OXFORD

When Ethnicity and Gender Align: Classroom Composition, Friendship Segregation, and Collective Identities in European Schools

Clemens Kroneberg ⓘ [1,*], Hanno Kruse[2] and Andreas Wimmer[3]

[1]Institute of Sociology and Social Psychology, University of Cologne, Köln 50923, Germany, [2]Department of Sociology, University of Amsterdam, 1018 WV Amsterdam, The Netherlands and [3]Department of Sociology, Columbia University, New York, NY 10027, USA

*Corresponding author. Email: c.kroneberg@uni-koeln.de

Abstract

Using survey data on school classes in four European countries, we study how the social relations and identities of adolescents develop depending on the degree to which ethnic and gender boundaries align with each other. Minority students will have mostly same-ethnic friends, we find, when classmates of different ethnic origins tend to be of the opposite sex as well. Within such local topographies of boundaries, minority students will also end up identifying less as members of the nation. In contrast, majority students are not affected by the alignment of ethnic and gender boundaries, and gender identities of both minorities and majorities are less malleable as well: Neither friendship segregation along gender divides nor the development of gender role attitudes depend on the degree to which gender and ethnic origin align. We argue that gender boundaries and feelings of national belonging among majority students are widely taken for granted and thus less sensitive to attribute alignment at the local level. The article builds a bridge between the literatures on ethnic segregation of friendship networks, adolescent ethnic identities, and gender role attitudes by integrating them into a structuralist framework that identifies the conditions under which the local configuration of boundaries affects social life.

Introduction

Over the past decades, many scholars and policymakers in Europe and beyond have been concerned about how to create shared feelings of belonging across ethnic divides and how to foster positive relations between minorities and majorities—thereby building social cohesion and avoiding the prospect of ethnic polarization. According to a classical sociological argument, social cohesion emerges from cross-cutting social ties (Simmel, 1908; Lipset, 1960; Blau, 1977): If individuals belong to different social categories, it is less likely that they sort themselves into mutually exclusive social groups that fragment the social web along a single categorical divide. However, as Blau (1994: p. 46) noted, there is a widespread tendency for categorical boundaries to align because sorting processes (emerging from individual choices or institutional rules) steer people with very similar combinations of attributes into the same local contexts—be it work teams, housing blocks, classrooms, or families (McPherson, 2004; Bruch, 2014). Such

'consolidation', in the words of Blau, will reinforce barriers to interaction across social categories, solidify ingroups and intensify social control within them (Blau and Schwartz, 1984: p. 83).

In this article, we study the consequences of the alignment between ethnic origin and gender in the school classes of four European countries.[1] We focus on these two categorical boundaries for three reasons. First, they tend to be particularly relevant and meaningful at that age (Ruble *et al.*, 2004; Turner and Spears Brown, 2007). Second, previous research has examined the relationship between ethnic origin and social facts that tend to be either endogenous to ethnicity, such as cultural tastes and attitudes (Stark and Flache, 2012; Smith, Maas and van Tubergen, 2014), or related to systematic group differences, such as socio-economic status (Moody, 2001; Smith, Maas and van Tubergen, 2014). In contrast, the gender composition of ethnic groups in a school class is largely exogenous and unsystematic, as we will discuss below. This allows for a more informative analysis of how attribute alignment affects social ties and identities. Finally, school administrators have considerable leeway to influence the gender and ethnic composition of classrooms. This opens up the possibility of positive policy interventions by making sure that gender and ethnic boundaries crisscross each other when admitting students to schools and when assigning them to classrooms.

