More than a Sorting Machine:
Ethnic Boundary Making in a Stratified School System*

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Abstract

This article examines the structural conditions that shape ethnic boundary making in the school setting. While previous work has focused on the ethnic composition of student bodies, our study places schools in their institutional and local contexts. We argue that the formation of identities and networks varies across local areas depending on the extent of ethnic stratification across schools. Empirically, we turn to the case of Germany, where the role of schools as producers of categorical inequalities is particularly obvious. Our analysis links large-scale survey data on adolescents' identification and networks with administrative geocoded information on local stratification across secondary schools. We find that minority students in schools with identical ethnic compositions show different inclinations to identify as a majority group member and to form friendships with majority peers—depending on the local extent of ethnic stratification across schools. To place these findings in a cross-national perspective, we identify scope conditions of these mechanisms of boundary making and discuss their presence in other countries and school systems. Our results support recent theories of immigrant incorporation and offer a more contextualized understanding of ethnic boundary making in schools.

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INTRODUCTION

In Western Europe, the incorporation of ethnic minorities has become a central concern that is being hotly debated in light of the recent refugee influx, Islamist and right-wing violence, and rise of nationalist and populist movements. As in other ethnically diverse societies, a fundamental challenge is how to build a community where fellow citizens develop shared identities and social relationships that bridge ethnic divides.

In sociology, assimilation theory has had a long history of addressing this question. In the classic account of assimilation, immigrant minorities enter the social networks of the majority group and move up the social ladder, through which they also begin to view themselves as full members of the receiving society (Gordon 1964). Over the years, this strand of sociological theorizing has undergone several refinements and revisions (Alba and Nee 2003; Portes and Rumbaut 2001). The most recent advancements point to different ways of immigrant incorporation and contend that these crucially depend on the social boundaries that minority groups face in their pursuit of increased life chances (Alba and Nee 2003; Nee and Alba 2013). This focus on boundaries shifts attention to the role of the majority population and its institutions in shaping the life chances, social networks and identities of minority group members (Crul and Schneider 2010; Wimmer 2008).

Our study examines ethnic boundary making in the school setting. Schools are arguably one of the most influential institutions of modern societies. They provide a context where adolescents of diverse backgrounds meet and where processes of group and identity formation unfold. Moreover, due to the declining numbers of the native majority in young age groups, it is in schools where increasing levels of ethnic diversity often become visible for the first time. In sociology, a vast amount of research has turned to schools as microcosms in which the new social fabric of societies is taking shape (see Warikoo and Carter 2009, Alba, Sloan, and Sperling 2011). Most large-scale quantitative studies have asked how the ethnic (or racial) composition of schools affects opportunities for inter-group contact, threat perceptions, and actual contact and its consequences. In particular, high ethnic concentration has been found to restrict friendship opportunities and to affect outgroup attitudes and preferences for cross-group friendships (e.g., Moody 2001, Mouw and Entwisle 2006, Baerveldt et al. 2007, Munniksma et al. 2017, Smith et al. 2016).

While the relationship between ethnic composition and inter-group contact has been well established, we submit that the influence of schools as institutions and sites of boundary making goes far beyond such compositional effects. We argue that minority students in schools of identical ethnic composition will show different inclinations to identify as a majority group

member and to form friendships with majority peers—depending on the extent of ethnic stratification across schools in the local context. In areas where such stratification is strong, those minority students who nevertheless make it to the more prestigious schools will perceive a marked difference from their minority peers and are more likely to adopt strategies of boundary crossing. In turn, majority students in such schools will tend to engage in boundary policing and tie their acceptance of minority students as friends to the latter's identification with the majority group. In comparison, in contexts where ethnic stratification across schools is weak, the boundary between majority and minority groups will be less salient, so that patterns of identification and affiliation become less coupled with minority students' educational placement.

We derive this argument by linking the study of boundary making in school settings with recent theories of immigrant incorporation (Nee and Alba 2013) and a view of schools as producers of categorical inequality (Domina, Penner, and Penner 2017). While the study of social networks among schoolchildren has proliferated in recent years, this research has largely overlooked that schools and school systems are institutions of categorical inequality that create social categories by sorting students between and within schools (e.g., into age grades, ability groups, or tracks). Building on a long line of qualitative work (e.g., Carter 2005, Warikoo and Carter 2009), we argue that ethnic boundary making is often a response to the place that students and schools occupy in the wider context of stratification. In particular, strategies of boundary crossing and policing will become more likely in school contexts where minority students face a bright boundary (Nee and Alba 2013).

To provide a large-scale analysis of how the school system can shape the formation of identities and peer relations, we turn to a case in which the role of schools as producers of categorical inequalities is particularly obvious: Germany's stratified secondary school system. In contrast to the within-school academic tracking in the United States, sorting in the German model takes place *between* vertically differentiated types of secondary schools. These secondary school types form a clear hierarchy, differ in academic rigor across subjects, and confer different social status and opportunities for postsecondary study to students (Alba and Foner 2015, Crul and Schneider 2010, Domina et al. 2017). Such stratification across schools subjects adolescents to different life worlds and produces visible categorical inequalities, often along ethnic lines. Germany's system of between-school tracking is therefore a strategic research site (Merton 1987) to examine how stratification in the school system shapes the formation of identities and peer relations.

Our study answers two major calls in the study of ethnic boundary making: to break down the boundary metaphor by analyzing both identities and social affiliations, as well as their interrelationships (e.g., Brubaker 2014; Jenkins 2014; Wimmer 2014), and to explain why ethnic origin matters in certain contexts but not in others (Alba 2005; Wimmer 2008; Warikoo and Carter 2009). Empirically, our analyses link large-scale survey data on adolescent networks and identities in 144 German schools with administrative data containing geocoded information on all secondary schools in Germany. This unique combination enables us to study the interplay of identities and social affiliations within schools, while positioning each school in its institutional and local context.

Our results suggest that ethnic boundary making strongly depends on the local context in which schools are embedded. In areas with strong ethnic stratification across schools, minority students who make it to the more prestigious schools are much more inclined to identify as German. Moreover, in these schools, such identification becomes much more important for their friendships with majority students. In areas with weak ethnic stratification, boundaries seem to be more blurred or blur-able, as educational placement, identification, and cross-group friendships are more loosely related. Additional analyses reveal important scope conditions of these processes. We find that Muslim students are less inclined to identify as German even in local contexts that are particularly conducive for crossing the native-immigrant boundary. Moreover, the local mechanisms of boundary crossing require students to be aware of local stratification across schools – which depends on social ties to peers from other schools. These scope conditions and comparable data on England, the Netherlands, and Sweden suggest that our results may be relevant well beyond the German case, including in countries with formally open educational systems.

Overall, our study lends support to recent theories of immigrant incorporation and offers a more contextualized understanding of ethnic boundary making in schools. Beyond their envisaged role as meritocratic sorting machines, stratified school systems can profoundly shape social identities and affiliations in adolescence.

THEORY AND PAST RESEARCH

Approaches to ethnic boundary making in the school setting

The concept of boundaries is a central ingredient of contemporary theories of immigrant adaptation. Ethnic boundaries are distinctions between individuals based on the belief of their (real or putative) common descent that shape individuals' actions and mental orientations towards one another (Alba and Nee 2003; Alba 2005; Barth 1969; Wimmer 2008). Analyses of

boundary making should therefore ideally focus on both: the identities individuals form and the social relations they enter (Jenkins 2008; Tilly 2005).

During adolescence, identities and peer relations are important issues yet subject to considerable change (Crosnoe and Johnson 2011; Giordano 2003; Meeus 2011; Steinberg and Morris 2001). Adolescents develop a sense of who they are and their place in society based on their daily experiences and interactions. Many of these experiences take place in schools. As cultural consensus on the location and meaning of ethnic boundaries may emerge in "environments characterized by face-to-face interactions and dense social networks" (Wimmer 2008, p. 999), schools provide a promising contextual unit of analysis for studying ethnic boundary making (Tabib-Calif and Lomsky-Feder 2014; Warikoo and Carter 2009).

However, while work on immigrant incorporation has produced important insights on the role of schools for minority students' educational performance and attainment (Alba et al. 2011; Alba and Holdaway 2013; Kasinitz et al. 2008, chap. 5; Portes and MacLeod 1996, 1999), it has rarely considered how schools shape the formation of identities and peer relations (Feliciano 2009; Brubaker et al. 2006, pp. 269-277). This question has mostly been addressed outside the sociological literature on assimilation. Previous research can be roughly divided into two, largely unconnected strands: Social network analyses of racial and ethnic homogeneity of friendship networks and qualitative research on how race and ethnicity are negotiated in educational settings.

A strong case can be made for using data on complete social networks to test propositions on social boundary making (Wimmer and Lewis 2010). Such data capture which social ties form among students and which ties could have but did not form, allowing researchers to identify the determinants of tie formation in a school setting (Wimmer and Lewis 2010; Stark 2011; McFarland et al. 2014; Smith et al. 2016). This line of research has generated a number of important insights. A recurring finding is that friendships between students who share the same ethnic origin are more frequent than to be expected by chance alone. Controlling for other known principles of tie formation (e.g., reciprocity or triadic closure), the remaining tendency to befriend one's co-ethnics is usually interpreted as indicating ethnic homophily – a social-psychological preference for co-ethnic friendships (McPherson, Smith-Lovin, and Cook 2001). In this literature, the ethnic homogeneity of friendship networks has been argued to result from local opportunities and students' preferences for intra- vs. inter-ethnic contact. Accordingly, the impact of the school context has been theorized in two ways. The ethnic composition of schools affects ethnic homogeneity either via varying opportunities for contact (Blau 1977; Feld 1981) or by activating or strengthening preferences for intra-ethnic ties. For example, based on

ethnic competition theory (Blalock 1967), it has been argued that ethnic groups of large and similar size are particularly likely to lead to threat perceptions and conflict (Moody 2001; Mouw and Entwisle 2006; Currarini, Jackson, and Pin 2010; Smith et al. 2016).

Despite the significance of this research agenda, its general analytical focus on patterns of tie formation and school composition has been associated with two limitations that our study seeks to overcome. First, with few exceptions (Boda 2018; Boda and Néray 2015; Leszczensky et al. 2016; Leszczensky and Pink 2019), social network analyses of ethnic boundary making have generally failed to consider the role played by students' subjective identities. As both identities and social affiliations are core components of boundaries (Wimmer 2008, p. 975), examining students' identifications and their consequences for tie formation is crucial to capture strategies of ethnic boundary making. Second, by reducing schools to sources of varying ethnoracial composition, most network-analytic research has overlooked that schools and school systems are institutions of categorical inequality (Domina et al. 2017). Educational systems create social categories by sorting students between and within schools (e.g., into age grades, ability groups, or tracks). These categories can lay the ground for durable inequalities and serve as a context for the formation of identities and social relations among students. It is therefore important to recognize that ethnic boundary making is often a response to the place particular students and schools occupy in the wider context of stratification.[1]

Both blind spots have been at the center of a second line of research that has been produced in a quite different intellectual world, based mostly on qualitative or interpretive standards of evidence (Warikoo and Carter 2009). In educational research, a host of studies has documented how minority students negotiate their identities in particular school contexts and how this process is interlinked with their own academic success as well as that of their peers (Horvat and Lewis 2003; Carter 2003, 2005; Tyson, Darity, and Castellino 2005). A main claim stemming from this work is that institutional stratification not only perpetuates school inequality but also "reinforce[s] racial and ethnic boundaries" (Carter 2005, p. 75). In the United States, ability-based tracking is an institutional practice that takes place within schools. Black and Latino students tend to be especially underrepresented in the high-track classes. Minority students from disadvantaged backgrounds who make it into high-track classes have been described as facing the challenge of accommodating their peers who are left behind and being accused of "acting

[1] Previous network-analytic studies on ethnic boundary making have been restricted by the limited scope of available network data. For example, the most detailed longitudinal studies of identification and friendship formation are based on only nine lower-track schools in Germany (Leszczensky and Pink 2019) or schools from a single Dutch city (Leszczensky et al. 2016).

white." Compared to its initial formulation (Fordham and Ogbu 1986), more recent research has both differentiated and contextualized this phenomenon (Carter 2003, 2005; Tyson et al. 2005). In her ethnographic research, Prudence Carter (2005) stresses that "acting white" is not implied by being successful in school per se but by abandoning one's own cultural background in exchange for the dominant white culture, the "culture of power." She also argues that the institutional practice of tracking amplifies this dilemma by putting successful African-Americans into tracks that are predominantly white and Asian and separating them from their peers in school. This argument resonates well with the study of eight high schools by Tyson et al. (2005), which finds that high-achieving black students are accused of "acting white" only in schools where black students are strongly underrepresented in advanced classes.

Despite the particular history and situation of racial minorities in the United States, particularly of African-Americans, these studies can inform research in other contexts.[2] At a more general level, they illustrate the boundary work of disadvantaged minority students who face stratified school settings that are culturally dominated by the majority group (Carter 2005). As a review concludes, a major challenge of this line of work is to investigate the generalizability of theoretical arguments in more large-scale studies (Warikoo and Carter 2009, p. 385).

