrooms are negatively associated with interethnic friendships at the context-level.*

CONSOLIDATION BETWEEN ETHNICITY AND SES IN WESTERN EUROPE

⁶ Conflict theory implies that *high* consolidation can exacerbate ethnic conflict by increasing competition (Bobo and Hutchings 2006; Olzak 1989). Yet conflict theory usually relates to attitudes in competitive conditions where positive forms of close contact are not guaranteed (e.g., following internal migration in the United States in the early 1900s). It remains to be seen whether conflict theory is relevant for friendships within middle school classrooms.

⁷ Note that individual-level dynamics (e.g., in which pairs of students respond to their similarities or differences in SES) do not capture context-level implications of consolidation. Without consolidation, SES differences between a pair of classmates that differ in ethnicity could reflect much smaller challenges to interaction, because they do not imply a prevailing trend of SES differences between ethnic groups.

Consolidation between ethnicity and SES exists in Western Europe in part due to the low socioeconomic origins of many ethnic minorities, whose families who originally came through guest worker programs (Alba and Foner 2015; Castles 1986; Drouhot and Nee 2019). Rising ethnic diversity in Western Europe began with labor migration shortly after the second World War, with recruitment of immigrants to satisfy labor shortages (Castles and Miller 2013). In Germany, labor migrants came from Italy, Yugoslavia, Greece, and Turkey, (Steinert 2014:18), though Turkish immigration expanded rapidly from family reunification in the 1980s and 1990s (Crul and Vermeulen 2003). The Netherlands also experienced similar patterns of labor immigration followed by later family reunification from Turkey and Morocco (Crul and Doornik 2003). Labor migrants were typically disadvantaged in numerous ways – they usually came from the less educated parts of their origin countries (Alba and Foner 2015), and were not fully included in destination societies but were treated as short-term guest workers (Bender and Seifert 2003:45–67).

In addition to labor migration and family reunification, ethnic minorities in Western Europe can also trace back their origins to colonial activity (e.g., those of Indian, Pakistani, Jamaican, or Nigerian descent in England or those of Surinamese or Antillean descent in the Netherlands). Post-colonial migrants experienced some advantages related to a common language and sometimes citizenship. For example, the educational attainment of minorities of Surinamese and Antillean descent in the Netherlands (in contrast to those of Moroccan and Turkish descent) have closed in on the educational attainment of the Dutch majority (Crul and Doornik 2003). Similarly, ethnic minorities in England generally show strong educational selectivity, in which their educational qualifications often surpass that of their “non-ethnic” counterparts. These conditions can (but do not always) translate to less consolidation between

ethnicity and SES – minorities are often disadvantaged in terms of lower occupational status despite educational advantages (Alba and Foner 2015:191).

In recent years, ethnic diversity in Western European countries has expanded particularly rapidly. This is both due to a larger set of origin countries such as the rise of immigration from Eastern Europe to destinations such as England (Vertovec 2007), as well as a larger set of destination countries. For example, while Sweden’s demand for labor immigrants led to some recruitment of guest workers starting in the 1950s, levels of immigration increased more recently due to asylum seekers and refugees, including those who fled the Yugoslav Wars and the war in Iraq (Runblom 1994). The purpose of this section is to provide some intuition on why there is often consolidation between ethnicity and SES in Western Europe. However, the extent of consolidation within classrooms is not neatly encompassed by national origins or destinations, but also reflects features of schools, neighborhoods, and local institutions.

Finally, understanding the network implications of consolidation between ethnicity and SES sheds light on an important mechanism for inequality. Homophily can exacerbate the inequality in adoption of any behaviors (including adoption of innovations as well as adoption of other behaviors or practices such as educational pursuits or migration) on which there are network externalities (DiMaggio and Garip 2011).⁸ Prominent agent based models of network diffusion have shown that consolidation and homophily have joint implications for diffusion (Centola 2015) and thus inequality in diffusion (Zhao and Garip 2021). While Centola (2015) mentions inequality in network formation in an interesting sensitivity analyses, Zhao and Garip

⁸ DiMaggio and Garip (2011) write that their case of internet diffusion is meant to illustrate the effect of *network externalities* (where adoption is facilitated by ties to prior adopters) on inequality. Their second case of internal migration in Thailand is meant to illustrate the impact of *homophily* on inequality, and to suggest the broad scope within which their proposed mechanisms operate. However, the precise effect of homophily also depends not only on the size of network externalities, but also on factors such as relative group sizes and network size (Gondal 2015).

(2021) show that consolidation and homophily together shape levels of inequality in any diffusion outcomes on which there are network externalities. Both studies develop their key argument using models that vary levels of consolidation and homophily through a wide range of values and possible combinations. While their results show that consolidation and homophily have joint implications for diffusion and inequality, few studies so far have analyzed the joint distribution of consolidation and homophily in empirical settings.

Social ties are important resources, and while “bonding” connections (i.e., same ethnic ties) often help individuals to get by, “bridging” connections (i.e., interethnic ties) are crucial for getting ahead (Putnam 2000). Intra-ethnic ties can facilitate entry into ethnic economies that offer not only a safety net but also opportunities for entrepreneurial activities (Portes and Jensen 1989), though some scholars also argue that these economies can be “dead-ends” with low wages and low returns (Kasinitz et al. 2011; Sanders and Nee 1992). For example, ethnic ties might facilitate modest ventures, such as kebab stores and confectioners in Western Europe or ventures in the garment industry in the U.S., but they can be a mixed blessing in that they offer little room for upward mobility (Alba and Foner 2015:64). In the European context, lack of interethnic ties in social networks imposes labor market disadvantages (Kalter 2011), with dense intra-ethnic networks functioning as a mobility trap (Esser 2004). However, there is no innate problem with intra-ethnic connections within minority groups (Modood 2011), especially when there is much intragroup variance in SES (both minority and majority groups can be heterogeneous in SES). There are several examples of immigrant minority groups in the U.S. that leverage intra-ethnic ties successfully – these examples are successful due to heterogeneity in SES (Alba and Foner 2015:240). Thus, since the relative amount of intra-ethnic and interethnic ties has the strongest

implications for inequality with the simultaneous presence of consolidation, it is essential to examine the possible link between consolidation and homophily.

DATA AND METHODS

I use data from the 2010 Children of Immigrants Longitudinal Survey in Four European Countries (CILS4EU) project, conducted in England, Germany, Netherlands, and Sweden (Kalter et al. 2016). The CILS4EU sample is stratified by region, school type, school size, and percentage of minority children enrolled, with oversampling of schools with many minority students. The latter is highly beneficial in studies of interethnic friendships since such studies typically exclude settings that are too homogenous for interethnic friendships to exist (Smith et al. 2016). Within participating schools,⁹ a target of two classrooms of 14-year-old students were randomly selected. All classrooms that contained at least 10 students and are heterogenous enough to be studied are included in the analytic sample (709 classrooms containing over 14,000 students).

Data on friendships were collected for all students by asking them to nominate up to five best friends from a roster of classmates. Since nearly all classmates are surveyed,¹⁰ information on inter- and intra-ethnic ties are triangulated, without directly asking students about their friends' ethnicities, a strategy that leads to more accurate answers by reducing social desirability bias (Kao et al. 2019:29). I construct classroom friendship networks using friendship nominations, which assumes that friendships are observable as directed relationships (Hallinan and Teixeira 1987; Moody 2001; Smith et al. 2016). This assumption oversimplifies the analysis

⁹ The school response rate of 85 percent is standard for large-scale international school surveys (Smith et al. 2016).

¹⁰ Parental refusal to participate and student absence on the day of the interview led to some nonresponse, but overall student response rates were quite high (over 85 percent in all classrooms). Classrooms with very high response rates (90-100%) did not differ from other classrooms (with 85-90% response rates) in terms of average levels of consolidation, and results held when restricting analyses to just classrooms with very high response rates.

of friendships, which many define as reciprocated (Kitts and Leal 2021). Yet directionality may also reflect meaningful social hierarchies and aspirational friendships (Ball and Newman 2013; Dijkstra et al. 2010; Lee and Butts 2018). Thus, I initially proxy friendships using directed nominations, and follow up with analyses that define friendships using only mutual nominations. These additional analyses address not only methodological but also substantive concerns: if there are differences in the two sets of analyses, they may shed light on the effects of consolidation in how it relates to the *meaning* of friendships.

Out of the 709 classrooms in the analytic sample, more than 80 percent had reliable data on friendships (where at least 75 percent of students participated in the classroom survey and at least 90 percent of friendship nominations are valid), leaving 573 classrooms and approximately 12,000 students in the main analyses.¹¹ Figure 1 provides some examples of networks on which the analyses are based.