Analysing survey data from schools in England, Germany, the Netherlands, and Sweden (CILS4EU, 2016; Kalter *et al.*, 2016a; Kalter *et al.*, 2016b), we show that minority students will have mostly same-ethnic friends when classmates of different ethnic origins tend to be of the opposite sex as well. Moreover, when majority group classmates tend to be of the opposite sex, minority students will, over time, identify less strongly as members of the nation. This is not the case for majority students, however, who unequivocally identify with the nation independent of local classroom composition (Skey, 2010). Similarly, school class composition does not shape gender relations and identities: Both levels of gender segregation of friendship networks and adolescents' attitudes towards gender roles are not affected by the alignment between gender and ethnicity. These findings suggest that the Blauian mechanism only works under certain conditions, i.e. when membership in particular social categories is not already taken for granted and deeply entrenched but open to situational (re-)definition.

Previous research on schools and colleges has not shown much interest in how the contextual alignment of ethnic and gender boundaries could potentially influence social relations and identities. This is surprising given that a wealth of qualitative research has documented how race/ethnicity, gender, and other social categories 'intersect', producing distinctive individual experiences, identities, and life chances (Warikoo and Carter, 2009). Quantitative research on the effects of classroom composition, however, has dealt with ethnicity and gender in largely separate literatures. One strand of research has explored how ethno-racial composition shapes opportunities and preferences for same-race or same-ethnic friends (termed 'homophily'; see e.g. Goodreau, Kitts and Morris, 2009; Smith *et al.*, 2016). Rather than examining the consequences of attribute alignment within classrooms (see Stark and Flache 2012; Smith, Maas and van Tubergen, 2014), most of these studies have estimated net racial (or ethnic) homophily rates at the individual level while controlling for other, correlated background characteristics, such as gender or social class (e.g., Marmaros and Sacerdote, 2006; Mouw and Entwisle, 2006; Wimmer and Lewis, 2010).

In the field of gender, educational researchers have become increasingly interested in the impact of classroom composition on how students evaluate their intellectual abilities (termed 'academic self-concepts', see Belfi *et al.*, 2012). For example, several studies have found that single-sex classes allow girls to develop more positive academic self-concepts concerning the sciences, while coeducational settings reinforce gender stereotypes (Lee and Bryk, 1986; Lee and Lockheed, 1990; Kessels and Hannover, 2008; Sullivan, 2009)—again without considering the potentially reinforcing role of an alignment between gender and ethnicity. The consequence of this scholarly division of labour is that we know little about whether such alignment in the composition of classrooms matters for friendships, identities, and attitudes.

Past Research, Theory, and Hypotheses

Simmel (1908) is usually credited for the idea that social cohesion increases if social categories cross-cut each other. While he initially wanted to explain why modern societies did not fall apart despite increasing social differentiation, Blau later generalized the argument to any kind of intergroup relations (Blau and Schwartz, 1984; Blau, 1994). In a nutshell, he stated that intergroup contact is encouraged if other dimensions of categorical difference cut across the focal boundary. Empirically, this argument has mostly been applied to explain how frequently social relations (e.g., in the form of marriages or friendships) emerge between two groups (Kennedy, 1944; Blau, 1977; Kalmijn, 1998). A second strand of

research emerged in political science, where researchers have examined the political consequences of cross-cutting cleavages since Lipset's (1960) seminal study on the subject (Selway, 2010; see, e.g., Cederman, Weidmann and Gleditsch, 2011). Similarly, a third line of research in organizational sociology and in management science has developed the concept of 'faultlines' to describe the dividing lines that split a work team into two or more subgroups based on the alignment of one or more individual attributes (Lau and Murnighan, 1998; Thatcher and Patel, 2012). Finally, social psychologists have shown how intergroup contexts defined by two dimensions of social categorization (called 'cross-categorization') can help to reduce the intergroup bias associated with each individual category (Brewer, 2000; Crisp, 2010).

In this study, we apply the idea of cross-cutting cleavages to the school context and integrate it with more recent sociological theories of boundary making. Rather than exploring relations between given groups, scholars working within the boundary tradition ask how and under what conditions social categories become relevant in the first place (e.g., Alba, 2005; Barth, 1969; Lamont and Molnár, 2002; Wimmer, 2008; Wimmer, 2013). Social boundaries have two components: how actors categorize and classify themselves and others (dividing the social world into 'us' and 'them') as well as the 'everyday networks of relationships that result from individual acts of connecting and distancing' (Wimmer, 2008: p. 975). As a heuristic framework, the boundary-making approach therefore encourages scholars to study collective identities and social networks in an integrated fashion.