In brief, ethnic boundary making in the school setting has been studied from two markedly different analytical angles. While taking a quantitative methodological standpoint, our study builds on and connects both lines of research. First, we use the power of social network analysis to adequately control for network structure when examining the interplay of identification and peer affiliations in schools. Second, we adopt a bird's-eye view of a stratified school system that allows us to show that seemingly generic processes of tie formation depend on institutional and local contexts (Entwisle et al. 2007; Adams et al. 2012; McFarland et al. 2014).[3] We thereby incorporate two core elements of the literature on race, ethnicity and education into the analysis of social networks: identities and institutional stratification.

[2] For an elaborated argument on treating "race" as a subtype of a broad understanding of ethnicity for comparative purposes, see Wimmer (2008, pp. 973-975).

[3] To our knowledge, Fryer and Torelli's (2010) study has been the only previous attempt to use data on complete networks across a large number of schools to test cultural theories on ethnic boundary making. Using AddHealth data, they find that high achievement reduces peer popularity among black and Hispanic students, particularly in mixed schools. However, Flashman (2012) showed that this finding is largely due to differential opportunities to befriend high-achieving students of the same racial group.

Germany's secondary school system as a strategic research site

Germany provides a well-suited case to conduct a large-scale analysis of how institutional stratification in the school system can shape the formation of identities and peer relations. The country's secondary school system sorts students into a hierarchy of school types which differ in academic rigor across subjects and confer different opportunities for postsecondary study (for details, see the data section). In particular, attendance of the highest type of secondary school (the German *Gymnasium*) is a strong distinguishing attribute among students: It is widely treated as a signal of greater intellectual ability and greater socio-economic prospects, making these high-track schools stand out as the most prestigious ones.

Although the German system is known for its particularly early and rigid assignment of students to a hierarchy of secondary schools, the phenomenon studied has implications well beyond the German case. In some countries, similar between-school tracking takes place at a later point in the school career (e.g., the Netherlands, France, Israel, Japan, Korea, or Mexico). In other countries, like in the United States, differentiation primarily takes the form of course-based tracking within schools. However, pronounced differences in school quality also exist between different public and private schools in the United States (Logan, Minca, and Adar 2012; Saporito and Sohoni 2007). In their seminal study of immigrant incorporation in and around New York City, Kasinitz et al. (2008, p. 133) highlight that the children of immigrants are unevenly distributed across a "complex and differentiated system of primary and secondary schools and colleges" (see also Alba and Holdaway 2013: 268; Crul and Holdaway 2009; Domina et al. 2017). At the same time, the more informal and complex hierarchy of secondary schools in the United States makes it more difficult to ascertain the extent of ethnic stratification across (and within) schools. In comparison, the German case provides a convenient starting point for studying how local ethnic stratification across schools shapes ethnic boundary making.

Similar to disadvantaged black and Latino groups in the United States, the most sizable immigrant minorities in Germany are underrepresented in the higher tracks (Kristen and Granato 2007). However, as tracking takes place *between* schools, high-achieving minority students are much more separated from their lower-achieving co-ethnic peers since they attend different schools. This should make them less likely to face pressures by co-ethnic students to remain loyal to their ethnic group (Portes and Sensenbrenner 1993). In fact, attending schools that tend to be dominated by the native majority group might lead to increased pressures as well as greater readiness to assimilate culturally and socially (Carter 2005, p. 29).

Of bright and blurred boundaries

In examining ethnic boundary making in stratified school systems, we build on theoretical notions and arguments that have been developed by Richard Alba and Victor Nee in their new assimilation theory (Alba and Nee 2003; Nee and Alba 2013). Similar to other modern accounts of assimilation, they argue that there are different ways in which immigrant minorities can become part of a national community and that these crucially depend on the social boundaries that minority groups face in their everyday lives.[4] For our purposes in understanding the adaptation of minority youth, the distinction between boundary crossing and boundary blurring is particularly important (Alba 2005, p. 23; see already Bauböck 1994; Zolberg and Woon 1999).[5] Boundary crossing involves an individual moving from one group to another, while the boundary is left unchanged. This individual-level assimilation has been at the heart of classic accounts of assimilation. Boundary blurring, on the other hand, means that the underlying distinction between majority and minority becomes less clear so that which individuals belong to which group is either more ambiguous and uncertain or less salient and consequential.

While this typology of boundary-related changes is useful theoretically, processes of immigrant adaptation in the real world can be expected to be more fuzzy and dynamic. Minority group members will adopt crossing and blurring as situational strategies, oscillate back and forth depending on circumstances, and will be treated differently by different parts of the audience of such identity performance (cf. Goffman 1969). Adolescents in particular are often in a stage of exploration (Phinney and Ong 2007; Quintana 2007) in which they face great uncertainty about whether possible attempts at boundary crossing will be successful – which would ultimately mean that they become (re-)classified as belonging to the majority group (Alba 2005, p. 23; Wimmer 2008; Boda 2018). This uncertainty makes it unlikely that minority youth will completely dis-identify with their ethnic background. Moreover, adolescents usually still live with and remain attached to their families, which makes their ethnic origin present and visible on an everyday basis. Not surprisingly then, research has found that most minority youth remain considerably identified with their ethnic origins in Europe (Heath, Jacob, and Richards, 2018; Schneider et al. 2012a).

[4] As another prominent approach, segmented assimilation theory also focuses on boundary work among the children of immigrants who negotiate their identities between ethnic communities, marginalized native minorities, and the mainstream (Portes and Zhou 1993; Portes and Rumbaut 2001). However, as the focus on boundary making is more explicit in Alba and Nee's theory, we adopt their framework in this article.

[5] In addition, there is the long-term, often generational process of *boundary shifting* by which former minority groups become part of a redefined mainstream. An example is the incorporation of Catholics and Jews into a Judeo-Christian mainstream in the United States, where these groups were previously perceived of as minorities under a white Anglo-Saxon Protestant mainstream.

From the perspective of assimilation theory, the most crucial question during adolescence is *whether minority youth start to identify with and form social ties to the native majority group*. A common identity as members of one nation can serve as a basis for trust and solidarity across ethnic origin divides and is therefore a core component of building a community of fellow citizens in ethnically diverse societies (Miller 1995, p. 140; see also Jenkins 2008, p. 15; Brubaker 1992, p. 188). However, building such a common identity is particularly difficult in Europe, where public and political discourse tend to draw a strong line between immigrant and native origin (Alba and Foner 2015, pp. 198-203; Schneider et al. 2012b, p. 229). Our analysis will focus on this crucial component of boundary crossing that might prepare the ground for a full change of group membership as minority youth come of age.[6]

A key proposition of Alba and Nee's theory posits that boundary crossing will be necessary only under certain conditions: when minorities face a *bright boundary* (Nee and Alba 2013, p. 368). If the distinction between majority and minority is less clear or less salient, minority group members do not have to cross the boundary to become part of a national community and fully participate in the life chances it offers. In contrast, it is much more difficult to ignore a bright boundary. Salient and clear divides commonly imply hierarchies of belonging where majority members belong without question while minorities will remain "outsiders" if they are not willing or able to assimilate (Skey 2010, 2013). A bright boundary will therefore create incentives among minority group members to adopt the strategy of boundary crossing – although such a move will not be feasible for all minorities alike and depends on the social acceptance by the majority group (Nee and Alba 2013, p. 368).

We argue that the local extent of ethnic stratification across schools affects the brightness of boundaries. According to Alba (2005, p. 26), the extent to which a boundary is blurred or blurable depends on the institutionalization of the native-immigrant distinction and related distinctions, such as those in religion and language. When "this complex of distinctions is manifest in many domains (implying that participants enact it with regularity in their everyday lives) and is associated with salient asymmetries in social status and power, then it is unlikely

[6] More generally, our interest is in minority students' cultural and social assimilation into the dominant ethnic group (Carter 2005, pp. 28-29) – which corresponds to feeling German in this particular national context (Alba and Foner 2015, pp. 198-203). This is the main reason why we do not adopt Berry's well-known scheme of the four acculturation types of integration, separation, marginalization, and assimilation (Berry 1997; Berry et al. 2006). Dichotomizing and combining responses on survey items that separately ask for the strength of national and ethnic origin identification does not do justice to the complexities and context-dependency of adolescents' identities (Schneider et al. 2012b, pp. 209-210; see also more generally, Brubaker 2004, p. 41). For example, even adolescents who appear to hold dual identities might not be able to reconcile national and ethnic identities but resort to code-switching between school and home environments. While surveys are limited in capturing adolescents' identities in a comprehensive and nuanced fashion (Kasinitz et al. 2008, pp. 81-82), quantitative analyses of survey data are most powerful in tracing the impact of network embeddedness and of wider contexts.

to be blur-able." (Alba 2005, pp. 26-27). In areas where ethnic stratification across schools is strong, it gives rise to such salient asymmetries in social status across the immigrant-native divide and strongly shapes adolescents' everyday lives. Hence, strong ethnic stratification across schools should confront minority students with particularly bright boundaries in the more prestigious schools, which tend to be dominated by the majority group.

Mechanisms and Hypotheses

To derive testable implications, we consider the situation in areas with strong ethnic stratification across schools in more detail. In Germany, this means that it is uncommon for minority students to attend the more prestigious (i.e., high-track) schools in such areas. We argue that this will produce hierarchies of belonging that are associated with increased assimilationist pressures and affect how minority students who nevertheless make it to such schools think of themselves.

First, the relatively few minority students who attend the more prestigious high-track schools will perceive a marked difference between themselves and most other minority peers in the local area. Because they have made it into the more prestigious schools, these minority students have a certain incentive to develop an identity that sets them apart from their less successful minority peers. Identifying as German may be one particularly beneficial way of doing so since this identity might be associated with a higher status (Tajfel 1981), especially in contexts in which ethnic stratification is more pronounced (Carter 2005).[7]

Second, high-track schools in such areas are prototypical "mainstream" institutions in the sense of "those social and cultural spaces where the native majority feels 'at home' or, in other words, where its presence is taken for granted and seen as unproblematic." (Alba and Foner 2015, p. 5; see also Brubaker et al. 2006, p. 273). To the extent that the cultural norms, codes, and styles of the majority group are dominant in these high-track schools, minority students might feel the need to orient themselves towards these implicit and explicit cultural requirements of the school (Carter 2005; Kasinitz 2008: 255). Relatedly, majority students might expect minority students to identify as German and embrace dominant cultural styles in

[7] This argument resonates with Turner's self-categorization theory (Turner 1999; Turner et al. 1987) which assumes that individuals define themselves by assessing the degree to which they are similar to (or different from) others in their immediate perceptual environment (see also Smith and Moore 2000). However, based on Turner's theory, one could likewise expect that the relatively few minority students in the high-track schools will primarily perceive a difference with their majority group schoolmates due to their immigrant origin. In contrast, our theoretical argument emphasizes the impact of ethnic stratification in the wider local context. Such a contextual view is beyond self-categorization theory, because the latter defines contexts "primarily in terms of individual perceptions and psychological processes rather than as external features with an independent influence." (Deaux and Martin 2003, p. 103).

such schools (see hypothesis 3 below). Taken together, strong ethnic stratification across schools should lead to a situation in which minority students in high-track schools have an incentive or feel pressured to identify as German:

HYPOTHESIS 1.—*In areas where ethnic stratification across schools is strong, minority students in the high-track schools are more likely to identify as German.*

Hence, we expect an increased inclination to identify with the native majority group in these contexts compared to minority students in the lower-track schools and those in areas where ethnic stratification across schools is weak. As noted, however, identifying and passing as German generally does not come easy for minority group members (Crul and Schneider 2010, pp. 1261-1262; Schneider et al. 2012b, p. 230). As previous research has shown, members of ethnic minority groups who grew up in Germany tend to feel at home in the country but have difficulties in feeling German (Ersanilli and Saharso 2011). This is mostly attributed to the prevailing ethnic conception of the German nation (Brubaker 1992; Ersanilli and Saharso 2011; Heath and Tilley 2005) where even native-born children and grandchildren of immigrants feel treated as "foreign" (for a similar argument in the U.S. context, see Zhou and Lee 2007). Recognizing the only partial permeability of bright boundaries, Alba and Nee argue that *only a selective subgroup* will engage in boundary crossing (Nee and Alba 2013, p. 368).