[Figure 1 About Here]

Measurement of Ethnicity

Ethnic background is proxied by parental country of origin because ethnic minorities in Europe are often immigrants or the children of immigrants. Using parental birth country to proxy ethnic origins is a common choice in studies of ethnicity in Europe (Leszczensky and Pink 2019; Portes, Aparicio, and Haller 2016; Smith et al. 2016, 2014; Stark and Flache 2012), despite some limitations¹², because national origin captures most salient minority groups (Castles and Miller 2013; Verkuyten 2005), is a relevant basis for adolescent identities (Heath, Jacob, and Richards 2018), and is usually used in public discourse within Europe to describe ethnicity. This simplifies

¹¹ Reliable sociometric data, found in over 80 percent of classrooms, requires that at least 75 percent of students participated in the sociometric survey and that less than 10 percent of nominations are invalid (Smith et al. 2016)

¹²A potential limitation of this strategy is that it flattens generational differences. However, in sensitivity analyses (available on request), results were robust to inclusion of average immigrant generation in classrooms.

some ethnic distinctions (e.g., Turkish Kurds and ethnic Turks, Afro-Surinamese and Indo-Surinamese, Walloon Belgian and Flemish Belgian, just to name a few) but is consistent with the subjective and reactive construction of ethnicity.¹³

I distinguish between the five largest and most salient ethnic groups in each survey country. In England, I distinguish between English, Pakistani, Indian, Nigerian, and Jamaican students. In Germany, I do the same for German, Turkish, Russian, Polish and Italian students. I examine Dutch, Turkish, Moroccan, Surinamese, and Antillean students in the Netherlands. Finally, I study Swedish, Iraqi, Turkish, Bosnian and Lebanese pupils in Sweden. I categorize the remainder into other Western, other non-Western. Students from smaller categories (the “other” categories) rarely meet in-group peers in class (Hofstra et al. 2017; Smith et al. 2014), so these categories are not broken-down further and robust to alternate categorizations.¹⁴

Measurement of Consolidation

Adolescents’ socioeconomic status (SES) is proxied by the highest occupational status of their parents¹⁵ as determined by the ISCO-08 combined with the ISEI ranking (Ganzeboom, De Graaf, and Treiman 1992)¹⁶ and categorized into “high,” “medium”, or “low” depending on if adolescents are in the top, middle, or bottom SES-tertile in their country of residence.¹⁷ To

¹³ Like Wimmer (2013), I follow in the Weberian tradition of viewing ethnicity as a subjectively felt belonging to a group that is distinguished by a shared culture and by common ancestry (Weber 1922). To better understand ethnicity, I first proxy ethnic categories using national origin – however, I do not assume that national origin is necessary meaningful. In fact, I argue that the extent to which it is meaningful depends on consolidation with SES.

¹⁴ The “other” Western and non-Western categories comprise 10% and 9% of all respondents. I categorize residual Asian and African groups as non-Western, and residual European, North American and Latin American groups as Western. Results are robust to an alternative coding of the “other” categories based on European Union membership.

¹⁵ Missing SES is coded to available data when missing for one parent and school-level means when missing for both. Single and multiple imputation led to similar results.

¹⁶ The International Standard Classification of Occupations (ISCO-08) ranks occupations, and the International Socio-Economic Index of occupational status (ISEI-08) makes the classification system internationally comparable.

¹⁷ While this is chosen over within-classroom comparisons because individuals tend to understand their social standing in relation to their broader society (Bourdieu 1984), results are robust to use of within-classroom comparisons. Note also that the main results treat SES as nominal – sensitivity analyses following the main results use alternate strategies of consolidation that preserve the ordinal nature of SES categories lead to similar results.

measure consolidation within a classroom, I take the correlation of ethnicity with SES using Cramér's V, though results were robust to several alternate measures of consolidation, as shown in the analyses on measurement of consolidation following the main results. Cramér's V, denoted by ϕ_c , is a familiar measure of association between nominal variables that is calculated by dividing a χ^2 statistic by an adjustment factor that makes ϕ_c comparable across different classes of different sizes and with different numbers of social categories. Specifically,

$$\phi_c = \sqrt{\frac{\chi^2}{n * \min(k - 1, r - 1)}}$$

where χ^2 is the chi-squared statistic for the test of independence between two attributes, n is classroom size, and r and k are the number of categories in relevant attributes. For consolidation (with SES), k is the number of ethnic categories and r is the number of SES categories represented in a classroom (in 96 percent of classrooms, $r = 3$). Figure 2 gives the distribution of consolidation. A rough guideline for interpreting Cramér's V, which can take on values between 0 and 1, is 0.1 = small, 0.3 = medium, 0.5 = large (Cohen 1988:224–26). Moderate levels of consolidation reflect the fact that parents of minority students tend to have a lower SES than majority counterparts (Schnepf 2007).

[Figure 2 About Here]

Analytic Strategy

Since the CILS4EU collects sociocentric data within classrooms, I am able to study interethnic friendships in a conservative way. Namely, I am interested in ethnic homophily, the extent to which the number of intra-ethnic friendships exceeds the expected amount based on chance (McPherson et al. 2001), and mechanisms like reciprocity (Schaefer, Kornienko, and Fox

2011) and transitivity (the tendency to befriend the friend of a friend) that amplify homophily, but would operate even in the absence of ethnicity (Kenneth A Frank, Muller, and Mueller 2013; Goodreau et al. 2009; Kossinets and Watts 2009; Mayer and Puller 2008; Simmel 1950).¹⁸

To simultaneously account for these processes, I use exponential random graph models (ERGMs) within each classroom. The ERGM framework is essential for the identification of homophily as defined by “tastes” for ethnic similarity. Without the ERGM framework, even if we were to observe a positive association between consolidation and ethnic tie segregation, we could not argue that consolidation relates to the ways that individuals respond to ethnicity (because consolidation might simply relate to tie formation mechanisms such transitivity). While the ERGM framework improves a causal interpretation of the effects of consolidation because it improves the identification of homophily, a strong causal interpretation is nevertheless outside of the scope of this study. In theory, stronger ethnic boundaries could produce stronger tastes for ethnic homophily – and I aim to show that this is plausible, but do not parse out the extent to which this occurs within classrooms, and the extent to which consolidation in classrooms may also reflect broader social structures that students are exposed to (outside of classrooms): both explanations for a consolidation-homophily link are likely at work.

ERGMs represent a general class of models that view an observed network as one realization of a set of possible networks with similar characteristics (such as homophily). These models get at which local stochastic processes are most likely to generate the observed network (Robins et al. 2007). The general form of an ERGM is as follows:

$$P(Y = y | X) = \frac{1}{k(\theta)} \exp (\theta' g(y))$$

¹⁸ Imagine that a A->B tie exists (A is friends with B) in part because A and B are both majorities and a B->C tie exists in part because B and C are both majorities. Then a B->A tie is likely due to reciprocity, and a A->C tie is likely due to transitivity. These two ties are same-ethnic even though they are not driven by homophily.

where Y is a random variable indicating the state of a network with a specific realization y , $g(y)$ is a vector of model statistics for the network y , θ is a vector of coefficients for those statistics (model parameters – for which θ_1 might refer to homophily), and $k(\theta)$ is a normalizing constant. Note that ERGM coefficients are also interpretable as the conditional probability of a tie given the ways in which the tie changes the network statistics (Wasserman and Pattison 1996).¹⁹ Model parameters are estimated using the *statnet* package in R version 3.5.1.

Descriptions of model terms are provided in Table 1. The first two terms capture the underlying propensity for ties and reciprocated ties.

[Table 1 About Here]

The next three terms in Table 1 capture homophily effects for ethnicity, SES, and gender, where gender homophily is very important at this age (McPherson et al. 2001; Smetana, Campione-Barr, and Metzger 2006). SES differences are differences in ISEI ranking, standardized within countries (the coefficient on SES homophily represents implications of a one-SD difference in SES on chances of a friendship).²⁰ The next set of terms in Table 1 contain covariate effects, where students differ in total number of ties based on SES, gender, and ethnicity (Coleman 1961; Dijkstra, Cillessen, and Borch 2013). The final model terms reflect the extent of transitivity (i.e. in which the friend of a friend is my friend) and tension (i.e. in which the friend of a friend is *not* my friend) in networks.²¹ The inclusion of these terms also helps avoid issues of model

¹⁹ In other words, $\text{logit}(Y_{ij} = 1 | y_{ij}^c) = \theta' \delta(y_{ij})$ where Y_{ij} is the random variable for whether i and j have a tie, $\delta(y_{ij})$ is the “change statistic” that records how much the $g(y)$ term changes as a consequence of Y_{ij} being toggled from no tie to tie, and y_{ij}^c denotes the ties for all dyads in the network other than between i and j .