The boundary-making approach assumes that individuals engage in boundary work—by shifting, crossing, or changing the meanings attached to these social categories (Wimmer, 2013: chapter 3). The extent to which actors are motivated and able to pursue these strategies depends on the nature (or properties) of boundaries, such as their permeability, salience, taken-for-grantedness, or visibility. As a consequence, different groups of individuals will be affected differently by a social boundary: While some belong without questioning to certain kinds of social categories, others' membership is precarious and constantly re-negotiated, and while some are allowed to cross a boundary and assimilate into another group, others will continue to be treated as outsiders (for the school context, see Kruse and Kroneberg, 2019).

We incorporate the insights of the Blauian/Lipsetian tradition into this boundary-making approach by asking how the alignment of several attributes (i.e., reinforcing cleavages or 'parameter consolidation' in Blau's

terminology) affects the strength of boundaries and associated levels of 'groupness' (Jenkins, 1997: p. 50)—i.e., the degree to which individuals will develop social ties, identities, and attitudes based on their categorical membership. This Blauian mechanism of boundary reinforcement, however, should only work for boundaries that show a minimal level of contextual variability: When membership in social categories is widely taken for granted, they tend to be relevant across different contexts, whether or not these categories align with other divides (see Wimmer, 2008: p. 1002f.). We explore these conjectures by examining how the degree to which gender and ethnic boundaries align affects students' social networks and identities.

Attribute Alignment and Friendship Networks in the School Context

Many social network studies have focused on the ethnic composition of schools or classes and how it influences students' preference to befriend same-ethnic or same-race peers (e.g., Mouw and Entwisle, 2006; Smith *et al.*, 2016). When estimating ethnic or racial homophily, researchers control for other background characteristics such as gender or social class but have rarely considered the varying degree of alignment between such characteristics.

An exception is Moody's (2001) analysis of Add Health data, in which he confirmed Blau's argument by showing that racial homophily is higher in contexts where socioeconomic status and race are highly correlated. A study by Stark and Flache (2012) showed that cultural homophily can reinforce ethnic homophily if ethnic origin aligns with cultural tastes, for example, a preference for Hip-Hop or Rock music, or with attitudes towards social and antisocial behaviours. In contrast to the alignment of sociodemographic attributes, however, such preferences are often endogenous to ethnic divisions.

Using the same data as the current study, Smith, Maas and van Tubergen (2014) examined homophily on an extensive set of cultural and socio-economic characteristics and asked whether these might be responsible for ethnic homophily in friendships. Surprisingly, however, none of these homophily dimensions helped to account for the tendency towards ethnic ingroup friendships—a finding that the authors attribute to the weak correlations between these other attributes and ethnic origin. All of their models examined ethnic homophily net of gender homophily, however, and their analysis therefore does not answer the question of how the alignment between gender and ethnicity contributes to ethnic friendship segregation.

Finally, Block and Grund (2014) asked whether friendship ties are more likely to emerge and persist when individuals share multiple attributes. Contrary to the Blauian intuition, their longitudinal analysis of 11 friendship networks revealed a diminishing effect of having more than one attribute in common. For example, sharing the same-ethnic origin matters less for forming a friendship tie when both students are male or female compared to a situation where one student is female and the other is male.

In this article, we take a more structuralist approach by focusing not only on homophily as a possible tie-formation mechanism but also on the resulting network structures and collective identities. When attribute alignment is strong, the nearly universal gender segregation will make ethnic commonality less relevant for choosing friends (in line with Block and Grund, 2014). At the network level, however, the fact remains that most everyday interaction between friends will involve co-ethnics, whether this pattern is generated by gender homophily or ethnic homophily. This important structural reality is often concealed behind the coefficients of multivariate network models that identify net homophily rates by carefully controlling for opportunities, other preferences for shared attributes, and their amplification through basic tie-formation mechanisms such as reciprocity or triadic closure.