We account for these challenges of boundary crossing and the notion of differential permeability in two ways. First, we will examine whether or not identification as German is also feasible for Muslim students who face specific stereotypes and othering discourses in contemporary Germany. The overlapping religious boundary might prohibit Muslim minority students from identifying as German – even in local contexts that are particularly conducive for crossing the native-immigrant boundary. Hence, our analysis of adolescents' boundary work follows up on the argument that cultural consensus about boundaries and belonging is negotiated at both local and national levels (Wimmer 2008, p. 999).[8]

Second, the general difficulties involved in crossing a bright boundary imply that it takes more than just inward-looking acts of identity choice to develop and hold onto an identification with the majority group. Rather, minority students require the support of interpersonal networks

[8] We are grateful to a reviewer for suggesting to examine how the significance of local mechanisms of boundary making varies across minority groups. As this inquiry into the scope conditions came after our original theory development, we do not formulate a hypothesis but treat the interaction of local and group-level influences as an empirical question.

in which such identification can be enacted on an everyday basis (Deaux and Martin 2003; Jenkins 2008; Wimmer 2014, p. 839). Minority students who pursue a strategy of boundary crossing should attempt to translate their national identification into friendships with majority students. And such friendships should in turn support the development or maintenance of an identity as German. Based on a relatively small number of schools, previous work has asked to what extent minority students' national identification breeds cross-group friendship or the other way around (Leszczensky et al. 2016; Munniksma et al. 2015). In our large-scale contextual analysis, there is no need to disentangle the reciprocal relationships inherent in these processes. Both are elements of boundary crossing and should produce a tighter coupling of national identification and friendships with majority students in school contexts in which minority students face a bright boundary:

HYPOTHESIS 2.—*In areas where ethnic stratification across schools is strong, a stronger national identification of minority students in the high-track schools is associated with a greater tendency to form friendships with majority students.*

Note that we expect this impact of the wider local context on friendship formation to be net of a school's ethnic composition, i.e., above and beyond the varying opportunities to form cross-group friendships.

As boundary making is an inherently two-sided process, we also look at the other side of the native-immigrant boundary. Power differentials between individuals of different ethnic origin create incentives for ethnic closure on the side of the privileged (Cornell and Hartmann 1998). Majority group members will therefore "try to police the ethnic boundary and make assimilation and other strategies of boundary crossing difficult" (Wimmer 2008, p. 1002; see already Shibutani and Kwan 1965, pp. 330-337). Ethnically stratified contexts where only few minority students attend high-track schools are characterized by hierarchies of belonging (Skey 2013; Brubaker et al. 2006, pp. 269-277; Carter 2005): While the native majority feels at home in the high-track schools of such areas (Alba and Foner 2015, p. 5), minority students will feel exceptional compared to their minority peers in the area and are likely to adopt strategies of boundary crossing (see hypotheses 1 and 2). This in turn implies that their majority group peers have the power to police the ethnic boundary by differentially allocating social acceptance. In a prototypical situation of bright boundaries, majority students should tie their acceptance of minority students as friends to the latter's willingness to identify with the majority group:

HYPOTHESIS 3.—*In areas where ethnic stratification across schools is strong, majority students in the high-track schools will accept minority students as friends to the extent that the latter identify as German.*

Taken together, we arrive at specific hypotheses about how the local context and school track affect the interplay between identification and friendships in schools. Where ethnic stratification across schools is strong, attendance of a high-track school will be associated with increased assimilationist pressures.[9]

In areas with low ethnic stratification across schools, boundaries are more likely to be blurred. Here, minority students are also well represented in the more prestigious schools. Even minority students in schools where they are heavily outnumbered by majority students will most likely be aware that many other minority students attend high-track schools in the local area. As ethnic background has little consequences for educational placement, we expect the salience of group membership and power differentials to be reduced so that minority students can more freely form their identities and choose their friends. Thus, in such areas, high-track attendance should be much less associated with minority students' national identification, and national identification should also be more loosely coupled with cross-group friendships.

To empirically test our hypotheses, we first examine how high-track attendance is associated with identification as German among minority students. We then use social network analysis to study the relationship between such identification and friendships between minority and majority students. In both types of analyses, we adopt a contextual view as we expect these relationships to depend on the type of school and the strength of ethnic stratification across schools in the local area.

DATA AND MEASURES

Our approach requires the combination of different types of data. To capture local processes of boundary making, we need data on identification and social networks in the school context. In order to relate these processes to the wider institutional and local context, we need data on a

[9] It is more difficult to foresee the formation of identities and friendships in the lower-track schools of ethnically stratified areas. Minority students who are overrepresented in these schools and sometimes even form the numerical majority will be well aware of their disadvantaged position, both individually and as a group. In response, they might turn to strategies of boundary making that have been described as "reactive ethnicity" (Portes and Rumbaut 2001, p. 148, p. 187) or even "normative inversion" (Wimmer 2008, p. 988). However, such a dynamic is likely to depend heavily on other school-level characteristics, such as the extent to which minority students share the *same* ethnic background or relative group sizes. In turn, there are also less clear-cut incentives on the side of majority group students. Hence, compared with the situation faced by the few minority students in the high-track schools, processes of boundary making in the lower-track schools are more contextually contingent.

large number of schools across the nation state. We assembled this data for Germany by linking large-scale survey data on adolescent networks and identities in 144 German schools with administrative data containing geocoded information on all secondary schools in Germany in the school year 2008-2009.

Survey data on identification and networks

We use the first wave of the *Children of Immigrants Longitudinal Survey in Four European Countries* (CILS4EU; Kalter et al. 2016). The data were collected in 2010/11 in Germany, the Netherlands, Sweden, and England, with a target population of 9th grade students, which means that most students were 14 years old at the time of the survey. The sampling strategy aimed at nationally representative samples of schools, where schools with high immigrant shares were oversampled (for details, see CILS4EU 2016). In our main analyses, we rely on data from the German sample, which is based on 5,013 interviews with students with or without an immigrant background, attending 271 school classes in 144 schools, as well as 3,914 interviews with their parents. In order to put the German case into a comparative perspective, we also use data from all four countries, consisting of 18,716 student interviews in 952 classes in 480 schools. Most importantly for our objectives, the CILS4EU data include information on students' self-identification and on complete social networks.

Self-identification as German: Respondents in Germany were asked how strongly they feel German on a four-point scale (strongly, fairly, not so much, not at all). We use this measure to capture students' self-identification as a member of the native majority group. Under our theoretical perspective, feeling German is a crucial aspect of boundary crossing for minority students.

Friendship networks: Our analysis of students' social networks is based on their self-reported best friends in the class. Note that in Germany's secondary schools, students in the same grade belong to one of several school classes that are comprised of about 10-35 students. The students in the class are generally taught the same courses and remain together in the same class for the duration of their schooling until at least the 9th grade. Classes thus provide the most important unit of students' everyday school life by providing a context of particularly frequent exposure and ample opportunities for strong tie formation (Smith et al. 2016, p. 1227). Based on students' nominations of their five best friends in class, we derive the (directed) friendship network for each school class.

In our multi-level models of minority students' identification, we use a comprehensive set of control variables. First, we account for differences in inter-group contact by including the

ingroup share, the majority share, and the extent of ethnic diversity (inverse Herfindahl index) in the class. Second, we add a number of individual-level controls, including students' gender, ethnic origin (Turkish, Polish, Former Soviet Union, Former Yugoslav Republic, Other Non-Western, Other Western), and generational status. Regarding generational status, we differentiate between foreign-born students (first generation), native-born students whose parents were born abroad (second generation), and native-born children of intermarriages (i.e., one parent being foreign-born while the other parent being native-born and having two native-born parents her-/himself). To control for family socioeconomic status, we include parents' highest ISEI score (HISEI) as a measure of parental occupational status (Ganzeboom, De Graaf, and Treiman 1992). Finally, we account for differences in students' abilities using scores attained in a language and in a cognitive test. Table A1 in appendix A presents the descriptive statistics of these variables.

Administrative geocoded data on ethnic stratification across schools

Depending on where they live, students are confronted with different levels of ethnic stratification across schools. To derive a local measure of this ethnic stratification, we rely on country-wide, geocoded information on all secondary schools, taken from restricted-access, administrative school data. The data is provided by the statistical offices of all sixteen German states. For all secondary schools in Germany, this data contains geographical location, track or type, and number of majority and minority students attending grades 7-9 in the school year 2008/09 (amounting to more than 1.2 million students in approximately 12,000 schools),

School track: In comparative stratification research, Germany is considered the archetype of a stratified educational system (Allmendinger 1989; Schindler 2017). Around the age of 10, when leaving elementary school, students are channeled into different types of secondary schools. While students may choose any secondary school, irrespective of its location, admission is based on school performance in elementary school. Each type of school prepares its students for different job profiles and occupational trajectories. Traditionally, there are three school tracks: a lower, an intermediate and an upper secondary school. The lower secondary school (*Hauptschule*) is the least demanding and concludes after the 9th grade. This lowest track provides basic general education and applied labor market skills and prepares students for training programs in blue-collar occupations. The intermediate secondary school (*Realschule*) concludes after the 10th grade, provides a more extensive general education and prepares students for vocational training in skilled white-collar or service occupations. The upper

secondary school (*Gymnasium*) prepares students for academic careers and grants the secondary school degree which allows for entry into higher education.[10]

Given Germany's knowledge-based economy and educational expansion, access to upper secondary schools has become increasingly critical. Although the German Gymnasium has historically been a highly selective institution of "humanistic education," it has considerably opened up in recent decades, so that 27 percent of all students attended a Gymnasium in the 1990s and early 2000s, compared to just 15 percent in the 1970s (Schneider and Tieben 2011, p. 151). Attending a Gymnasium is a strong distinguishing attribute among adolescents in Germany: It is widely treated as a signal of greater intellectual ability and greater socio-economic prospects, and it is common for each graduating cohort to take to the streets to publicly and noisily celebrate their achievement. While accounting for the tripartite nature of the educational system, our analysis focuses on this main dividing line: how attending the highest type of secondary school (i.e., high-track attendance) relates to minority students' identification and friendships.

Local levels of ethnic stratification across schools: Variation in this contextual variable derives from several sources. First, education is the responsibility of federal states in Germany (e.g., Bavaria, Berlin, North Rhine-Westphalia, Saxony), so that policies that affect the odds of minority children to attend the high-track schools are likely to vary across states (see Dollmann 2016). For example, although ethnic stratification is generally high in Germany, it is on average higher in the Western parts of the country (Länderoffene Arbeitsgruppe 2013). A second source of variation is the ethnic composition of local areas, since immigrant-origin groups differ in their rates of high-track attendance (Kristen and Granato 2007). Third, in the case of excessive demand, schools can use different admission policies that might privilege or penalize majority or minority groups, including home-to-school distance and enrollment of older siblings in the school.[11]

Our analysis assumes that students will notice when minority students are underrepresented in the high-track schools (or overrepresented in the lower-track schools) in their local areas. Such awareness depends on contacts with peers from other schools, which usually takes place

[10] In addition to these three tracks, most federal states have introduced comprehensive schools, where all three degrees can be obtained within one institution. As these schools are considerably less selective than the high-track schools (Gymnasium), we group them together with the lower tracks. This is also supported by our data, as average cognitive test scores attained by their students resemble those of students from the intermediate school type.

[11] Additional analyses confirm these expected patterns: Ethnic stratification varies strongly across federal states but also among areas within states, and this variation can be partially accounted for by the ethnic composition of these local areas (results available from the authors upon request).

in students' neighborhoods, due to having attended the same local elementary school, or due to encounters in the streets, in local clubs, and associations. Supporting evidence for considerable social contact across schools can be gained based on an ego-centric network module in the CILS4EU data: In Germany, about one third of students' five best friends attends other schools (~35 %) and school types (~33 %).

To derive a measure of the local level of ethnic stratification across schools, we first identify all secondary schools within a given radius from a student's school. The resulting number of schools nearby depends on the chosen radius and local population densities. We opt for a radius of 5 kilometers (~3.1 miles) to approximate the local surroundings on which students base their perceptions of ethnic stratification.[12] In a second step, we compute the association between majority group membership and track attendance in these areas. We distinguish between the three school tracks described above: lower, intermediate and upper secondary schools. We use Cramer's V to capture the strength of association between majority status and track attendance.[13] This measure varies between .04 and .44 with a mean value of ~.25.

ANALYTIC STRATEGY

Multi-level models of minority students' identification

Hypothesis 1 focuses on how the local extent of ethnic stratification moderates the association between high-track attendance and identification as German among minority students. In testing this hypothesis, we use multi-level models and restrict our analysis to students born in a foreign country or with at least one parent born abroad (2,340 students in 144 schools).

Theoretically, we assume that ethnic stratification across schools affects the brightness of boundaries but is largely exogenous to dynamics of ethnic boundary making that take place *within* particular schools. Whatever the sources of ethnic stratification in a local area, when majority students tend to numerically dominate high-track schools, attendance of such schools

[12] Given that the average home-to-school distance in the German CILS4EU sample equals ~2.5 kilometers (km), we account for the maximum distance between schools of two neighboring peers (with average ways to school) by choosing a 5 km radius. In areas of greater population density, students will base their perception of local stratification on peers from a greater number of schools. The mean number of schools nearby is ~20 and varies between zero (three surveyed schools have no other school nearby within a range of 5 km) and 87. Both smaller and larger specifications (up to 15 km) yield substantively identical results (analyses available upon request).