²⁰ A pair-level interaction between ethnic homophily and SES homophily is not included here because it complicates the interpretation of ethnic homophily (only at average levels of SES) and because it presented challenges to model convergence when included due to being a poor explanation for ties within classrooms. In addition, such a term does not address the question of whether consolidation explains differences in homophily between contexts.

²¹ Of the possible configurations of *dgwesp* and *dgwnsp*, which capture transitivity and tension, I use the outgoing two-path. Using the more familiar undirected versions of the terms led to similar results (and in fact removing all directed information from the analyses led to similar results, as discussed on page 35). Since transitivity is a form of structural balance, I use “tension” to refer to the absence of balance – it does not refer to interpersonal tension.

degeneracy by capturing the higher order dependency structure in the network (Hunter 2007; Snijders et al. 2006).

To formalize, the level-1 analyses here consist of ERGM models, which predict probability of a set of ties, Y , given a set of nodes and their attributes:

$$\Pr(Y = y) = \frac{1}{k(\theta)} \exp \left\{ \sum_A \theta_A g_A(y) \right\}$$

The g_A term represents the network statistics indexed by A in vector $g(y)$ – as described in the above Table 1 – and the θ_A term represents the change in conditional log-odds of a tie for each unit change in the network statistics (the coefficients corresponding to those statistics). The denominator k is simply a normalizing constant over all possible networks.

Estimation builds on maximum likelihood estimation combined with MCMC techniques since the normalizing factor $k(\theta)$ is intractable. To minimize nonconvergence, which often arises in ERGMs, scholars constrain parameters when possible and exclude redundant model terms (Hunter and Handcock 2006; McFarland et al. 2014). I constrain maximum outgoing ties to five (as pupils could nominate up to five best friends) and account for a carefully selected set of most theoretically relevant model terms.²² Omitted terms are approximated well by the model (shown in Figure 4 and discussed in main results). Lastly, models were given plenty of time to converge (maximum 40 iterations, a MCMC burn in of 400,000, and an MCMC sample size of 200,000).²³

²² Sensitivity analyses that compare the main results with cut-offs at 3, 4, and 5 best friendship nominations yield substantively similar results, which implies that the results are not sensitive to taking a smaller cut-off. Since the average student did not report more than 3 best friends in the classroom, results are likely to be similar if the survey imposed a larger cut-off instead, but this is not possible to test due to the data constraints.

²³ I exclude degenerate networks from the analyses. To identify non-convergence I first evaluate the change in the log likelihood between the last iterations of the fitting algorithm, where a change of less than 5 generally indicates convergence (Hunter, Goodreau, and Handcock 2008). The mean change in log likelihood here was less than 0.38. Second, I identify model degeneracy by manually inspecting the density and trace plots for each classroom to

After estimating ethnic homophily in each classroom, I use metanalysis to compare results across classrooms, a strategy which is justified when explanations for ties are adequately captured (Kruse and Kroneberg 2019; McFarland et al. 2014; Smith et al. 2016; Snijders and Baerveldt 2003). Comparisons across models in the exponential family require strong assumptions on specification and comparability (Mood 2010). In networks, lack of comparability is often due to differences in size. Here, this problem is minimal: classrooms are similar in scale, and size is included in the level-2 comparisons, described below. Another known complication related to size is that the standard form of ERGMs assume that mean degree increases with network size (Butts and Almquist 2015; Krivitsky and Kolaczyk 2015), although this is not always the case. Here, there is no reason to believe that students in larger classrooms (25-38 students) have more friends than those in smaller classrooms (11-25 students), so I introduce an “Krivitsky” offset of $-\log(N)$ to the edge term (comparing Figures A-1 and A-2 in the appendix shows that constant mean degree is a better assumption).

Following Smith et al. (2016), I will apply weights proportional to the inverse variance of the estimate on the homophily coefficient (down-weighting cases where ethnic homophily is imprecisely estimated in metanalyses) and include classroom-level covariates: consolidation, mean classroom SES, classroom size,²⁴ diversity (1 - the Herfindahl index),²⁵ the proportion minority, and an indicator for the survey country.²⁶ The level-2 model is as follows:

determine whether trace plots are trendless and centered at 0, and whether density plots have an approximately normal curve. I describe the resulting included and excluded sample in the main results.

²⁴ Larger classrooms may increase intra-ethnic friendships by offering a larger choice-set and creating uncertainty (Cheng and Xie 2013; Currarini, Jackson, and Pin 2010; McFarland et al. 2014).

²⁵ Diversity may make ethnicity more salient (Goodreau et al. 2009; McFarland et al. 2014; Moody 2001; Mouw and Entwisle 2006; Wimmer and Lewis 2010). The Herfindahl index measures the lack of diversity – it can be interpreted as the likelihood that any two random classmates differ in ethnicity.

²⁶ I introduce country fixed effects to make comparisons within countries and adjust for unobserved cross-national differences. In sensitivity analyses discussed after main results and in appendix, I disaggregate by survey country.

$$\begin{aligned} \theta_{1c} = & \gamma_{10} + \gamma_{11}(\phi_c) + \gamma_{12}(\textit{Classroom Size}) + \gamma_{13}(\textit{Mean SES}) \\ & + \gamma_{14}(\textit{Diversity}) + \gamma_{15}(\textit{Proportion Minority}) \\ & + \gamma_{16}(\textit{Germany}) + \gamma_{17}(\textit{Netherlands}) + \gamma_{18}(\textit{Sweden}) + \mu_{1c} \end{aligned}$$

where θ_{1c} corresponds with the estimate of ethnic homophily (the first subscript refers to the fact that level-2 analyses are conducted on a single level-1 parameter, ethnic homophily, defined as the first element of the vector θ , and the second subscript refers to a specific classroom), ϕ_c represents consolidation in classroom c , γ_{10} is the fixed-effect intercept that captures the average amount of the level-1 variable across level-2 groups (classrooms), $\gamma_{11}, \dots, \gamma_{18}$ are effects of level-2 variables, and μ_{1c} is the random effect.

The coefficient γ_{11} represents the effect of consolidation on ethnic homophily net of other features of classrooms ($\gamma_{12}, \dots, \gamma_{18}$). Sensitivity analyses, discussed in the main results, will control for broader and attitudinal measures of consolidation (e.g. between ethnicity and religious affiliation, language ability, effort in school, and social attitudes) in order to account for ethnic differences along these measures (Alba and Foner 2015; Crul, Lelie, and Schneider 2012; Diehl and Schnell 2006; Kalter et al. 2018).

Metanalyses are conducted using the *metafor* package in R version 3.5.1 using random effects, which assume that true levels of ethnic homophily vary between classrooms.

RESULTS

The models used in the main analyses converged well, leading to estimates of ethnic homophily in 88 percent of cases. I exclude 11 percent of cases in which there was evidence of model degeneracy as their omission increases the reliability of estimates of homophily.

[Table 2 About Here]

Table 2 compares classrooms in the included and excluded sample. The main

difference between the two samples is that the excluded sample consists of smaller classrooms. This is unsurprising because for small classrooms, a single absent student or mistaken nomination may render network data unreliable. Excluded classrooms also tend to be slightly higher in mean SES, though further studies are needed to understand why this is the case. Importantly, Table 2 shows that the excluded cases do not bias the sample on average levels of consolidation (upon which excluded and included classrooms are similar).

Descriptive Features of Adolescent Classroom Friendship Networks

The first step of the analyses is to determine the local structure and processes that characterize friendship networks. Figure 3 provides boxplots of the distribution of ERGM coefficients across all classrooms (boxes are quartiles, whiskers extend to the furthest points within 1.5 times the interquartile range past the boxes).

[Figure 3 About Here]

Figure 3 shows that mutuality, transitivity, and gender homophily most strongly characterize the configurations of adolescent classroom friendship networks. Among the homophily terms, gender homophily is the strongest. There is a very strong tendency of friendships at this age to be between same-gender peers. Since mutuality and transitivity can amplify homophily, yet theoretically operate even in the absence of ethnicity, properly accounting for mutuality and transitivity leads to a more conservative study of homophily. In the remaining analyses, I interpret variation in ethnic homophily as driven by barriers to ethnic mixing.

The distribution of ethnic homophily in Figure 3 shows that the bottom quartile of homophily is less than zero. In most classrooms, estimates of ethnic homophily are greater than zero, meaning that friendships between classmates who come from the same ethnic background

are more likely than friendships between classmates who differ in ethnic background. ERGM coefficients get at the contribution of an individual's or friendship's attributes to the conditional log-odds of a tie. Results show that the log-odds of a tie are significantly higher for an ethnically homophilous friendship compared to its heterophilous counterpart (estimates of means given in Appendix Table A-1). However, the distribution of ethnic homophily varies substantially across classrooms, which helps motivate the later meta-analyses that aim to explain variation in ethnic homophily by consolidation.