Our argument relies on the empirical insight that adolescents' friendship networks tend to be strongly and nearly universally segregated by gender (Maccoby, 1998). In contrast, ethnic segregation is weaker on average or even non-existent in a considerable number of schools and classrooms (Moody, 2001; Baerveldt et al., 2004; Mouw and Entwisle, 2006; Leszczensky and Pink, 2015; Kruse et al., 2016; Smith et al., 2016; Shwed, Kalish and Yossi, 2018). Compared to majority students, ethnic minority students often form more cross-group friendships simply because their smaller group sizes imply fewer opportunities for same-ethnic ties, in particular if friends also need to satisfy other preferences, such as gender or cultural homophily (Smith et al., 2016: p. 1231). Hence, there are strong grounds to expect that, in school classes where ethnic categories and gender are associated with each other, gender segregation will translate into a heightened level of ethnic segregation of friendship networks:

H1: In school classes with greater alignment between gender and ethnic origin, ethnic segregation in the friendship networks of majority and minority students is stronger than in classes with less attribute alignment.

We do not expect the reverse to hold, however, because gender boundaries are so strong during adolescence that we observe only few friendships between boys and girls. Hence, even though analytically ethnic homophily could strengthen gender segregation, gender homophily dominates adolescent friendship formation to such a degree that we do not expect the reverse effect to be visible. In other words, ethnicity can 'borrow groupness' from gender when both boundaries align, but not the other way around, giving rise to the second hypothesis:

H2: The extent of gender segregation in friendship networks is unaffected by the degree to which gender and ethnic boundaries align in a school class.

Attribute Alignment and the Perception of Boundaries by Students

Beyond its impact on social network structures, attribute alignment might also affect how students classify themselves and others and thus their collective identities (Lamont and Molnár, 2002: p. 188). Specifically, we argue that ethnicity will assume more 'groupness' (Jenkins, 1997: p. 50; Brubaker, 2004) when ethnic boundaries align with the gender divide in a school class. In such a situation, students will face ethnic outgroups whose members also tend to be of the opposite sex. This will lead to a greater awareness of ethnic group membership, increase the relevance of associated norms, cultural codes, and behavioural styles, as well as strengthen 'perceptions of difference' (Smith and Moore, 2000: p. 4) vis-a-vis members of other ethnic categories. Although a considerable part of these differences may in fact stem from gender-specific norms and styles, students will start to attribute some of these differences to their diverging ethnic origins (Kutzner and Fiedler, 2017).

Attribute alignment will therefore affect the formation of ethno-national identities, particularly among minority students who face a native majority that tends to consist of peers of the opposite sex. Native peers will appear as more different, and minority students will therefore be less likely to identify as a member of the national majority (termed 'identificational assimilation' in the canonical work of Gordon, 1964).

H3: In school classes where gender and ethnic boundaries align, minority students develop a weaker identification as members of the nation compared to minority students in classes with less attribute alignment.

For majority students, we do not expect that attribute alignment affects their ethno-national identity.

Members of the dominant ethnic majority typically identify with the nation without much questioning (Mummendey *et al.*, 1999; Sidanus and Pratto, 1999; Skey, 2010), mostly because they perceive their own group as typical for or even synonymous with the overarching national group. Due to this high level of taken-for-grantedness, the chances that majority members disidentify with the national group are very slim indeed. The strength of attribute alignment in a classroom will therefore hardly affect the national identification of majority students.

H4: The extent to which majority students identify as members of the nation is not affected by the degree to which gender and ethnic boundaries align in a school class.