[13] As a robustness check, we used log-odds derived from area-specific ordinal logistic regressions. This alternative measure produced substantively identical results (analyses available upon request). However, in more than half of all areas, the data violate the parallel slopes assumption necessary to apply this ordinal measure (cf. Brant 1990). In comparison, using Cramer's V is unlikely to induce severe bias, as only four schools/areas (~ 2.8 %) exhibit noteworthy deviations from the expected pattern (i.e., the low track showing the lowest shares of majority students, the high track the highest shares, and the intermediate track ranging in between).

takes on a particular social meaning and becomes associated with increased pressures or greater readiness to identify as German. To evaluate this claim, it is important to control for common causes of ethnic stratification, high-track attendance and boundary making.

First, different ethnic groups are unevenly distributed across areas, vary in their educational achievement, and face boundaries of different brightness due to their cultural characteristics.[14] To address this source of selection bias, we control for minority students' own ethnic origin as well as the ethnic composition of school classes. Second, different institutional features and policies across federal states could affect the extent of ethnic stratification and be indirectly linked with processes of boundary making in schools. As we are mainly interested in the impact of local contexts on minority students' identification, we re-estimate all models including state-level fixed effects. These analyses control for state-level sources of unobserved heterogeneity and solely use the remaining variation across local contexts.

Another methodological concern is that minority students who make it into the high-track schools despite living in a highly ethnically stratified area are obviously a selective group. These students could have a higher inclination to identify as German, irrespective of how bright a boundary they face. To reduce this problem, we control for an extensive set of individual-level background characteristics. In addition to minority students' gender, ethnic origin, generational status, and family SES, the CILS4EU data allow us to capture students' abilities based on their results in standardized language and cognitive tests. Moreover, we re-run the models using propensity score matching. This robustness analysis compares only students who had a very similar baseline probability of making it into a high-track school, although only some of them ended up attending this track. We thereby account more effectively for systematic differences in baseline characteristics and reduce possible confounding effects.

Another potential source of unobserved heterogeneity are students' families. Minority students who make it to the high-track schools in areas where these institutions are dominated by the majority group might stem from families that are strongly oriented towards assimilation. To some extent this might reflect our context effect of interest: If parents already sense a certain social climate in the local area, their quest for belonging and upward mobility might lead them to instill a greater inclination to identify as German in their children before the latter even enter these secondary schools. However, it is also possible that immigrant families with a stronger

[14] In additional analyses, we regressed the extent of ethnic stratification in the local area on a set of student characteristics. Results indicate that ethnic groups indeed show different patterns, but the largest share of these ethnic differences is located on the level of federal states: All group differences turn statistically insignificant once we introduce state-level fixed effects (results available upon request).

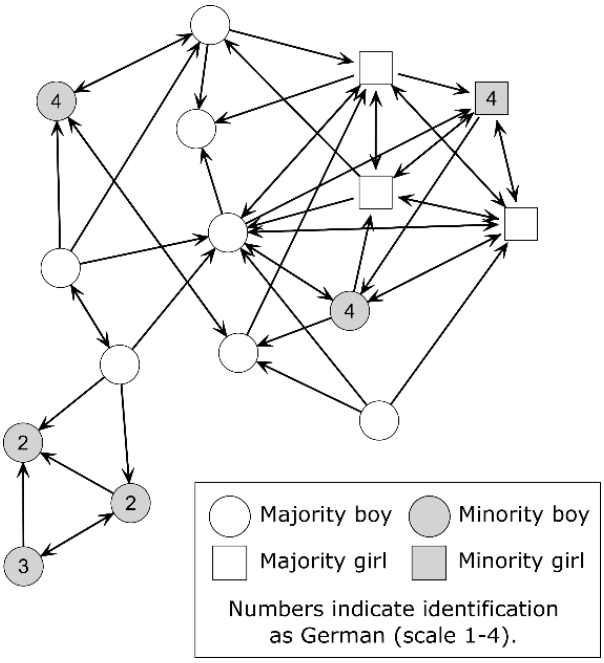
orientation towards assimilation self-select into these areas. To address this concern, we re-ran all models while replacing students' identification as German with that of their parents as a placebo outcome. To the extent that bright boundaries in the high-track schools of particular local areas affect minority students' identification as German, their parents' identification should not vary in similar ways across contexts.

Although these analytic steps are designed to enhance confidence in a causal interpretation of our results, they do not establish causality. We therefore interpret our results cautiously and use data on social networks to test additional specific implications of our theoretical arguments.

Exponential random graph models of friendship networks

Our second and third hypotheses assume a particular interplay of identification and peer relations in the high-track schools in ethnically stratified school systems. Figure 1 illustrates the kind of data on which this part of our analysis is based. It depicts all friendship nominations (arrows) in a class that consists of four female students (squares) and 12 male students (circles). One of the girls and five of the boys in the class have a migration background, as indicated by grey-shaded nodes. The network exhibits the well-known tendency of sex homophily: All girls in the class cluster in the top right corner of the graph. There is also some clustering with regard to minority status. Three of the six minority students form a separate triadic cluster at the bottom of the graph, while the other three have several friendships with majority students and are well integrated into the larger component of the network.

Figure 1: An example friendship network in a school class in the CILS4EU data



Our analyses focus on the extent to which minority students' identification as German corresponds with their own friendship nominations (see hypothesis 2) as well as the nominations they receive from their majority peers (see hypothesis 3). In figure 1, such an association is clearly visible (without yet controlling for potential confounders): The three minority students who remain largely separate from their majority peers report only moderate levels of identification as German. Conversely, those minority students who maintain more friendships with their majority group peers also identify strongly as German.

According to our theoretical expectations, the association of identification and the tendencies to form cross-group friendships should be particularly strong in the high-track schools of ethnically stratified areas. We therefore follow a two-step procedure (similar to McFarland et al. 2014; Smith et al. 2016). In the first step, we estimate exponential random graph models (ERGM) to identify the determinants of tie formation in each network. ERGMs allow us to estimate our effects of interest while accounting for other drivers of tie formation, such as differences in meeting opportunities, sex and ethnic homophily, or the balancing mechanisms of reciprocity and transitive closure (Robins et al. 2007; Wasserman and Pattison 1996). In line with previous work (e.g., Dijkstra, Berger, and Lindenberg 2011; Kruse et al. 2016), we run school-wise analyses that combine the friendship networks of all classes from the same school.[15] Each ERGM yields an estimate of minority or majority students' tendency to form intergroup friendships in a given school – and to what extent these tendencies depend on minority students' identification as German (see app. B for details on the model setups).[16]

In the second step, we examine variability in the coefficients across areas and tracks, asking whether minority students' identification is more relevant in the high-track schools of ethnically stratified areas. By combining ERGM estimates in a multivariate random effects meta-analysis (An 2015), we are able to test whether strategies of ethnic boundary crossing and policing are more prevalent in some schools and areas than in others.

[15] This is done in order to guarantee sufficient within-network variation and is technically implemented by defining all ties across school classes as non-existent by design. Compared to real grade-level networks that include between-class friendship nominations, analyses of combined within-class networks yield rather conservative estimates of ethnic homophily (see Leszczensky and Pink 2015).

[16] Due the high data requirements of network models, we have to restrict our analysis sample to 82 or 84 schools with 148 or 150 school class networks, depending on model setup. We provide details on the analysis sample and the model setups in appendix B.

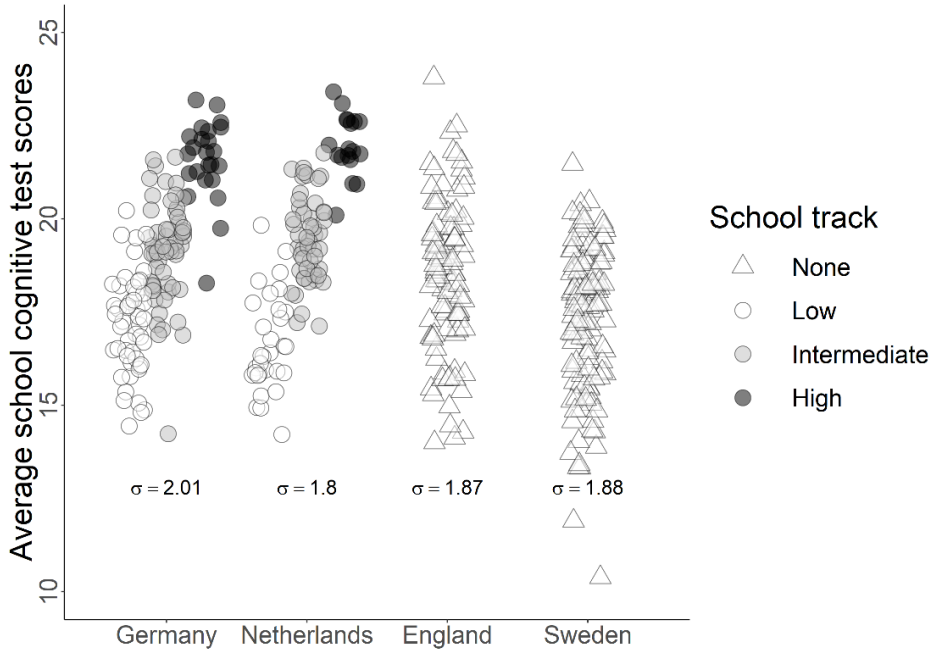
RESULTS

The German case in context

Before we test our hypotheses on ethnic boundary making in local contexts in Germany, it is useful to put this case into context. To this end, we compare the stratification across schools in Germany to that in the three other countries included in the CILS4EU study: England, the Netherlands, and Sweden. Whereas Germany and the Netherlands have a formally differentiated system of secondary schooling, England and Sweden are predominantly comprehensive systems up to age 16 (Jonsson 2018, p. 55).

As figure 2 shows, however, we find strikingly similar differences in performance levels between schools in the four countries. By comparing the (weighted) standard deviation across countries, we see that between-school differences in students' average cognitive test scores do not significantly differ between the comprehensive and the formally differentiated school systems.[17] Hence, how majority and minority students are locally distributed across schools of different quality and prestige might be relevant also in other countries, including those with formally open educational systems (Alba and Holdaway 2013, p. 268).

Figure 2: Between-school differences in students' average cognitive test scores in four European countries.



[17] Pairwise comparisons likewise do not yield patterns that align with the dichotomy of formally stratified and open school systems. While between-school differences in Germany are significantly larger than those in England and in the Netherlands, all other pairwise comparisons yield statistically insignificant differences.

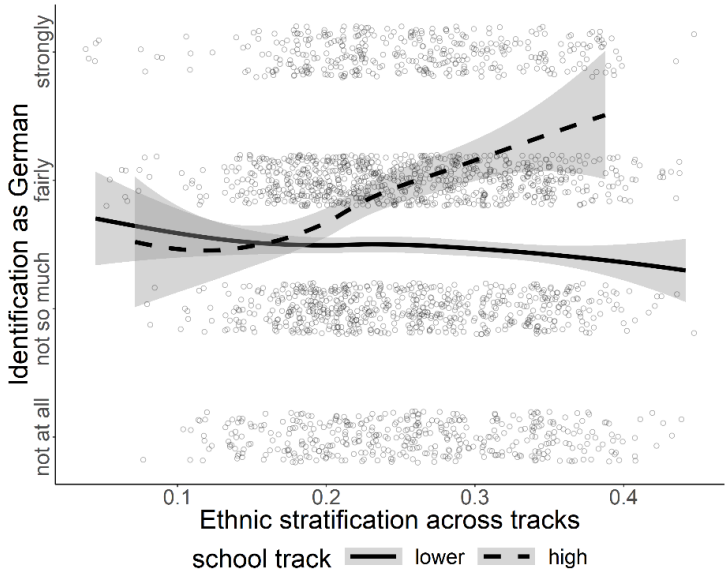
Still, Germany is particularly well-suited to examine local levels of ethnic stratification across schools because between-school differences are institutionalized and socially recognized in the form of different types of secondary schools. As evident in figure 2, these types correspond to real differences in ability levels: 96 % of the high-track schools in the German sample are in the top quintile of the test score distribution (in the Netherlands, this is even true of all high-track schools).

In the following, we present three sets of analyses. First, we inspect how minority students' identification as German varies across school tracks and areas. Second, we conduct a meta-analysis across a large number of student networks to examine in which contexts such identification tends to be associated with cross-group friendships. Finally, we identify scope conditions for the working of these local mechanisms of ethnic boundary making that are relevant for the transferability to other countries.

Track attendance and minority students' identification across areas

In Germany, minority students on average identify "not so much" or "fairly" as German (i.e, 2.5 on a scale from 1 to 4). This identification is stronger for the educationally more successful minority students: Those who attend high-track schools show a mean value of 2.8, whereas those in the lower-track schools show a mean identification of 2.47 ($p < 0.0001$). Based on our theoretical reasoning, we expect this average to hide important contextual variation, as the implications of high-track attendance should shift across areas, depending on the level of ethnic stratification across schools.