In contrast, variation in SES homophily is quite low (a 1-SD increase in SES difference leads to a -0.01 reduction in the log-odds of a tie). Results are in line with existing studies— net of mutuality, transitivity, other forms of homophily, and covariate effects, ethnic homophily remains an independent factor in friendship formation but SES homophily plays a minimum role (Kao et al. 2019; Quillian and Campbell 2003; Smith, Maas, and Van Tubergen 2014). This implies that no matter how high consolidation is, it is unlikely to hinder interethnic friendships as a simple byproduct of SES homophily in the additive way that Blau and Schwartz's original argument implies. Yet such an additive byproduct does not fully capture consolidation because consolidation reflects the joint configuration of ethnicity and SES at the context-level. While the probability of a tie between a pair of classmates has only a little to do with their own difference in SES, it could still have much to do with the differences in SES between their ethnic groups (consolidation). Thus, to study the implications of consolidation, it is necessary to compare levels of ethnic homophily across classrooms.

Last, covariate effects play a small role in friendship networks relative to homophily effects. Higher-SES students, minorities, and girls generally have more ties, but these effects are

small.²⁷ There is some debate about how covariate effects and homophily effects interact. To clarify, there is no evidence of interplay between covariate and homophily effects (such as those implied by status-caste exchange implies, in which minorities trade their lower position on the ethnic hierarchy for a higher position on the status hierarchy). First, majorities and minorities in an interethnic tie are on average similar in SES. Second, while minorities with more friendships with majorities tend to have higher SES than minorities with fewer friendships with majorities, the former does not tend to have higher SES than their majority friends. Third, majorities with more interethnic friendships are on average higher in SES than their counterparts with few interethnic friendships. This is consistent with critiques of status-caste exchange theory (Rosenfeld 2005), and with studies that show that despite some social hierarchy, the low implications of SES relative to race and ethnicity are robust to consideration of hierarchy (Kao et al. 2019:45).

To build on these analyses of consolidation, it is necessary to ensure that ERGMs adequately capture friendship dynamics using model diagnostics. I use the *gof* (goodness-of-fit) function in *statnet* to repeat the simulation multiple times and assess whether the models reproduce global properties (including properties that are not explicitly modeled). Figure 4 shows distributions of global properties for 100 simulated networks for a classroom that was strategically selected on “poor” fit based on diagnostics on convergence. Soft lines are 95 percent bounds on these distributions and dark lines represent the original network.

[Figure 4 About Here]

²⁷ The positive covariate effect on minority implies that ethnic minorities have a higher odd of ties than majorities *in the average classroom*. Further analyses (available on request) showed that this appears to be driven by higher degree (number of ties) for minorities in classrooms where minorities make a smaller proportion of the classroom. It seems that minorities may have lower degree at the individual level, but higher degree in the average classroom, due to high degree for classrooms in which there are few minorities.

Even for this classroom, statistics for the original network fall comfortably within bounds of simulations, including global properties that were not explicitly modeled. The first three plots in Figure 4 show that models capture the distribution of three such properties: outdegree (number of nominations for each student), edgewise shared partners (number of mutual friends for each friendship),²⁸ and minimum geodesic distance (minimum number of friends through which pairs of students are connected). The last plot shows the distribution of network statistics in the simulated networks for included model terms.²⁹ Overall, models adequately captured the most important features of friendship networks (additional model terms would be redundant).

Implications of Consolidation for Interethnic Friendships

The above analyses build up to the question of whether consolidation has a direct effect on ethnic homophily. By direct, I refer to implications beyond the potential mechanical effects of SES homophily on interethnic friendships when ethnicity and SES are correlated. Table 3 reports results of meta-analyses comparing ethnic homophily across classrooms.

[Table 3 About Here]

There is a large positive association between consolidation and ethnic homophily. Classrooms with higher levels of consolidation are significantly higher in ethnic homophily. The coefficient on consolidation is 0.46, which is large given the empirical distribution of ethnic homophily (mean 0.34, where negative values indicate the lack of homophily).³⁰ This supports the idea that

²⁸ Models produce slightly too many nodes with outdegree of 3 and slightly too many edges with only one shared partner, but other possible degree values and overall distributions are well-approximated.

²⁹ A–H are the terms for edgelist and the other model terms top to bottom in Figure 3 (excluding the terms for gender covariate and homophily).

³⁰ While a causal interpretation is outside of the scope of this study, even if roughly half the estimated effect here were due to alternative explanations associated with selection into classrooms, the consolidation effect would still be twice its standard error, and statistically significant at $p < 0.05$ (K.A. Frank et al. 2013; Rosenberg et al. 2002).

interethnic friendships are less common under consolidation. While the earlier analyses show that the probability of a friendship between a pair of classmates has little to do with their own differences in SES, these analyses show that the probability of their friendship has much to do with differences in SES between their ethnic groups.

The positive association between consolidation and ethnic homophily is net of other features of classrooms, such as diversity. Ethnic homophily is positively associated with diversity and negatively associated with the proportion minority. To further contextualize the magnitude of the association between consolidation and ethnic homophily – the effect size for consolidation is over two times larger than the effect size for diversity, although diversity often takes center-stage in studies of interethnic friendships.

The association between consolidation and ethnic homophily is also robust to country fixed effects and are driven by within-country comparisons.³¹ Finally, estimates are net differences in classroom size and mean SES. Accounting for classroom size and mean classroom SES helps to control for unobserved within-country institutional differences in schools and differences in ethnic composition (i.e., which specific ethnic groups are represented). Overall, the evidence of larger barriers to interethnic friendships under higher consolidation is robust to other contextual covariates.

To illustrate the effect of consolidation on interethnic friendships, I simulate networks using the ERGM fit on which the main results are based, varying population structure and whether or not there is a structural effect of consolidation on ethnic homophily. In each

³¹ Table A-2 in the appendix shows the result of analyses that are disaggregated by country. Results are substantively similar after disaggregation for Germany, Sweden, and England. However, note that the sign of the coefficient on consolidation is reversed for the Netherlands. More research is necessary to understand why consolidation does not have the anticipated association with ethnic homophily in the Netherlands. One possible explanation that warrants further exploration is the size of the majority group (the Dutch majority makes up 73 percent of the Dutch sample versus only 56, 59, and 57 percent of the German, Swedish and English samples).

simulation, I take a hypothetical German classroom with 9 Turkish students (gray nodes) and 9 German students (white nodes) that have either high SES (squares) or low SES (triangles), and simulate friendship ties. To interpret results in terms of conditioning on SES, I focus on same-SES ties in the discussion of the simulation results.

In the first set of simulations, I assume there are 4 high SES and 5 low SES students within each ethnic category (a low consolidation classroom population). Figure 5A shows an example simulated network that emerged from this population structure (assuming density, reciprocity, transitivity, and ethnic homophily to be at their average fitted levels, and holding all other effects such as gender homophily fixed at zero to simplify the interpretation).

[Figure 5 About Here]

Some amount of ethnic friendship segregation can be observed in the example network. When repeating the process used to generate this example network 1000 times, I find that among all possible same-SES ties, on average 36 percent of all possible same-ethnic ties formed, in comparison to 27 percent of all possible inter-ethnic ties.

In the second set of simulations, I assume that German students are more likely than Turkish students to have high SES (2 high-SES and 7 low-SES Turkish students, versus 7 high-SES and 2 low-SES German students). This corresponds to a high level of consolidation. Figure 5B shows an example network that emerged from simulations starting with this population structure, but with the same network formation “rules” as in the simulation in Figure 5A, where the only thing that differs is the population structure. When repeating this exercise 1000 times, among same-SES pairings, 43 percent of possible same-ethnic ties formed, in comparison to only 26 percent of all possible inter-ethnic ties.

In the third case, I again take the high-consolidation classroom population, but also

account for the structural effect of consolidation on the ethnic homophily parameter, as given by the main results (the coefficient on consolidation in Table 3). According to Cramer's V, the example population here has a consolidation of 0.31, and thus I add $0.31 * 0.46 = 0.14$ onto the ethnic homophily coefficient used in simulations, which produced much higher levels of ethnic segregation in simulated networks (such as in Figure 5C). When repeating this exercise 1000 times and summarizing friendships that formed among same-SES dyads, 50 percent of possible same-ethnic ties formed, in comparison to only 20 percent of possible inter-ethnic ties. The increased chances of same-ethnic ties and decreased chances of intra-ethnic ties illustrate the direct effect of consolidation on the structure of interethnic ties in networks.