Finally, we also derive a hypothesis for the development of gender identities. As with the national identity of majority students, most adolescents take their gender identity as male or female for granted (Rudman and Kilianski, 2000; Ridgeway and Correll, 2004), so that we do not expect attribute alignment to affect their gender identities. Moreover, lacking a measure of non-binary gender identities (Sullivan, 2020), we cannot examine how such identities might respond to attribute alignment. Instead, we focus on the impact of attribute alignment on how students perceive differences between males and females—arguably a more malleable, less taken-for-granted form of social classification that might very well be influenced by the Blauian mechanism. More specifically, when gender and ethnic boundaries align, students should perceive boys and girls as even more distinct from one another. Students will therefore be more likely to argue that men and women should conform to different behavioural expectations. We will test this conjecture with regard to students' attitudes towards the division of labour between men and women, which have been linked to various behavioural outcomes in adulthood (Steiber and Haas, 2012):

H5: In school classes where gender and ethnic boundaries align, students develop more traditional gender role attitudes, compared to students in classes with less attribute alignment.

Data and Measures

We use data from the 'Children of Immigrants Longitudinal Survey in Four European Countries' (CILS4EU, 2016; Kalter *et al.*, 2016a; Kalter *et al.*, 2016b). Starting in 2010, the yearly survey targeted representative samples of adolescents in England, Germany, the Netherlands, and Sweden. We use data from the first two waves during which most participants were still attending secondary school. Students attended the ninth grade in wave 1 and the 10th grade in wave 2. In wave 1, the gross sample includes 18,716 students in 952 classrooms.[2]

When entering secondary school, children in Europe are assigned to a school class (or classroom) of 10–35 students who take the same courses together. As classmates are exposed to each other on a daily basis, it is at the level of school classes that attribute alignment should influence friendship formation as well as collective identities. From the point of view of a student, the extent of attribute alignment she or he experiences in a school class depends on the composition of her or his own social category (e.g., the gender composition among co-ethnics) relative to the composition of the other social categories (e.g., the gender composition among classmates of different ethnic origin).

For the sake of brevity, we refer to students of the same-ethnic origin in a school class as 'ethnic groups'. As it takes at least three individuals for group-formation processes to unfold (Simmel, 1908), we only take ethnic groups into account that comprise at least three students in a school class.[3] Because there are no (or only few) sizable minority groups in many school classes, this reduces the sample to 10,388 students who belong to 1,125 ethnic groups in 713 classrooms. As discussed below, the sizes of our analytical samples will depend on the outcomes of interest and the corresponding units of analysis, which vary across the different hypotheses we test.

Main Variables

Ethnic origin

We define students' ethnic origin based on their parents' and their own country of birth (following Dollmann, Jacob and Kalter, 2014). Students who themselves and whose parents were born in the survey country are defined as belonging to the native majority group. If one or both parents were born in a foreign country, this country is used as students' ethnic origin. If parents were born in different foreign countries, we define students' ethnic origin according to their mother's country of birth. Finally, we use students' own country of birth in the few cases where their parents were born in the survey country but the children were born elsewhere.

Attribute alignment

The extent of attribute alignment depends on the association between ethnic origin and gender. Students face strong attribute alignment whenever their co-ethnics tend to be of one sex and outgroup members of the other.[4] We generally assume that the relevant outgroup consists of all classmates of different ethnic origin. Only when we examine minority students' inclination to identify as a member of the national majority (H3), the national majority group becomes the relevant outgroup. We quantify attribute alignment using *Cramer's V*, a measure of association for categorical, unranked data, ranging from 0 (no alignment) to 1 (perfect alignment). If all ethnic in- and outgroup members are of the same gender, as is the case in single-sex classes, we define attribute alignment as being zero.

Segregation in friendship networks

Students were asked to nominate up to five best friends in the classroom. We quantify ethnic and gender segregation in these friendship networks using the fraction of same-ethnic and same-gender friendships, thus representing an index of isolation (see Massey and Denton, 1988). This measure corresponds closely to our interest in the extent of gross segregation.