Figure 3: Minority students' identification as German across school tracks for different local levels of ethnic stratification.



NOTE. Lines depict bivariate, locally weighted regressions (i.e., Lowess scatterplot smoothing curves).

Figure 3 depicts how the association between track attendance and identification as German varies across areas. The striking pattern in the figure indicates that the stronger identification as German among high-track minority students emerges only in areas with greater levels of ethnic stratification across schools. Where ethnic stratification across schools is weak, minority students report only a moderate identification as German, irrespective of the track they attend. The stronger ethnic stratification across schools, the stronger the track difference in identification becomes (as indicated by the diverging scatterplot smoothing curves in fig. 3). In strongly stratified areas, those minority students who make it into the high-track schools identify strongly as German. This finding is in line with hypothesis 1. To provide a more rigorous test, we turn to multivariate models that control for important sets of potential confounders.

Table 1 presents estimates of the effect of high-track attendance on identification as German in areas with weak or strong ethnic stratification across schools (i.e., values ranging up to versus values above the population mean of ~0.25).[18] The upper part of table 1 presents estimates from a series of multi-level models, with students nested in school classes, that account for three potential sources of confounding. We first control for the ethnic composition in the class to account for varying opportunities for intergroup contact (in terms of the share of one's ethnic ingroup, the majority share, and the extent of ethnic diversity). We then add individual-level background characteristics that include minority students' ethnic origin, generational status, gender, family SES, and language and cognitive test scores (see app. table A2 for full model results). Finally, we introduce state-specific fixed effects to remove unobserved heterogeneity across federal states.

Once we factor in these potential confounders, differences in identification across school tracks decrease substantially. Where ethnic stratification across schools is weak, the difference between tracks approaches zero and ceases to be statistically significant. In areas with strong ethnic stratification across schools, the difference decreases also but remains statistically significant and substantial in size: Minority students who attend a high-track school are estimated to report an identification as German that is 0.3-0.4 points stronger (on a scale of 1 to 4) than the identification in lower-track schools. This remaining difference is substantial and even surpasses that of generational status: In line with previous research on Germany (Diehl

[18] We opted for a binary measure for better accessibility and to be consistent throughout all subsequent steps of the analysis. Splitting the sample based on alternative cut-off points around the population mean provides very similar results. The same holds for alternative model specifications that apply a continuous measure of ethnic stratification across tracks (analyses available upon request).

and Schnell 2006; Heath et al. 2018), the second generation is estimated to identify more strongly as German than the first generation by ~0.25 points (see app. table A2).

The middle part of table 1 presents estimates based on propensity score matching. These models not only account for differences between treatment group (i.e., high-track students) and control group (i.e., lower-track students), but also restrict causal inference to a region of common support (see Morgan and Winship 2007). The results further corroborate our finding: The gross average treatment effect (ATE) of high-track attendance is close to zero in areas with weak ethnic stratification across schools, while it is more than 0.3 in areas with strong ethnic stratification across schools.[19]

Table 1: The effect of high-track attendance on identification as German among minority students

	Area with weak ethnic stratification		Area with strong ethnic stratification	
	Coef.	(s.e.)	Coef.	(s.e.)
Multilevel models				
Gross association	0.205 **	(0.092)	0.703 ***	(0.123)
Net of school class composition	0.130	(0.087)	0.451 ***	(0.126)
Net of school class composition + individual level controls	-0.008	(0.085)	0.332 ***	(0.121)
Net of school class composition + individual level controls + state fixed-effects	0.031	(0.089)	0.362 ***	(0.121)
Propensity score matching				
Net of school class composition (ATE)	-0.029	(0.083)	0.343 **	(0.167)
Multilevel models of parents' identification				
Net of school class composition + individual level controls + state fixed-effects	0.035	(0.108)	-0.129	(0.142)

NOTE. * $p < .1$; ** $p < .05$; *** $p < .01$ (two-tailed tests); complete model results in tables A2 and A3 in appendix A. Differences between areas are statistically significant (at least $p < .05$) except for the placebo regression of parents' identification ($p = 0.338$). Significance tests for the propensity models use a *z* test, as outlined in Clogg et al. (1995; see also Paternoster et al. 1998).

[19] The logistic matching models regress respondents' selection into the treatment (i.e., high-track attendance) on a set of individual determinants of school choice (i.e., ethnic origin, generational status, sex, SES, language and cognitive test scores). This is done separately for areas with weak and strong ethnic stratification. These models are presented in table A3 in appendix A. They are based on nearest neighbor caliper matching with replacement, using three nearest neighbors per treatment case and a caliper value of 0.1. Alternative numbers of neighbors and caliper values and other matching algorithms provide very similar results (analyses available upon request).

Finally, we address another potential source of unobserved heterogeneity. Minority students who make it to the high-track schools in areas where these institutions are dominated by the majority group might stem from families that are strongly oriented towards assimilation. This could bias our results if immigrant families with a stronger orientation towards assimilation self-select into these areas. To address this concern, we re-ran all models while replacing students' identification as German with that of their parents as a placebo outcome. Much like their children, the parents of minority students identify "not so much" or "fairly" as German on average (i.e., 2.45 on a scale from 1 to 4), with parents of lower-track school children identifying less strongly than those of high-track school children (i.e., 2.42 versus 2.61, $p = 0.0056$). As shown in table 1, however, this difference does not vary between areas with strong or weak ethnic stratification across schools. Hence, as expected, our effects of interest do not hold for the placebo outcome of parents' identification as German.

Meta-analysis of exponential random graph models of friendship networks

The results reported above indicate that where ethnic stratification across schools is strong, minority students who make it into the high-track schools are more likely to identify strongly as German. To the extent that processes of ethnic boundary making are at work in these contexts, such identification should also be relevant for the formation or maintenance of friendship ties. We present results for two specifications of exponential random graph models (ERGMs, see app. B). To capture boundary crossing, model 1 asks whether the presence of ties from minority students to majority members depends on the former's identification as German. Model 2 examines whether the presence of ties from majority members to minority students depends on the latter's identification as German – which would be indicative of boundary policing. Before we address the question of whether such processes become particularly relevant in the high-track schools of ethnically stratified contexts, we describe results for the pooled sample of all schools.

Table 2: Results of ERGM meta analysis of friendship networks (all schools pooled)

	Coef		(s.e.)
Model 1			
Edges	-3.516	***	(0.137)
Mutual	2.408	***	(0.038)
GWESP	0.993	***	(0.015)
Same Sex	0.637	***	(0.018)
Same Ethnic Origin	0.170	***	(0.022)
Minority Ego	0.054		(0.108)
Majority Alt	-0.294	**	(0.118)
Feel German Ego	-0.024		(0.037)
Minority Ego * Majority Alt	-0.393	***	(0.129)
Feel German Ego * Minority Ego	-0.028		(0.044)
Feel German Ego * Majority Alt	0.094	**	(0.044)
Feel German Ego * Minority Ego * Majority Alt	0.132	**	(0.054)
N(classes)	148		
N(schools)	82		
Model 2			
Edges	-3.468	***	(0.117)
Mutual	2.390	***	(0.038)
GWESP	0.992	***	(0.015)
Same Sex	0.636	***	(0.018)
Same Ethnic Origin	0.171	***	(0.022)
Majority Ego	-0.227	*	(0.119)
Minority Alt	0.143		(0.089)
Feel German Alt	-0.108	***	(0.031)
Majority Ego * Minority Alt	-0.136		(0.127)
Feel German Alt * Majority Ego	0.176	***	(0.043)
Feel German Alt * Minority Alt	0.037		(0.036)
Majority Ego * Feel German Alt * Minority Alt	0.026		(0.052)
N(classes)	150		
N(schools)	84		

NOTE. ERGM results combined via multivariate random effects meta-analysis (cf. An 2015); * $p < .1$; ** $p < .05$; *** $p < .01$ (two-tailed tests)

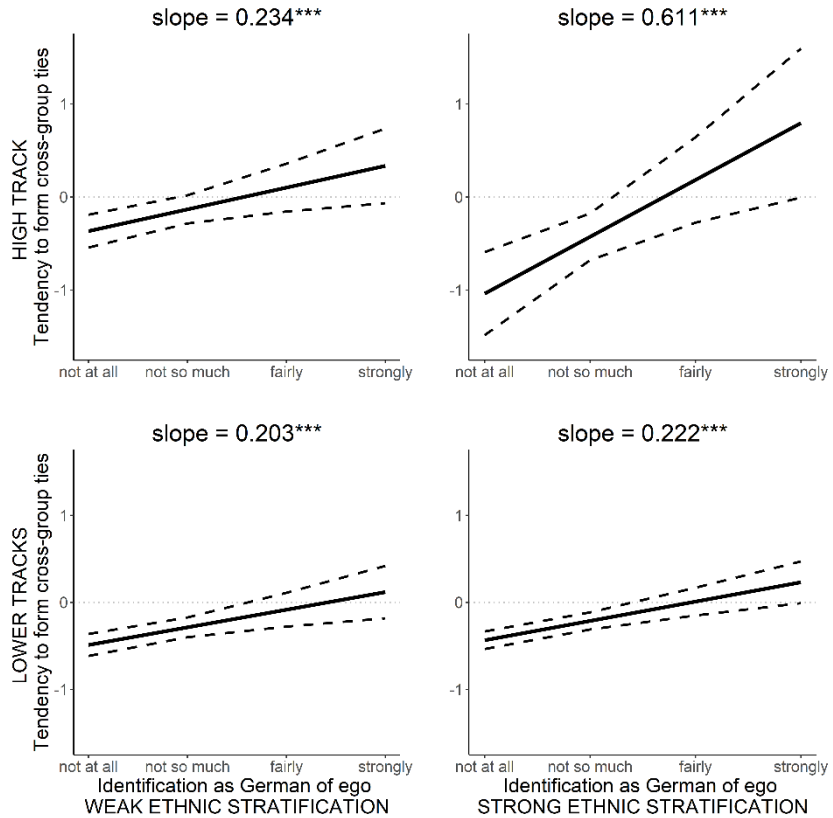
Table 2 reports the results of a meta-analysis across all school-specific ERGMs. Both models fit the data well.[20] In line with well-known tendencies of tie formation, models 1 and 2 show that friendship nominations tend to be reciprocated (*Mutual*), tend to cluster in triadic structures (*GWESP*), and are more likely among peers of the same sex and same ethnic origin. In addition,

[20] To examine goodness of fit (GOF) for each model specification, we simulated 500 networks per school based on the school-specific estimates. Using statnet's built-in GOF command for ERGMs (Goodreau et al., 2008), we compared simulated with observed network statistics concerning edgewise-shared partners, outdegrees, and geodesic distances. Following Robins, Pattison, and Wang (2009), we interpret GOF t-ratios below 2 (in absolute value) to indicate that the observed feature is not unusual in the estimated graph distribution. 89 % of all GOF ratios derived based on model 1 and model 2 meet this criterion, the mean GOF ratio across all schools being as low as 0.75 (model 2: 0.74). Hence, based on this criterion and array of network statistics, both model specifications show a remarkably good fit.

each model includes a three-way interaction that captures to what extent the tendencies to form or maintain cross-group friendships vary with minority students' identification as German.

Conditional on the rest of the network, we ask how the probability of a friendship tie depends on whether the tie links a minority and a majority student, and how this effect in turn depends on minority students' identification as German. As derived in appendix B, the linear combination of interest for model 1 indicates whether minority students with strong identification as German are more likely to befriend majority students. Evaluated across all school-specific ERGMs, this tendency seems to exist: The linear combination of the two relevant estimates is positive and its combined standard error is small ($\hat{\theta}_{\text{Feel German Ego*Majority Alt}} + \hat{\theta}_{\text{Feel German Ego*Minority Ego*Majority Alt}} = 0.094 + 0.132 = 0.226$; s.e. = 0.032; $p < 0.0001$). In model 2, the linear combination of interest indicates whether majority students accept minority students as friends to the extent that the latter identify as German. In table 2, we observe only weak evidence of this tendency ($\hat{\theta}_{\text{Feel German Alt*Minority Alt}} + \hat{\theta}_{\text{Majority Ego*Feel German Alt*Minority Alt}} = 0.037 + 0.026 = 0.063$; s.e. = 0.035; $p = 0.072$). Again, our theoretical reasoning leads us to expect that these averages hide important contextual variation.