Narrowing Ethnic Distinctions and Broadening Consolidation

Here, I extend the analyses to different types of consolidation and also discuss the robustness of analyses to different measurements of ethnicity. The choice of whether to make more detailed distinctions within a group or to expand intersectional studies beyond two attributes is a familiar trade-off between scale and coherence (McCall 2005:1785–87). I focus on SES and ethnicity for a variety of reasons. Theoretically, the notion that SES has no consequence for friendships when adolescents have opportunities to interact warrants further testing, not only because of classical theories that suggest otherwise, but also because the consolidation of SES and ethnicity can exacerbate inequality. Methodologically, most strategies assume that social attributes are additive rather than intersectional – I focus on ethnicity and SES to show how such assumptions can oversimplify and obscure true implications of social differences, even for two attributes. In addition, while SES for adolescents is ascribed, cultural or attitudinal attributes are endogenous, meaning they are influenced by peers (Kao et al. 2019), which complicates interpretation of coefficients. However, I now broaden the definition of consolidation in order to

understand how consolidation between SES and ethnicity might relate to other types of consolidation, and to assess a more general argument that links ethnic homophily to consolidation.

Table 4 repeats the analyses in Table 3 but adds other forms of consolidation as additional covariates.³² The positive association between SES consolidation and ethnic homophily is not explained away by ethnic differences in religious affiliation, language proficiency, effort in school, or social attitudes, and it also remains statistically significant in the model that includes all additional types of consolidation together (Table 4, column 6).

[Table 4 About Here]

This implies that the effects of SES consolidation on ethnic homophily are robust to and not mediated by other types of consolidation. For example, ethnic differences in SES do not simply proxy greater cultural and attitudinal distance between the ethnic groups represented in classrooms.

Several other forms of consolidation are also independently and positively associated with ethnic homophily (Table 4, column 6). Both consolidation between ethnicity and social attitudes and consolidation between ethnicity and religion predict significantly higher ethnic homophily. Like ethnic differences in SES, ethnic differences in religion may capture brighter ethnic boundaries. Ethnic differences in certain social attitudes may also have effects on ethnic homophily net the other types of consolidation, but these effects are difficult to interpret because

³² Differences in social attitudes are proxied by average tolerance towards cohabitation, divorce, homosexuality, and abortion (whether each is always, often, sometimes or never ok). Language skills are captured using students' subjective evaluation of their school performance in the subject of the survey country language, i.e. "how well are you doing in the [survey country language]?" on a five-point scale. School effort is captured by asking students for their opinions on the statement: "I put a great deal of effort into my school-work" on a five-point scale. Religious affiliation differentiates between Protestant, Catholic, Islamic, Buddhist, other-religious, or non-religious beliefs.

they are at least partly a consequence of networks rather than ascribed like SES (and to a large extent religious affiliation) among adolescents.

Results show no effects of consolidation between gender and ethnicity on ethnic homophily. I speculate that this is because ethnically unbalanced gender distributions in classroom populations are likely due to and attributed to chance. In contrast, when SES and ethnicity (or religion and ethnicity) are consolidated, this consolidation is more likely to both reflect and reinforce stronger ethnic boundaries, which would imply higher levels of ethnic homophily. The contrast between the implications of SES consolidation and gender consolidation helps to clarify the contribution of this paper: while the main effect of gender homophily is very strong (Figure 3), there is no evidence of a direct effect of gender-ethnic consolidation on ethnic homophily.³³ In contrast, while the main effect of SES homophily is very weak, there is evidence of a direct effect of SES-ethnic consolidation on ethnic homophily. While differences in SES may not factor strongly into friendship-making within classrooms absent of consolidation, differences in SES that are consolidated with ethnic differences may specifically reinforce and highlight ethnic differences.³⁴

Finally, results were insensitive to the measurement of ethnicity. Ethnicity in this study is operationalized by parents' country of birth, following existing studies (Leszczensky and Pink 2019; Smith et al. 2016; Smith et al. 2014; Stark and Flache 2012). Results were similar when exclusively coding students who originate from European Union countries as part of the "other Western" category, and when distinguishing between 1st and 2nd generation immigrant

³³ In more gender-ethnic consolidated classrooms, there will be higher levels of ethnic friendship segregation (due to the layering of gender and ethnic homophily as proposed by Blau and Schwartz), but there is no evidence of higher levels of ethnic homophily (underlying tendency towards ethnic similarity).

³⁴ These findings resonate with calls in several sociological subfields for a more intersectional and multidimensional approach that simultaneously considers measures such as class and race/ethnicity (Lamont 2002; Wimmer 2013).

minorities. There is no measurement of ethnicity that guarantees that ethnicity has strong implications for friendship-making – regardless of how ethnicity is defined, it is consolidation of ethnicity with other social attributes that reflects brighter ethnic boundaries.

The Meaning and Measurement of Friendships

Friendships, as proxied using directed friendship nominations, are a useful starting point in the above analyses because the directionality of nominations may reflect meaningful social hierarchies (Ball and Newman 2013), potential differences in popularity (Dijkstra et al. 2010), or disagreement between two individuals on the nature of the relationship (Lee and Butts 2018). Yet many scholars argue that friendships are by definition reciprocal relations: friendships are built on factors such as mutual positive sentiment and goodwill, emotional support and reliability, as well as regular interaction patterns (Bukowski and Hoza 1989; Hartup and Stevens 1997; Hruschka 2010; Kitts and Leal 2021). In the following analyses, I proxy friendships using mutual nominations.

These analyses could help shed light on the effects of consolidation in how it relates to the meaning of friendships. First, consolidation could exacerbate ethnic homophily when individuals are motivated by status-seeking: high levels of consolidation (such that ethnic minorities tend to have lower SES) may reduce the status of ethnic minorities and create a spillover effect: in this case, the association between low SES and ethnicity may create status-stigma even for ethnic minorities who have happen to have high SES in spite of high levels of consolidation. Second, consolidation could also exacerbate homophily if individuals' friendship decisions are based on evaluations of the potential for mutual understanding, support, repeated interaction, and bonding. Similarly, when ethnic groups differ in SES (under consolidation),

individuals may overestimate ethnic differences in interests, tastes, attitudes and outlooks compared to when ethnic groups are similar in SES.

The results, given in Table 5 show that the effect of consolidation on ethnic homophily is particularly strong when defining friendships as reciprocated (row 1), and not significant when only considering directed ties (row 2). This supports the idea that consolidation could create a kind of ethnic spillover in assessments of the potential for mutual understanding, support, repeated interactions, etc. The main arguments in this paper are structural and fully disentangling mutuality-based and status-based mechanisms is outside the scope of this paper. Thus, while the results in Table 5 show especially strong support for the first mechanism regarding mutuality-based explanations, both mechanisms could be at work.

[Table 5 About Here]

To further assess the robustness of results to status-based explanation for directed friendship nominations, I also provide two additional analyses that varies the modeling decisions regarding the directionality of ties in how it relates to SES hierarchy in Table 5 (row 3). First, I include in ERGMs, an additional model term *nodeicov* on SES that accounts for higher indegree among higher SES individuals. Second, I model the effect of SES on ties as directed by using an *edgescov* effect on the difference in SES (rather than *absdiff*). These analyses led to substantively similar estimates of ethnic homophily, as well as the effect of consolidation on ethnic homophily, as Table 5 shows. Additional analyses (not reported in Table 5 but available on request) show that results were robust to several other specifications of SES similarity (such as using *nodefactor* along with a categorical measure of SES).

A potential challenge to the measurement of friendships using friendship nominations is the length of the nomination list. While a maximum cutoff of 5 friendship nominations was

imposed by the CILS4EU survey, which asks students to nominate up to 5 best friends in their classroom (and the average student reported around 3 best friends), I repeat the analyses with cutoffs at 3, 4, and 5 nominations to assess the robustness of results to alternate cutoffs. Results remain substantively similar even when using the smaller cut-offs, as shown in the fourth set of analyses in Table 5.

Alternate Strategies of Measuring Consolidation

The main analyses rely on Cramér's V, which is a simple and widely applicable measure of correlation (which can for example be used for all variables in Table 4). However, this measure has several potential weaknesses. First, the backbone of Cramér's V is a chi-squared coefficient, which may be unstable in small samples (Atilgan 2013). While some prior scholars view the statistical instability of correlations among dimensions for smaller groups as a reflection of the real effect of group size on social interaction (Mcpherson and Smith-Lovin 1987:374), it is nevertheless important to assess the sensitivity of the results to extreme values that could occur due to statistical instabilities. I find that extreme values of Cramér's V do not drive results: effects of SES-ethnic consolidation on ethnic homophily are similar when using the natural log of Cramér's V (comparing 1st and 2nd rows of Table A-3 in the appendix).