Identification as a majority member

Responding to the question 'how strongly do you feel English/German/Dutch/Swedish?', students could choose between 'not at all strongly', 'not very strongly', 'fairly strongly', and 'very strongly'. We use their responses as a metric measure of the extent to which minority students identify as a member of the national majority (Connor, 1994; Brubaker, 2004: p. 41).

Gender role attitudes

Four items capture students' gender role attitudes (Salikutluk and Heyne, 2017; Kretschmer, 2018). In response to questions about the division of labour between men and women ('In a family, who should do the following? Taking care of children/cooking/earning money/cleaning the house'), students could choose between the answers 'mostly the man', 'mostly the woman', and 'both about the same'. We identified the fraction of a student's responses that aligns with traditional gender roles, the so-called male-breadwinner model (according to which women take care of children, cleaning, and cooking, while men earn money). The resulting measure varies between 0 and 1 and captures the extent to which the students hold traditional gender role attitudes.

The Supplementary data contains descriptive information on all variables. To account for the relatively low item non-response, ranging between 0 and 11 per cent, we apply multiple imputation techniques throughout all analytic steps using chained equations (van Buuren *et al.*, 2015).

Analytic Strategy

While our analysis of observational data cannot establish causality, we argue that assignment to school classes with varying levels of attribute alignment is conditionally ignorable (Rosenbaum and Rubin, 1983). Even though schools often aim at a relatively even distribution of gender across classrooms, they generally do not pay attention to how gender and ethnic origin might align in a school class.[5] This yields a certain degree of random variation in the gender composition of ethnic groups in a classroom (and, vice versa, the ethnic composition of gender groups). This assumption of ignorability (or unconfoundedness) is conditional on a number of classroom characteristics that are analytically related to attribute alignment.

Specifically, the likelihood that a school class entails two sizable ethnic groups with a certain degree of alignment will vary with the size of the classroom, the ethnic diversity and gender homogeneity of the classroom, the share of boys, and of majority students in the classroom.[6] As these variables might also affect our three outcome variables directly, we control for these potential confounders in all models. To lend credibility to our assumption of conditional ignorability, we will show below that the degree of attribute alignment is unrelated to a broad range of variables, when we control for these compositional characteristics. This also addresses the concern that schools might have considered student requests in making class assignments so that attribute alignment is likely to be correlated with prior (and mostly same-sex) relationships. To some extent, this should be visible in a greater share of reciprocated friendship ties, and maybe also of closed triangles, where attribute alignment is strong. We therefore include these basic network characteristics when examining the correlates of attribute alignment.

Other Control Variables

All models include country-specific ethnic group fixed effects to control for stable factors associated with an ethnic group in a specific country (e.g., country-specific ethnic stereotypes that might influence friendship ties). In the regressions of national identification and gender

role attitudes, we also control for gender, ethnic origin, immigrant generation (native, first, second, or interethnic), age, and parental socio-economic status (using ISEI scores, see Ganzeboom, De Graaf and Treiman, 1992) as these might influence the strength of ethnic and gender identities. As larger survey intervals imply more time for identity processes to unfold, we control for the time between the interviews (in months), which varied across schools.

Analytic Steps and Specifications

The main analysis comprises three steps. In the first step, we examine our assumption that variation in attribute alignment is largely random and ignorable after conditioning on its obvious structural determinants. Specifically, we show that, above and beyond these characteristics, other structural and attitudinal variables are not related to attribute alignment. The units of analysis are ethnic groups ($n = 1,125$).