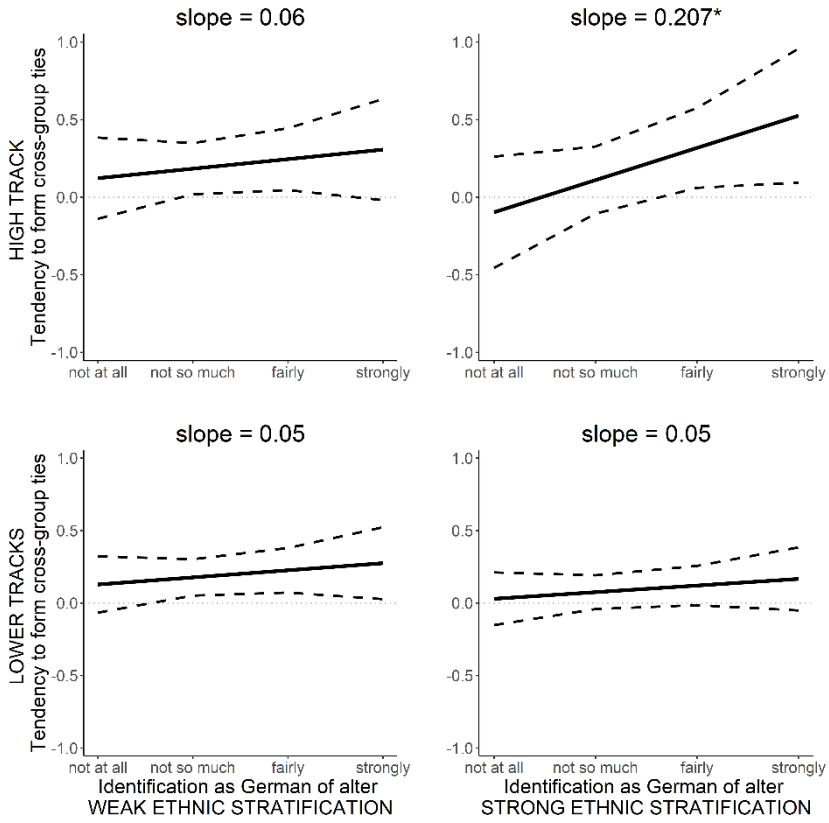
Figure 4: Minority students' tendency to form cross-group ties conditional on their identification as German



NOTE. * $p < .1$; ** $p < .05$; *** $p < .01$ (two-tailed tests). Estimates from ERGM meta analyses by school type and area; complete results in table A4 in appendix A.

To test our second and third hypotheses, we split the pooled sample by school type (high- vs. lower-track schools) and area (strong vs. weak ethnic stratification across schools) and conduct the meta-analysis across school networks in each of the four contexts. Doing so allows us to examine whether the significance of minority students' identification as German for cross-group friendships varies across contexts. For better accessibility, we present the main results graphically (for full model results, see app. table A4). Based on model 1, figure 4 shows that minority students who strongly identify as German are more likely to maintain friendships with majority students in all contexts. However, the association between minority students' identification and their cross-group friendships is clearly strongest in the high-track schools located in areas with strong ethnic stratification across schools. In these settings, the estimated slope is almost three times as steep as in the other three combinations of school type and area. This finding confirms hypothesis 2 and suggests that high-track schools in ethnically stratified areas are particularly conducive to boundary crossing.

Figure 5: Majority students' tendency to form cross-group ties conditional on their minority peers' identification as German



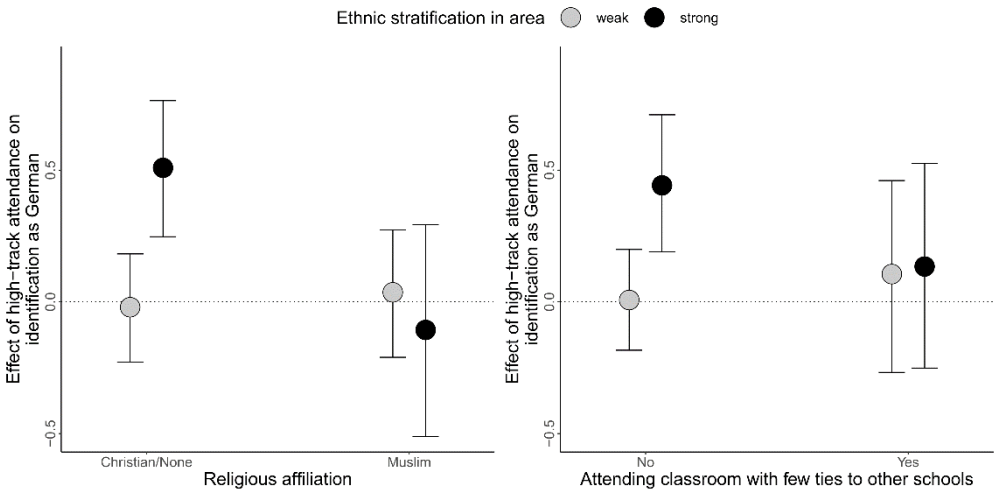
NOTE. * $p < .1$; ** $p < .05$; *** $p < .01$ (two-tailed tests). Estimates from ERGM meta analyses by school type and area; complete results in table A4 in appendix A.

Turning to hypothesis 3, we trace contextual variation in the degree to which majority students tie their acceptance of minority students as friends to the latter's identification as German (model 2). Figure 5 shows a striking difference across contexts: Minority students' identification as German and the tendency of majority students to nominate them as friends are significantly associated only in the high-track schools of ethnically stratified areas. In all other contexts, this association is statistically insignificant and close to zero. Again, this finding supports our theoretical expectations and suggests that majority students tend to engage in boundary policing in the high-track schools of ethnically stratified areas.

Scope conditions for local mechanisms of boundary crossing

To approach the question of how our results might transfer to other countries, we identify scope conditions of the local mechanisms of boundary making. To this end, we return to our first hypothesis that minority students who attend high-track schools in ethnically stratified areas are more likely to identify as German and ask under which conditions this phenomenon might be absent.[21]

Figure 6: Effect heterogeneity among minority students across different religious affiliations (left) and school classes with different frequencies of ties to other schools (right).



NOTE. Results are based on the most restrictive model setup including individual- and class-level controls and state fixed effects.

[21] It was not possible to test the relevance of these scope conditions for the other two hypotheses. As the network models already estimate three-way interactions and are based on relatively small networks, there was not enough statistical power to additionally differentiate by religious denomination. Moreover, there was too little between-school variation in social contacts to peers from other schools to subdivide the network analysis in the different areas and tracks.

First, as pointed out repeatedly in previous scholarship, the permeability of boundaries varies across racial and ethnic groups. In Western Europe, Islam has become a highly contentious issue, and Muslim minorities face specific stereotypes and othering discourses (Helbling 2012). For them, identifying and passing as German might be particularly difficult (Fleischmann and Phalet 2018).[22] To test for such differential permeability, we evaluate hypothesis 1 separately for two subgroups: Minority students with Christian or no religious denomination and minority students with a Muslim denomination. On average, the Muslim subgroup is less inclined to identify as German than students with Christian or no religious denomination (2.3 versus 2.7, $p < 0.0001$). Recall that we found high-track attendance to be strongly associated with an identification as German only in areas with strong ethnic stratification across schools. As is evident from the left-hand part of figure 6, this is not the case for minority students of Muslim denomination. Even when their extraordinary educational placement makes them stand out from their local co-ethnic peers, these students seem to have difficulties in crossing the boundary and passing as German. The result identifies an important scope condition for the mechanisms under study and suggests that the larger political context conditions local processes of ethnic boundary making.

A second scope condition follows from our assumption that minority students sense the extent to which they are underrepresented in high-track schools in their local areas and overrepresented in the lower-track schools. We argued that such awareness depends on contacts with peers from other schools, which usually takes place in students' neighborhoods, due to having attended the same local elementary school, or due to encounters in the streets, in local clubs, and associations. This assumption can be indirectly evaluated based on the CILS4EU data since it also includes an ego-centric network module that asks respondents about their five best friends. As noted above, in Germany, about one third of students' five best friends attends other schools (~35 %) and school types (~33 %). This is evidence for considerable peer contact across schools. At the same time, there are school classes where minority students have only few friendship ties to other schools. Based on our theoretical account, boundaries should be less bright and boundary crossing less frequent in such classes.

The right-hand part of figure 6 shows that the strong coupling of high-track attendance and identification in ethnically stratified areas exists only in classes where minority students have

[22] As the feasibility of boundary crossing depends largely on social categorization by the majority group (Jenkins 2008, p. 23), the inclination to strongly identify as German among adolescents should be largely independent of their level of religiosity (Maxwell and Bleich 2014). Recognizing this power of social categorization processes does not imply to assume Muslims to constitute "a homogeneous and solidary group" (Brubaker 2013, p. 6).

substantial ties to peers from other schools. The relationship is absent in classes where minority students have only few friends at other schools (i.e., classes below the first tercile, with less than ~25 % of all reported friends attending other schools). Considerable social contact to peers from other schools thus seems to be a scope condition for the local mechanisms of boundary crossing. These findings not only lend further credibility to our theoretical account, but also prepare the ground for discussing its relevance beyond the German case.

DISCUSSION AND CONCLUSION

It is widely recognized that the success of integration in ethnically diverse societies depends to a great extent on the performance of educational systems (Alba et al. 2011). However, beyond their envisaged roles as meritocratic sorting machines and transmitters of academic knowledge and skills, schools profoundly shape social identities and affiliations in adolescence. While a wealth of qualitative studies has documented how minority students negotiate their identities in particular school contexts (e.g., Horvat and Lewis 2003; Carter 2003, 2005; Smith and Moore 2000; Tyson et al. 2005), there have been few attempts to investigate the contextual dependence of peer relations and identities in more wide-scale studies (Warikoo and Carter 2009, p. 385). We approached this task by focusing on the case of Germany's secondary school system that allowed us to combine survey data on identification and networks with large-scale geocoded data on local stratification across schools.

Our results show that ethnic boundary making in school settings varies with the local extent of ethnic stratification across schools. In areas with strong ethnic stratification, educational placement is strongly associated with identification and friendship formation: In the high-track schools, minority students show a much greater willingness to identify as German and these feelings are more relevant for their friendships with majority students. In turn, majority students also tie their acceptance of minority students to the latter's identification with the majority group. This coupling of educational advancement and boundary crossing is reminiscent of Milton Gordon's (1964) canonical concept of assimilation. Rather than describing a universal principle of immigrant incorporation, this regime seems to rest on a system of ethnic stratification in which most minority students are relegated to the lower tiers of the school system.

Quite different from such Gordonian worlds are areas where ethnic stratification across schools is weak. Here, minority students are also well represented in the more prestigious schools. Interestingly, though, this success is not accompanied by a stronger identification as German. Moreover, where minority status has little consequences for educational placement,

identification as German is also less relevant for cross-group friendships. This situation resembles Alba and Nee's (2003) view of assimilation as "a decline in the social salience and consequences of categorical membership" (Alba 2008, p. 39). In the long run, the reduced salience of ethnic origin and the more evenly distributed socio-economic prospects could pave the way for an expansion of the mainstream to include minority groups, at least across generations.

Our study makes five contributions. First, these findings provide more robust evidence for the claim that the belonging of minority youth depends on institutional arrangements and local integration contexts (Crul and Schneider 2010; Crul and Mollenkopf 2012). This supports the view that understanding the diversity of immigrant adaptation requires to go beyond individual-level characteristics and focus on different contexts of reception (Portes, Aparicio, and Haller 2018).

A second contribution emerges from our inquiry into the scope conditions of these local mechanisms of boundary making. For Muslim minority students, we found no heightened inclination to identify as German – even in local contexts that are particularly conducive to crossing the native-immigrant boundary. Based on previous research, we interpret this finding as indicative of the specific stereotypes and othering discourses confronting Muslims in Western Europe. Hence, our study highlights the multi-level character of ethnic boundary making (Wimmer 2008; Jenkins 2008): Adolescents' boundary work is not only shaped locally but also constrained by wider discourse in society.

Third, our study provides one of the first stringent tests of the notion that bright boundaries make strategies of boundary crossing and policing more likely (Nee and Alba 2013). We used the extent of ethnic stratification across schools as a source of local variation in the brightness of boundaries that is largely exogenous to dynamics of ethnic boundary making *within* particular schools. We find evidence for boundary crossing and policing in the high-track schools of local areas where these institutions are numerically dominated by the majority group. Still, identification as German seems less feasible for Muslim minority students, and the stronger association between identification and friendships in these contexts likewise implies that some minority students do not identify as German and tend to remain among themselves. These findings support Alba and Nee's claim that "a bright boundary favors individualistic, abrupt assimilation undertaken *by a selective subgroup*" (Nee and Alba 2013, p. 368, emphases added). Taken together, our confirmation of specific implications lends considerable credibility to the theoretical arguments on how bright boundaries shape ethnic boundary making.

Fourth, our findings carry important implications for the network-analytic study of ethnic boundary making in school settings. Social scientists have amassed considerable evidence that the ethnic composition of a school's student body affects inter-group contact and friendships. However, previous work has largely neglected the role of the institutional and local context in which schools are embedded. By relating the significance of minority students' identification for cross-group ties to the extent of ethnic stratification across schools, we contribute to a contextual understanding of social networks (see Entwisle et al. 2007; Adams et al. 2012; McFarland et al. 2014).