Second, Cramér's V as a measure of consolidation between ethnicity and SES ignores the ordered and hierarchical nature of SES. Thus, I also conduct analyses using the rank biserial correlation coefficient, which tests for correlation between ordinal variables and dichotomous nominal variables. While the main results were not robust (3rd row of Table A-3), this could be a product of the dichotomization of ethnicity imposed by the rank biserial coefficient (which considers only two categories of the nominal variable). Thus, I also measure consolidation using the pseudo r-squared values associated with ordered logistic regressions that predict SES as an

ordered outcome using ethnicity. Using this strategy, I observe a robust effect of consolidation on ethnic homophily (4th row of Table A-3). Measuring consolidation using the pseudo r-squared value resulting from a multinomial logistic regression that predicts ethnicity using SES as a factor variable within each classroom also led to robust results (5th row of Table A-3). These regression-based strategies for measuring consolidation are sometimes used in other studies of consolidation that follow in the tradition of Blau and Schwartz (Moody, 2001: pg. 697) and have several limitations as well as benefits.³⁵ Overall, results were robust to several strategies for measuring consolidation and did not depend on whether SES was treated as ordinal or nominal. This speaks not only to the lack of sensitivity to the measurement of consolidation, but also lends more support for mutuality-based rather than hierarchy-based motivations for friendships.

Limitations and Future Directions

This study offers insight into interethnic classroom friendships among adolescents in 2010. However, due to rising immigration and shifts in the composition of migrant groups, adolescents now and in the future may experience different levels of consolidation than what is captured here (Castles and Miller 2013). Nevertheless, since this study uses data that oversample schools with more minority students, it may be able to make the kinds of distinctions that would apply to a larger and more heterogeneous group of minorities. Further studies are needed to determine whether the CILS4EU data are limited or useful as a harbinger of future trends.

Classroom friendships—the focus of this study—are a meaningful starting point for

³⁵ Also called “multiple correlation coefficients”, measures of consolidation based on regression fit require a more stringent set of assumptions (e.g., homoscedasticity) compared to Cramér's V and also do not treat the social dimensions involved symmetrically (it is sensitive to the choice of dependent variable). However as shown here, the lack of symmetric treatment can also offer substantively meaningful insights and important robustness checks.

studying ethnic boundaries. Most close adolescent friendships start in schools (Cotterell 2007), and in Western Europe, most of these friendships start in classrooms. For example, within-classroom friendships in Germany make up more than 83 percent of in-school friendships (Leszczensky and Pink 2015:23). Friendships in broader networks (e.g., on social media) are often made up of weaker ties (Hofstra et al. 2017; Kao and Joyner 2004). Since weaker ties are often less homophilous, the link between consolidation and ethnic homophily may be weaker for such ties. A limitation of the CILS4EU is that it does not adequately provide information on “other” friendships outside of classrooms. Potential synergies or tradeoffs among in-classroom, in-school, and outside friendships may be a productive direction for future research on the conditions under which ethnic boundaries become salient. Future research should also extend this analysis to the U.S. school context where, despite the greater relevance of broader networks and differences in ethnoracial dynamics, consolidation at the context-level could explain crucial differences in ethnoracial homophily.

Finally, while the link between consolidation and ethnic homophily is here driven by symmetric ties and is not sensitive to the directionality of associations between ethnicity and SES, future compositional analyses should further explore potential asymmetries in the implications of heterogeneity, for example by differentiating between native and immigrant homophily. In addition, while the methods used here account for the mechanical implications of compositional differences for opportunities of interaction, future studies should consider how such constraints could shape the experience of different ethnic groups in distinct ways.

CONCLUSION AND DISCUSSION

In many postindustrial societies, rising ethnic diversity raises questions about ethnic integration, especially forms of integration that are defined by weaker symbolic boundaries such as

increasing perceptions of similarity or more interethnic friendships (Drouhot and Nee 2019). Interethnic dynamics in schools and classrooms are of special interest: friendships among adolescents tend to improve subsequent interethnic attitudes, encourage future interethnic relationships, and promote inclusion (Ellison and Powers 1994; Emerson, Kimbro, and Yancey 2002; Kao et al. 2019). Yet little is known about how the layering of multiple differences at the context-level relates to interethnic dynamics. I analyze the implications of the configuration of SES and ethnicity, which I argue captures the strength of ethnic boundaries, for ethnic homophily using the case of classroom friendships. Results show more ethnically homogenous friendships in more consolidated classrooms (where knowing a students' ethnicity tells you a lot about their SES and vice versa) than in superdiverse classrooms (in which there is little correlation between ethnicity and SES).

The insights and strategy used here to capture structural intersectionality (ranging from consolidation to superdiversity) should prove useful to research beyond interethnic friendships, and even beyond ethnic integration (McCall 2005; Warikoo and Carter 2009).³⁶ My main theoretical contribution is to devise a much-needed framework for capturing social intersection at the context-level. Individual case studies show that the implications of social attributes, such as ethnicity, SES, or gender, need to be studied simultaneously, but there is disagreement on how to conduct such analyses quantitatively and structurally (McCall 2005). To capture structural intersectionality, I turn to Blau and Schwartz (1984), who first define consolidation. However, I differ from Blau and Schwartz, who argue for an additive “byproduct” effect (Blau and Schwartz 1984; Stark and Flache 2012; Wimmer and Lewis 2010) by arguing that the layering (or consolidation) of differences at the context-level may amplify each other beyond a simple

³⁶ For example, differences in consolidation between seniority and race/ethnicity/gender could help explain differences in workplace dynamics, above and beyond implications of these dimensions within a single workplace.

additive effect. Thus, a contribution of this study is to put studies of intersectionality in conversation with writings by Blau and Schwartz (1984) to improve existing frameworks for studying multidimensional social structure.

I also argue that improving the study of structural intersectionality is likely to be especially valuable for studies of ethnicity because structural intersectionality captures intracategorical variation (the more consolidation, the less intracategorical variation). Research has theorized that intracategorical heterogeneity within ethnic groups shapes interethnic dynamics. For example, intra-ethnic dynamics are not limited to individual-level prospects for boundary crossing, but also involve the salience and divisiveness of social differences as a whole (Alba and Nee, 2003). Several scholars have now written on the balancing act between showing the real difference that ethnicity makes and acknowledging the implications of internal heterogeneity within ethnic groups (Drouhot and Garip 2021; Kasinitz et al. 2008:23). Properly accounting for structural intersectionality has the potential to improve this balancing act. For example, the role of SES among students who have opportunities to meet is missing from current studies of interethnic classroom friendships. In focusing on SES, I also bring existing studies, which generally find that interethnic friendships are not a byproduct of SES at the individual level (Quillian and Campbell 2003; Smith 2018; Smith et al. 2014), closer to long-standing accounts of “ethclass” and intergroup dynamics (Gordon’s 1978; Allport, 1954): the success of interethnic contact as proxied by interethnic friendships is conditional on the joint configuration of ethnicity *and* SES.

Last, but not least, my findings imply that ethnic diversity, in terms of the univariate proportion of ethnic minorities or number of ethnic groups, does not sufficiently explain social outcomes. Currently, there is much debate about the implications of diversity for integration

(Goodreau et al. 2009; McFarland et al. 2014; Mouw and Entwisle 2006; Wimmer and Lewis 2010). However, due to broad concerns about the challenges of diversity (Putnam 2007), scholarly and public interest in diversity is often disproportionate compared to interest in inequality (Abascal and Baldassarri 2015; Bonilla-Silva 1997). Yet future studies might find it more constructive to consider consolidation, not unidimensional diversity, when it comes to explaining and predicting intergroup dynamics. Greater attention to consolidation (and the range of inter- and intracategorical variation that consolidation captures) is likely to improve the study of any social relationships in settings in which scholars can observe the population structure. In contemporary classrooms, communities, and societies, scholars should study the implications of joint configurations of multiple attributes, from superdiversity (Vertovec 2007) to consolidation.

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TABLES AND FIGURES

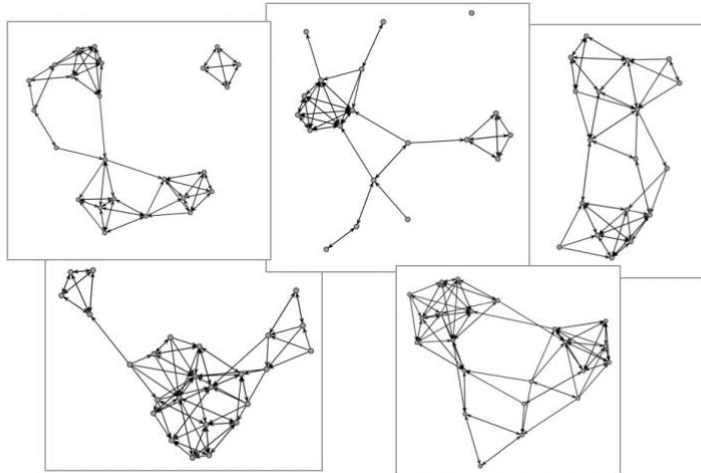


FIG. 1. – Examples of adolescent classroom friendships

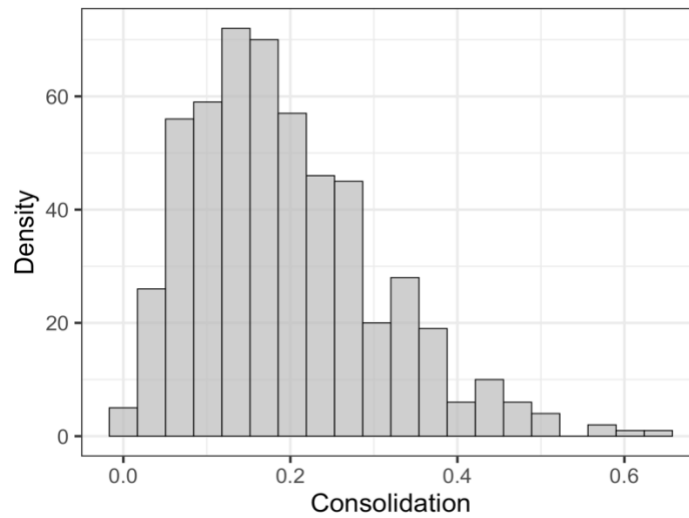


FIG. 2. – Distribution of consolidation between SES and ethnic origin in adolescent classrooms (higher numbers indicate more consolidation)

TABLE 1
Model of Friendship Formation

Parameter	Description	Statnet term; technical notes
Density	Baseline propensity of friendships	<i>edges</i>
Mutuality	Propensity of reciprocity – the increased propensity of a reciprocated friendship compared to an unreciprocated friendship	<i>mutual</i> ; sender and receiver effects (e.g. <i>gwidegree</i> , <i>gwodegree</i>) are not included to improve convergence. They are redundant with existing model terms
Ethnic Homophily; SES Homophily	Increased propensity of friendships between same-ethnic individuals; 1 SD more similar in SES	<i>nodematch</i> (ethnicity); <i>absdiff</i> (SES);
Gender Homophily	Increased propensity of same-gender friendships	<i>nodematch</i> (gender)
Covariates: Ethnic-, SES-, and Gender-Differences	Increased propensity of friendships involving ethnic minorities, higher-SES individuals (1 SD), and girls	<i>nodefactor</i> (ethnicity); <i>nodecov</i> (SES); <i>nodefactor</i> (gender); main analyses do not consider differential ethnic homophily, because observed patterns do not differ for majority and minority homophily
Transitivity	Increased propensity of friendships that contribute to a transitive two-path connecting a pair of friends in the same direction. This best captures the notion that “the friend of my friend is my friend”	<i>dgwesp</i> (alpha = 0.5); alpha refers to a decay parameter for decreasing marginal returns to the propensity of friendships given additional mutual friends. A flexible decay caused problems with estimation, so it is held at 0.5. Fixing the decay at 0.4, 0.6, and 0.7 led to similar results
Tension	Increased propensity of friendships that create situations in which two people are linked indirectly (by a two-path) but not directly	<i>dgwnsp</i> (alpha = 0.5); alpha refers to a decay, similar to the decay for <i>dgwesp</i> ; also note that the coefficient on this parameter is typically negative

TABLE 2
Descriptive Statistics of the Included and Excluded Classrooms

	<u>Included Sample</u>		<u>Excluded Sample</u>		t (two-tailed)
	Mean	SD	Mean	SD	
Size	21.66	4.38	18.91	4.81	4.37***
Diversity	0.25	0.23	0.20	0.22	-1.52
Proportion Minority	0.39	0.23	0.34	0.24	1.47
Consolidation	0.19	0.14	0.18	0.17	0.52
Mean SES	50.33	10.25	53.71	11.88	-2.17*
	N = 503		N = 70		

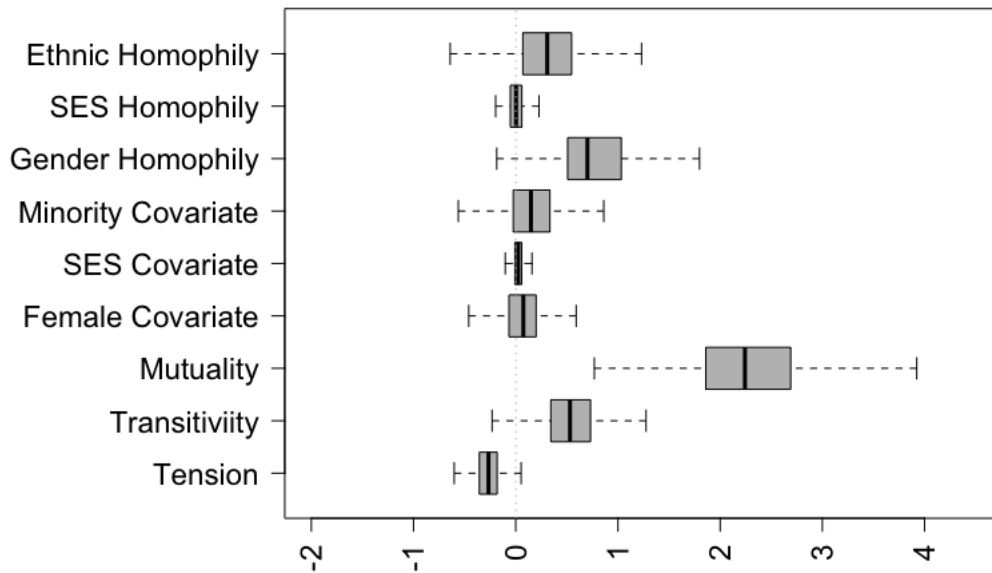


FIG. 3. – Summary of ERGM coefficients across classrooms

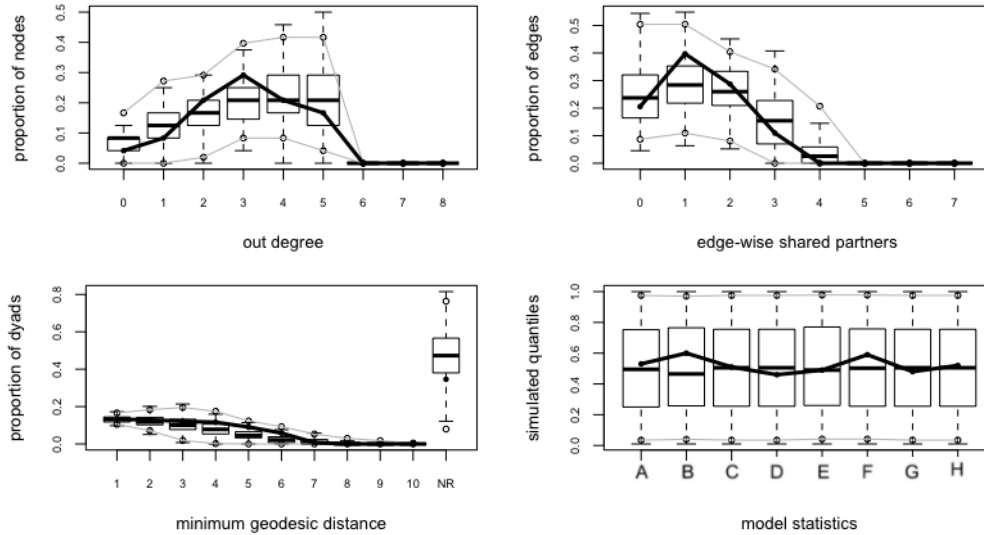


FIG. 4. – Goodness of fit diagnostic plots for an example classroom on three network statistics not included in the model as well as for included network statistics. Boxplots show the distribution of the statistics across 100 simulated networks. Soft lines are 95 percent bounds on distributions. Boxes represent the median and the interquartile range. Dark lines show the distribution for the original network. In the bottom left, " NR " refers to dyads that are not reachable from each other.