Finally, our analysis points to a fertile middle ground between large-scale studies on ethnic stratification in education and detailed studies of identities and networks in particular schools. Previous quantitative studies on host country identification have treated education largely as a control variable or examined its influence on the individual level. While some studies have confirmed the claim of assimilation theory that educational success should go hand in hand with increased identification (Verkuyten and Yildiz 2007; Martinovic and Verkuyten 2012), others have pointed to an "integration paradox," where the more highly educated sometimes perceive more discrimination and respond with lower host country identification (De Vroome, Martinovic, and Verkuyten 2014). Again, our analyses caution against expecting the relationship between educational attainment and identification to be context invariant. Our findings suggest that – for many minority students – the social meaning of educational attainment and its impact on identification will depend on the place that particular students occupy relative to their co-ethnic peers in the wider system of stratification.

Limitations and Future Directions

Although we derived specific implications and engaged in extensive robustness testing, our analysis does not uniquely identify the causal processes that underlie our results. Ideally, future studies would measure students' identification already before they enter secondary school. Lacking such a pre-treatment measure, we took care to account for major sources of selection bias that make particular minority students attend high-track schools in ethnically stratified areas. The CILS4EU data allowed us to control for an extensive set of individual background characteristics, including cognitive and language test scores, as well as indicators of the composition of school classes and state-level fixed effects. In addition, we addressed the concern that immigrant parents with a stronger orientation towards assimilation might self-select into these areas and have their children attend high-track schools. Based on information from the parental survey, we replaced students' identification as German with that of their

parents as a placebo outcome. As expected, it is only among minority students themselves that high-track attendance becomes strongly associated with identification as German in ethnically stratified areas.

We hope that future research will follow our strategy of combining survey data on identification and social networks in schools with large-scale data on the wider institutional and local contexts. In particular, it would be exciting to learn how ethnic stratification in the educational system contributes to local processes of ethnic boundary making in other countries. Although a country comparison is outside the scope of this article, our analyses already yield three findings that can inform studies in other countries. First, based on comparable data, we could show that between-school differences in average cognitive test scores are as pronounced in the formally open educational systems of England and Sweden as in Germany and the Netherlands. This supports Alba and Holdaway's (2013, p. 268) claim that "tracking still takes place even within very open educational systems." Hence, our findings could also motivate similar analyses in the United States, where the decentralized system of locally funded schools likewise leads to great disparities between schools (Alba and Foner 2015, pp. 171-176).

Second, the mechanisms identified require that minority students are aware of the composition of other, geographically proximate schools. We argued that such awareness depends on contacts with peers from other schools. In support of this assertion, we found high-track attendance and identification to go hand in hand in areas with strong ethnic stratification only in classes where minority students have substantial ties to peers from other schools. Again, based on the comparative CILS4EU data, one can show that this scope condition is only slightly less prevalent in the formally open educational systems of England and Sweden, where 50 percent of all minority students attend such classes, compared to about two thirds in Germany and the Netherlands. Still, future studies in other countries should devote attention to what extent the student bodies from different schools in a local area are segregated or linked.

Third, we found that Muslim students are less inclined to identify as German even in local contexts that are particularly conducive for crossing the native-immigrant boundary. Previous research suggests that Muslims face a very similar situation across continental Europe (Fleischmann and Phalet 2018; Savelkoul et al. 2012) as they struggle to "develop a sense of belonging and being comfortable about being not only 'Muslims in Europe' but 'European Muslims.'" (Zolberg and Woon 1999, p. 18). Outside of Western Europe, our analytic strategy could help to identify which groups face similarly impermeable boundaries. As noted by Alba (2005: 42), "boundary concepts, such as bright vs. blurred boundaries, provide a productive basis for comparisons. These concepts subsume features like race that have proved their

explanatory power in the U.S. and enable them to be matched with their equivalents (or near equivalents) elsewhere." For example, our study could motivate a more rigorous approach to Zolberg and Woon's (1999) famous title-giving question in what sense Islam in Europe is like Spanish in the United States. Such work can build on previous attempts to study how minority students negotiate their identities in elite institutions in which they are underrepresented, such as Hispanics in Ivy League universities (Ethier and Deaux 1990, 1994; Deaux and Ethier 1998). We encourage scholars to extend this line of work and study processes of local boundary making in diverse samples of schools that allow for a bird's-eye view of stratified educational landscapes.

Examining mechanisms of boundary crossing in other countries requires to think carefully about the nature and markers of mainstream identities – as the underlying social-category schemes are specific to different societies (Alba and Foner 2015, p. 199). In contrast to the "thick" definitions of national belonging in continental Europe, it is considerably easier for immigrant minorities in the United States to "feel American." At the same time, this is often associated with a heightened sense of nonwhiteness or a pan-minority identity as adolescents find their place in America's racialized social system (Zhou and Lee 2004, p. 14). In particular, minority students in schools that are dominated by the white native majority often do not belong in the same taken-for-granted manner and may feel compelled to assimilate culturally and socially to the dominant ethnic group (Carter 2005). Hence, capturing such phenomena requires different measures than probing the extent to which minority youth "feel American."

Finally, future research should explore the long-term consequences of being exposed to particular school settings. Boundary crossing is a process that will often take several phases in one's life to be completed (Feliciano 2009; Syed and Azmitia 2009). Based on self-reported identities in early adulthood, one could assess whether the contextual effects on identification and friendships vanish once adolescents leave these school settings, or whether they prepare the ground for a full change of group membership once minority youth leave the parental home and continue on their route of educational and occupational advancement in mainstream society.

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APPENDIX A

Table A1: Summary statistics across all variables used in the multilevel models

	mean	s.d.	min	max	missing (in %)
Feel German	2.52	0.98	1.00	4.00	3.12
Area with strong ethnic stratification *(yes=1)*	0.52		0.00	1.00	1.97
High-track *(yes=1)*	0.15		0.00	1.00	0.00
Ethnic origin					
Turkish	0.36		0.00	1.00	0.00
Former Soviet Union	0.13		0.00	1.00	0.00
Polish	0.07		0.00	1.00	0.00
Ex-Yugoslav	0.09		0.00	1.00	0.00
Other Western	0.16		0.00	1.00	0.00
Other Non-Western	0.20		0.00	1.00	0.00
Immigrant generation					
First	0.23		0.00	1.00	0.00
Second	0.63		0.00	1.00	0.00
Child of intermarriage	0.14		0.00	1.00	0.00
Ingroup share in class	0.19	0.18	0.03	0.70	0.00
Majority share in class	0.40	0.22	0.00	0.96	0.00
Ethnic diversity in class	0.72	0.12	0.18	0.92	0.00
Sex (*male=1*)	0.51		0.00	1.00	0.00
HISEI	37.92	18.75	11.01	88.70	8.08
Cognitive test score	18.19	4.20	1.00	27.00	0.30
Language test score	9.54	4.24	0.00	24.00	0.17
Federal state					
1	0.07		0.00	1.00	0.00
2	0.38		0.00	1.00	0.00
3	0.08		0.00	1.00	0.00
4	0.02		0.00	1.00	0.00
5	0.02		0.00	1.00	0.00
6	0.10		0.00	1.00	0.00
7	0.19		0.00	1.00	0.00
8	0.12		0.00	1.00	0.00
9-15	0.02		0.00	1.00	0.00
N(students)	2,340				
N(classes)	267				
N(schools)	144				

Table A2: Multilevel models of identification as German among minority students

	M1		M2		M3		M4		M5 (identification of parent)	
	Coef	(s.e.)	Coef	(s.e.)	Coef	(s.e.)	Coef	(s.e.)	Coef	(s.e.)
Fixed Parts										
Constant	-0.011	(0.044)	-0.015	(0.042)	-0.390 ***	(0.077)	-0.445 ***	(0.124)	-0.739 ***	(0.147)
Strong ethnic stratification	-0.046	(0.059)	-0.033	(0.056)	-0.013	(0.053)	-0.019	(0.062)	0.057	(0.075)
High-track	0.205 **	(0.092)	0.130	(0.087)	-0.008	(0.085)	0.031	(0.089)	0.035	(0.108)
Strong ethnic stratification * high-track	0.498 ***	(0.153)	0.321 **	(0.150)	0.340 **	(0.139)	0.330 **	(0.142)	-0.164	(0.171)
Ingroup share in class[1]			-0.599 ***	(0.157)	-0.015	(0.211)	0.019	(0.212)	0.180	(0.254)
Majority share in class[1]			0.316 **	(0.151)	0.138	(0.150)	0.122	(0.149)	0.300 *	(0.175)
Ethnic diversity in class[1]			-0.691 ***	(0.258)	-0.384	(0.249)	-0.383	(0.249)	-0.071	(0.298)
Ethnic origin (ref.: *Turkish)*										
Former Soviet Union					0.365 ***	(0.083)	0.366 ***	(0.083)	0.608 ***	(0.100)
Polish					0.530 ***	(0.093)	0.536 ***	(0.094)	0.801 ***	(0.112)
Ex-Yugoslav					-0.083	(0.089)	-0.068	(0.089)	0.620 ***	(0.109)
Other Western					0.084	(0.077)	0.095	(0.077)	0.433 ***	(0.092)
Other Non-Western					0.198 **	(0.078)	0.207 ***	(0.078)	0.619 ***	(0.095)
Immigrant generation (ref.: *first*)										
Second					0.249 ***	(0.054)	0.250 ***	(0.054)	0.211 ***	(0.066)
Child of intermarriage					0.765 ***	(0.078)	0.767 ***	(0.078)	0.758 ***	(0.094)
HISEI[1]					0.003 ***	(0.001)	0.003 ***	(0.001)	0.004 **	(0.002)
Sex (ref.: *female*)[2]					-0.025	(0.041)	-0.028	(0.041)	0.149 ***	(0.057)
Cognitive test score[1]					-0.008	(0.005)	-0.009 *	(0.005)	-0.001	(0.007)
Language test score[1]					0.014 **	(0.006)	0.013 **	(0.006)	0.008	(0.008)
Federal state (ref.: *state 1*)										
State 2							0.077	(0.101)	0.038	(0.120)
State 3							-0.024	(0.132)	-0.005	(0.161)
State 4							-0.095	(0.192)	0.111	(0.244)
State 5							0.168	(0.175)	0.148	(0.282)
State 6							-0.095	(0.141)	-0.036	(0.165)
State 7							0.031	(0.104)	0.075	(0.123)
State 8							0.098	(0.112)	-0.020	(0.135)
Other state							0.206	(0.174)	0.112	(0.208)
Random Parts										
σ^2	0.891		0.884		0.813		0.814		0.897	
$\tau_{00,\ classid}$	0.056		0.039		0.028		0.023		0.023	
$N_{classid}$	253		253		253		253		246	
$ICC_{classid}$	0.059		0.042		0.034		0.028		0.025	
N(students)	2044		2044		2044		2044		1572	
R^2 / Ω_0^2	.025 / .082		.049 / .089		.131 / .161		.136 / .160		.161 / .212	
AIC	5676.65		5639.641		5482.105		5490.617		4442.133	

NOTE. * $p < .1$; ** $p < .05$; *** $p < .01$ (two-tailed tests); [1] Centered; [2] M5 controls for parents' instead of students' sex.