TABLE 3
Classroom Composition on Ethnic Homophily

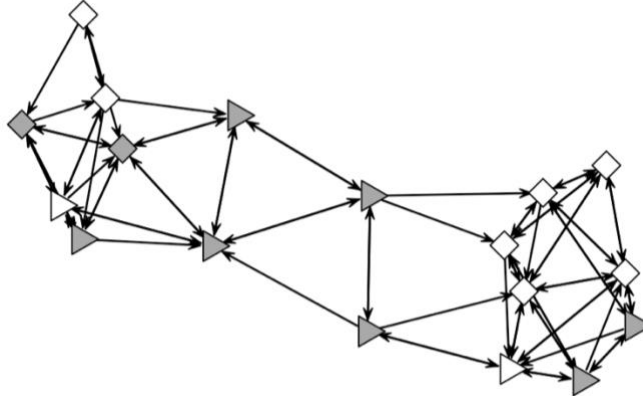
	Coef.	SE
Intercept	0.03	(0.13)
Consolidation	0.46**	(0.13)
Mean SES	-0.06**	(0.02)
Proportion Minority	-0.40**	(0.11)
Diversity	0.19*	(0.10)
Class Size	-0.00	(0.01)
Country (ref. = England)		
Germany	-0.02	(0.04)
Netherlands	-0.00	(0.04)
Sweden	0.07	(0.04)
AIC		314.90

Notes: N = 11,011 students in 503 classrooms. Regressions weighted by inverse variance of estimated ERGM coefficients on ethnic homophily. * P < 0.05, ** P < 0.01, *** P < 0.001

A. Low Consolidation



B. High Consolidation, mechanical effect on homophily (“byproduct”)



C. High Consolidation, structural effect on homophily (context-level)

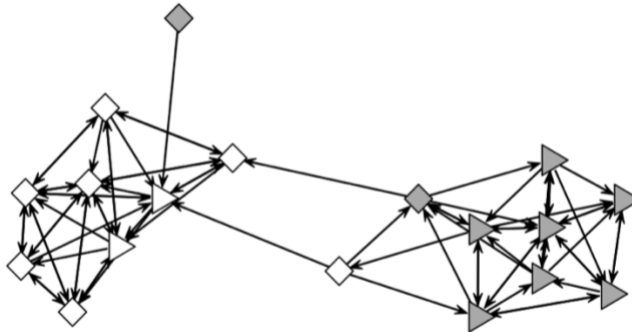


FIG. 5– Simulated friendships in three example classroom friendship networks. There are 9 Turkish students (gray nodes) and 9 German students (white nodes) in each network. High SES status is given by a square node, while low SES status is given by a triangular node. Example A and Examples B/C differ in levels of consolidation. Example C differs from Example B in that it illustrates the main finding that consolidation has a structural (direct) effect on ethnic homophily, whereas Example B assumes that the effects of consolidation are mechanical

TABLE 4
 Predicting Ethnic Homophily using Different Forms of Consolidation with Ethnicity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Consolidation							
SES	0.46** (0.13)	0.45** (0.13)	0.47** (0.14)	0.55*** (0.14)	0.37** (0.14)	0.52*** (0.14)	0.49*** (0.15)
Religion	--	0.22** (0.08)	--	--	--	--	0.19* (0.08)
Language	--	--	-0.04 (0.13)	--	--	--	-0.05 (0.14)
School Effort	--	--	--	-0.27* (0.13)	--	--	-0.18 (0.14)
Social Attitudes	--	--	--	--	0.27** (0.09)	--	0.27** (0.10)
Gender	--	--	--	--	--	-0.08 (0.12)	-0.04 (0.12)

Notes: N = 11,011 students in 503 classrooms. Net of classroom size, survey country, proportion minority, and mean SES. Regressions weighted by inverse variance of estimated ERGM coefficients on ethnic homophily. * P < 0.05, ** P < 0.01, *** P < 0.001

TABLE 5
Effect of SES-ethnic Consolidation on Ethnic Homophily, Varying the Treatment of Directed Ties, Specification of Homophily, and Measurement of Friendships

	Coef.	SE	# Classrooms
(1) Using reciprocated nominations only	1.01***	0.28	374
(2) Using unreciprocated nominations only	-0.03	0.11	345
(3) Accounting for SES-based directionality			
(3a) Adding SES-indegree effect	0.34**	0.12	508
(3b) Directed SES-hierarchy	0.41**	0.13	503
(4) Varying the length of nomination list			
(4a) Cut-off at 5 nominations	0.46**	0.13	503
(4b) Cut-off at 4 nominations	0.41**	0.13	496
(4c) Cut-off at 3 nominations	0.45**	0.16	481

Notes: (1) and (2) drop the *mutuality* term and use *gwesp* and *gwnsp* instead of *dgwesp* and *dgwns*; (3a) includes an additional model term *nodeicov* on SES that accounts for higher indegree among higher SES individuals (3b) models the effect of SES on ties as directed by using an *edgescov* effect on the difference in SES (4b) and (4c) assess the sensitivity of main results to a shorter nomination list; The third column displays the number of classrooms for which the different models converged; * P < 0.05, ** P < 0.01, *** P < 0.001

APPENDIX

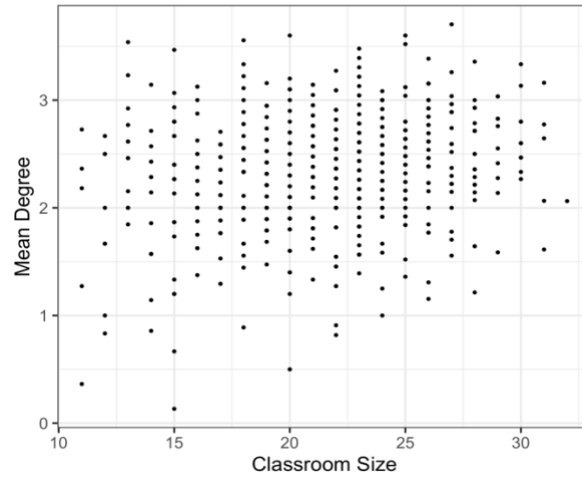


FIG. A-1. – Distribution of Mean Degree by Classroom Size

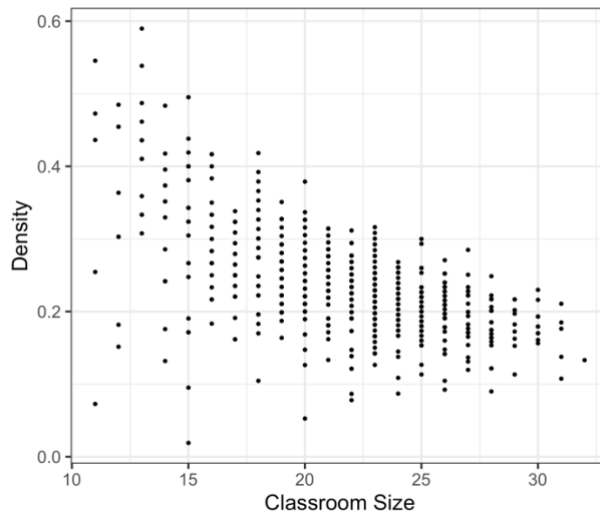


FIG. A-2. – Distribution of Network Density by Classroom Size

TABLE A-1
 Estimated Mean ERGM Coefficients across Classrooms

	Means	SE
Edges	-3.064***	(0.045)
Mutuality	2.220***	(0.027)
Transitivity	0.548***	(0.013)
Tension	-0.259	(0.006)
Covariates		
Minority	0.145***	(0.010)
SES	0.021***	(0.002)
Gender	0.060***	(0.008)
Homophily		
Ethnic	0.350***	(0.013)
SES	-0.008*	(0.003)
Gender	0.632***	(0.015)

Notes: N = 11,011 students in 503 classrooms.

TABLE A-2
Predicting Ethnic Homophily, Disaggregating by Survey Country

	England	Germany	Netherlands	Sweden
Intercept	-0.17 (0.24)	0.16 (0.26)	0.11 (0.49)	-0.02 (0.29)
Consolidation	0.45 (0.34)	0.52* (0.21)	-0.06 (0.38)	0.63* (0.25)
Mean SES (scaled)	-0.03 (0.03)	-0.05 (0.04)	-0.13** (0.04)	-0.05 (0.03)
Proportion Minority	-0.57** (0.18)	-0.12 (0.24)	-0.25 (0.48)	-0.34 (0.23)
Diversity	0.22 (0.20)	0.14 (0.20)	0.16 (0.40)	0.03 (0.22)
Class Size	0.00 (0.01)	-0.00 (0.01)	0.00 (0.01)	0.01 (0.01)

Notes: N = 96, 146, 126 and 140 English, German, Dutch, and Swedish classrooms. Regressions weighted by inverse variance of estimated ERGM coefficients on ethnic homophily. * P < 0.05, ** P < 0.01, *** P < 0.001

TABLE A-3
Effect of SES-Ethnic Consolidation on Ethnic Homophily,
Using Several Strategies to Measure Consolidation

Measurement of Consolidation	Coef.	SE	AIC
(1) Cramér's V	0.46**	0.13	314.90
(2) Log Cramér's V	0.07***	0.02	312.88
(3) Rank Biserial Coefficient	0.03	0.02	325.56
(5) Regression fit (predicting SES)	0.42**	0.15	319.17
(4) Regression fit (predicting ethnicity)	0.54***	0.16	315.27

Notes: The measurement used in strategy (4) is based on the pseudo-R-squared of a multinomial logistic regression predicting ethnicity using SES as a factor variable. The measurement used in strategy (5) is based on the pseudo-R-squared of an ordered logistic regression predicting SES as an ordinal variable using ethnicity as a factor variable. * P < 0.05, ** P < 0.01, *** P < 0.001