Table A3: Propensity score matching models for high-track attendance

	Area with weak ethnic stratification			Area with strong ethnic stratification		
	Coef.		(s.e.)	Coef.		(s.e.)
Constant	-6.482	***	(0.604)	-12.689	***	(1.317)
Ethnic origin (ref.: *Turkish*)						
Former Soviet Union	-0.479		(0.316)	0.544		(0.452)
Polish	-0.749	**	(0.363)	0.178		(0.519)
Ex-Yugoslav	-0.768	*	(0.422)	0.086		(0.549)
Other Western	-1.135	***	(0.340)	-0.197		(0.423)
Other Non-Western	-0.040		(0.258)	-0.142		(0.440)
Immigrant generation (ref.: *first*)						
Second	-0.063		(0.255)	1.241	***	(0.447)
Child of intermarriage	-0.274		(0.346)	0.760		(0.480)
Sex (ref.: *female*)	-0.421	**	(0.183)	-1.151	***	(0.288)
Cognitive test score	0.110	***	(0.027)	0.221	***	(0.051)
Language test score	0.258	***	(0.027)	0.305	***	(0.041)
HISEI	0.023	***	(0.005)	0.039	***	(0.007)
AIC	811.950			404.093		
N(students)	970			1,074		

NOTE. * $p < .1$; ** $p < .05$; *** $p < .01$ (two-tailed tests)

Table A4: Results of ERGM meta analysis of friendship networks in area- and track-specific subsamples

	Area with weak ethnic stratification				Area with strong ethnic stratification			
	Lower tracks		High track		Lower tracks		High track	
	Coef	(s.e.)	Coef	(s.e.)	Coef	(s.e.)	Coef	(s.e.)
Model 1								
Edges	-3.497 ***	(0.233)	-3.956 ***	(0.311)	-3.408 ***	(0.228)	-3.233 ***	(0.501)
Mutual	2.388 ***	(0.068)	2.383 ***	(0.092)	2.344 ***	(0.059)	2.802 ***	(0.124)
GWESP	0.968 ***	(0.026)	1.080 ***	(0.038)	0.978 ***	(0.023)	0.981 ***	(0.048)
Same Sex	0.656 ***	(0.033)	0.631 ***	(0.043)	0.636 ***	(0.027)	0.633 ***	(0.057)
Same Ethnic Origin	0.141 ***	(0.038)	0.245 ***	(0.053)	0.190 ***	(0.036)	0.054	(0.071)
Minority Ego	0.077	(0.187)	0.507 **	(0.255)	-0.036	(0.175)	0.419	(0.518)
Majority Alt	-0.336 *	(0.202)	-0.009	(0.264)	-0.312	(0.199)	-0.440	(0.374)
Feel German Ego	-0.032	(0.062)	0.084	(0.086)	-0.045	(0.061)	-0.087	(0.133)
Minority Ego * Majority Alt	-0.356	(0.226)	-0.592 **	(0.290)	-0.345	(0.213)	-1.210 **	(0.544)
Feel German Ego * Minority Ego	0.009	(0.077)	-0.272 **	(0.107)	0.008	(0.070)	-0.274	(0.222)
Feel German Ego * Majority Alt	0.118	(0.075)	-0.054	(0.101)	0.116	(0.073)	0.120	(0.135)
Feel German Ego * Minority Ego * Majority Alt	0.084	(0.097)	0.288 **	(0.126)	0.107	(0.087)	0.491 **	(0.236)
N(classes)	51		21		64		12	
N(schools)	29		11		36		6	
Model 2								
Edges	-3.493 ***	(0.202)	-3.472 ***	(0.249)	-3.372 ***	(0.196)	-4.035 ***	(0.461)
Mutual	2.364 ***	(0.067)	2.366 ***	(0.092)	2.332 ***	(0.058)	2.782 ***	(0.124)
GWESP	0.968 ***	(0.026)	1.083 ***	(0.038)	0.976 ***	(0.023)	0.979 ***	(0.047)
Same Sex	0.655 ***	(0.032)	0.621 ***	(0.043)	0.635 ***	(0.027)	0.641 ***	(0.057)
Same Ethnic Origin	0.163 ***	(0.039)	0.221 ***	(0.053)	0.183 ***	(0.036)	0.063	(0.071)
Majority Ego	-0.274	(0.208)	-0.318	(0.266)	-0.235	(0.200)	0.273	(0.400)
Minority Alt	0.178	(0.155)	0.004	(0.187)	0.106	(0.147)	1.263 ***	(0.446)
Feel German Alt	-0.107 **	(0.054)	-0.122 *	(0.069)	-0.117 **	(0.052)	0.014	(0.119)
Majority Ego * Minority Alt	-0.099	(0.226)	0.057	(0.283)	-0.121	(0.209)	-1.567 ***	(0.532)
Feel German Alt * Majority Ego	0.204 ***	(0.076)	0.178 *	(0.100)	0.177 **	(0.073)	0.015	(0.140)
Feel German Alt * Minority Alt	0.047	(0.063)	0.091	(0.082)	0.032	(0.058)	-0.419 **	(0.190)
Majority Ego * Feel German Alt * Minority Alt	0.002	(0.093)	-0.030	(0.121)	0.013	(0.084)	0.626 ***	(0.229)
N(classes)	52		21		65		12	
N(schools)	30		11		37		6	

NOTE. ERGM results combined via multivariate random effects meta-analysis (cf. An 2015); * $p < .1$; ** $p < .05$; *** $p < .01$ (two-tailed tests)

APPENDIX B

ERGM specifications and quantities of interests

The general form of an ERGM stipulates that one particular realization x of a random network X can be observed with probability

$$P(X=x)=\frac{1}{\kappa}\exp\left(\sum_A \theta_A s_A(x)\right), \quad (1)$$

where the summation is over a number of network configurations A (e.g., mutual dyads, ties sent by minority students, etc.). $s_A(x)$ denotes the respective count statistic of A in x (e.g., the number of mutual dyads in x, the number of ties sent by minority members in x, etc.), κ is a normalizing constant, and θ_A is a configuration-specific weighting parameter to be estimated (cf. Robins et al. 2007; Lusher, Koskinen, and Robins 2013). Estimates of θ_A indicate which local network configurations are more prevalent ($\hat{\theta}_A > 0$) or less prevalent ($\hat{\theta}_A < 0$) in *x* than expected at random and net of all other configurations included.

To arrive at the conditional log-odds of a specific dyadic structure, we relate the probabilities of two hypothetical states of a given network x that differ only in one additional occurrence of the dyadic structure of interest (e.g., one network state including an additional tie between a minority student identifying strongly as German and a majority peer, all else held equal). Assuming that a tie between two actors *i* and *j* (i.e., $X_{ij}=1$) creates one such dyadic structure, we can transform equation (1) into the conditional form (cf. Strauss and Ikeda 1990)

$$\text{logit}\left(X_{ij}\middle|x_{ij}^{c}\right)=\sum_A \theta_A \Delta(s_A(x))_{ij}, \quad (2)$$

where x_{ij}^{c} denotes the state of all dyads in x other than (*i*,*j*) and where $\Delta(s_A(x))_{ij}$ denotes the change that a tie between (*i*,*j*) evokes in each count statistic $s_A(x)$ included in the model.

We use two different model setups to test our second and third hypotheses, respectively. Referring to each change statistic $\Delta(s_A(x))_{ij}$ simply as (A), model 1 is based on the following specification:

$$\begin{aligned}\text{logit}\left(X_{ij}\middle|x_{ij}^{c}\right)_{m1} = {} & \theta_{m1.1}(\text{Edges})+\theta_{m1.2}(\text{Mutual})+\theta_{m1.3}(\text{GWESP})+\theta_{m1.4}(\text{Same Sex})+\theta_{m1.5}(\text{Same Ethnic Origin})+\\ & \theta_{m1.6}(\text{Minority Ego})+\theta_{m1.7}(\text{Majority Alt})+\theta_{m1.8}(\text{Feel German Ego})+\\ & \theta_{m1.9}(\text{Minority Ego*Majority Alt})+\theta_{m1.10}(\text{Feel German Ego*Minority Ego})+\\ & \theta_{m1.11}(\text{Feel German Ego*Majority Alt})+\theta_{m1.12}(\text{Feel German Ego*Minority Ego*Majority Alt}). \quad (3)\end{aligned}$$

This specification accounts for students' general tendency to form ties (Edges), to reciprocate friendship nominations (Mutual), to form friendship triads (GWESP), and to befriend peers of the same sex (Same Sex) and ethnic origin (Same Ethnic Origin).[23] The three-way interaction

[23] Alternative model specifications that additionally account for spatial proximity between classmates, popularity of athletic peers, and further forms of homophily (i.e., with regard to social background and grade point average)

and its constitutive terms form the basis to test our second hypothesis: Model 1 estimates whether directed ties sent from minority to majority students are more prevalent in cross-group dyads where minority students identify more strongly as German. Mathematically, this is equivalent to taking the derivative of equation 3 with respect to (Majority Alt) and with respect to (Feel German Ego):

$$\frac{\delta^2\left[\text{logit}\left(X_{ij}\middle|x_{ij}^c\right)_{m1}\right]}{\delta(\text{Majority Alt})\,\delta(\text{Feel German Ego})} = \theta_{m1.11}+\theta_{m1.12}(\text{Minority Ego}). \quad (4)$$

The right-hand part of the equation serves as our quantity of interest when testing our second hypothesis: Positive values indicate that minority students who identify strongly as German have a greater tendency to nominate majority peers than minority students who identify weakly. Negative values suggest the opposite.

In model 2, we use the following specification:

$$\begin{aligned}\text{logit}\left(X_{ij}\middle|x_{ij}^c\right)_{m2} = {} & \theta_{m2.1}(\text{Edges})+\theta_{m2.2}(\text{Mutual})+\theta_{m2.3}(\text{GWESP})+\theta_{m2.4}(\text{Same Sex})+\theta_{m2.5}(\text{Same Ethnic Origin})+\\ & \theta_{m2.6}(\text{Majority Ego})+\theta_{m2.7}(\text{Minority Alt})+\theta_{m2.8}(\text{Feel German Alt})+\\ & \theta_{m2.9}(\text{Majority Ego*Minority Alt})+\theta_{m2.10}(\text{Majority Ego*Feel German Alt})+\\ & \theta_{m2.11}(\text{Feel German Alt*Minority Alt})+\theta_{m2.12}(\text{Majority Ego*Feel German Alt*Minority Alt}). \quad (5)\end{aligned}$$

Model 2 examines whether directed ties sent from majority to minority students are more prevalent among cross-group dyads where minority students identify more strongly as German. We therefore take the derivative of equation 5 with respect to (Minority Alt) and with respect to (Feel German Alt), yielding

$$\frac{\delta^2\left[\text{logit}\left(X_{ij}\middle|x_{ij}^c\right)_{m2}\right]}{\delta(\text{Minority Alt})\,\delta(\text{Feel German Alt})} = \theta_{m2.11}+\theta_{m2.12}(\text{Majority Ego}). \quad (6)$$

According to our second and third hypotheses, the association of identification and the tendencies to form cross-group friendships – as expressed in equations 4 and 6 – should be particularly strong in the high-track schools of areas where ethnic stratification is strong. To test these theoretical expectations, we combine the ERGM estimates in a multivariate random effects meta-analysis (An 2015) which accounts not only for the uncertainty in each parameter separately but for the complete covariance structure of the estimates obtained in each single network.[24]

provide substantively identical results but come with a decrease in sample size (results not shown here, available upon request).

[24] We carried out the analyses in *R* (version 3.4.1), using the packages *lme4* (version 1.1.13; Bates et al. 2015), *MatchIt* (version 3.0.1; Ho et al. 2011), *ergm* (version 3.7.1; Hunter et al. 2008; Handcock et al. 2017), and *mvmeta* (version 0.4.7; Gasparrini et al. 2012).

ERGM sample restrictions

To guarantee sufficient coverage of the actual network structure, we restrict the sample to those 127 (out of 144) schools where at least 70 % of all students participated in the network survey. Moreover, we had to exclude schools in which there are too few minority or majority students to allow for a meaningful cross-group analysis (n=38 or n=41 depending on model setup), where convergence could not be obtained (n=4 / n=0), and where information on local levels of stratification was unavailable (n=3 / n=2). This yields an analysis sample of 82 or 84 schools with 148 or 150 school class networks, depending on model setup.

Table B1 compares the schools in our analysis sample with the excluded ones. Importantly, we observe no statistically significant differences in the extent of ethnic stratification in their local areas. However, there are differences in composition since we had to exclude schools with very few minority or majority students. Most notably, excluded high-track schools show greater majority shares (accompanied by slightly larger average HISEI scores) than high-track schools included in the ERGM analysis. This will most likely bias the estimates of our effects of interest downward since the excluded high-track schools with very few minority students can be assumed to exhibit even larger pressures or incentives for boundary crossing and opportunities for boundary policing. Finally, average abilities differ only among the lower-track schools, with excluded schools showing slightly lower average cognitive test scores.

Table B1: Comparison of schools included in and excluded from ERGM analysis

	Included in ERGM	Not included in ERGM	Difference	P-value
Model 1				
N(schools)				
Total	82	45		
High track	18	9		
Lower tracks	64	39		
Ethnic stratification in area				
Total	0.252	0.233	0.020	0.283
High track	0.238	0.222	0.015	0.822
Lower tracks	0.256	0.234	0.022	0.255
Majority share				
Total	0.522	0.540	-0.018	0.732
High track	0.605	0.832	-0.227	0.001
Lower tracks	0.500	0.495	0.005	0.931
HISEI				
Total	43.479	41.853	1.626	0.462
High track	56.493	63.259	-6.766	0.057
Lower tracks	40.075	38.560	1.515	0.402
Cognitive test score				
Total	18.993	17.751	1.242	0.017
High track	21.504	21.815	-0.311	0.530
Lower tracks	18.337	17.126	1.211	0.016
Model 2				
N(schools)				
Total	84	43		
High track	16	8		

Lower tracks	68	35		
Ethnic stratification in area				
Total	0.249	0.240	0.009	0.633
High track	0.238	0.222	0.015	0.822
Lower tracks	0.252	0.243	0.009	0.655
Majority share				
Total	0.528	0.528	0.000	0.998
High track	0.605	0.832	-0.227	0.001
Lower tracks	0.509	0.479	0.030	0.617
HISEI				
Total	44.001	40.758	3.243	0.135
High track	56.493	63.259	-6.766	0.057
Lower tracks	40.831	37.109	3.722	0.023
Cognitive test score				
Total	18.978	17.724	1.254	0.018
High track	21.504	21.815	-0.311	0.530
Lower tracks	18.337	17.060	1.277	0.013