In the second step, we investigate whether attribute alignment is associated with the ethnic and gender segregation of friendship networks (H1 and H2). Again, the units of analysis are ethnic groups, since both attribute alignment and friendship segregation vary across ethnic groups in a given classroom. As we are interested in how attribute alignment manifests itself in the structure of friendship networks, we examine the cross-sectional association of attribute alignment and ethnic/gender segregation at wave 1. When the first survey was taken, most students had attended the same school class already for at least 2 years, in Germany and Sweden even up to 4 years. As children's friendship networks tend to be strongly segregated by gender, the degree of alignment between ethnicity and gender should shape friendship choices already in the first years of secondary school, yielding a more or less pronounced ethnic clustering of friendship ties.[7]

In the third step, we examine the impact of attribute alignment on ethno-national identification (H3 and H4) and gender role attitudes (H5). The units of analysis are students. More specifically, we regress change in students' ethno-national identification and gender role attitudes between wave 1 and wave 2 on the strength of attribute alignment in wave 1 while accounting for an extensive set of controls.[8] These change score models assume the counter-factual that, in the absence of differences in attribute alignment, the expected change in ethnonational identification and gender role attitudes would be identical across groups (Morgan and Winship, 2007: p. 257).[9]

Focusing on change as the outcome variable is based on theoretical considerations and prior research. During the first years of secondary school (before wave 1), students are still in childhood or just beginning to enter adolescence. As research on adolescent development has shown, 'the bulk of identity "work" occurs late in adolescence' (Steinberg and Morris, 2001: p. 91). We therefore do not expect that attribute alignment is already relevant for identity formation in these early years, but it should show its effect in our observation window, when students are at the transition from early to mid-adolescence (between age 14 and 15). In line with this assumption, we show below that attribute alignment is not associated with the level of national identification and gender role attitudes at wave 1.[10]

Since we seek to explore how attribute alignment affects the development of ethno-national and gender identities, the classroom compositions should be stable in between observations. We therefore exclude all students in the Netherlands as they are reallocated to new classrooms between waves. The same is true for many students attending lower secondary schools in Germany as they leave school between waves. Excluding these classrooms and students yields 6,198 students who belong to 649 ethnic groups and 423 classrooms.

Two of our hypotheses describe outcomes or groups for which we expect no effect of attribute alignment: the gender clustering of friendship cliques (H2) and the ethno-national identification of majority students (H4). Testing these hypotheses requires us to define a smallest effect size of interest (thereby avoiding the '$P > 0.05 =$ no effect' fallacy, see Bernardi, Chakhaia and Leopold, 2017; Anvari and Lakens, 2019). In the absence of clear benchmarks from previous research or practical interventions, we set the null hypothesis as a Cohen's d of 0.1 or higher. If we reject this null hypothesis, we can conclude that the effect is smaller than 0.1 (i.e., half of what is conventionally regarded as a small effect) and therefore too small to be meaningful or, in other words 'trivially small', in line with our substantive hypotheses. We test whether the observed effect falls outside the equivalence bounds of -0.1 and 0.1 in two one-sided tests and report only the test yielding the higher P-value in the Results section (Lakens, Scheel and Isager, 2018).

Results

Variation in Attribute Alignment

The extent to which ethnic origin and gender align in the sampled school classes is very similar across the four

countries: Attribute alignment is usually moderate with mean values close to 0.2 and only rarely do we observe associations greater than 0.75 (for details, see the Supplementary data). The observed distributions do not differ from what could be expected if students were randomly assigned to school classes, supporting the view that the school authorities' decisions to allocate students to classes generally do not take the resulting alignment of gender and ethnic origin into account.

Our analyses assume that variation in attribute alignment is largely random after conditioning on obvious structural determinants, such as the absolute and relative size of ethnic and gender groups. To provide a partial test of this assumption, the linear models in Table 1 regress attribute alignment on these structural characteristics (Model 1) and subsequently add potential confounders and several attitudinal variables and network characteristics (Model 2) that should not be related to attribute alignment if our assumption holds.

Model 1 shows that attribute alignment decreases with the size of a class, with the fraction of majority students and of girls, and with more homogeneous gender compositions; net of these influences, other structural characteristics are only weakly associated with attribute alignment. Throughout the subsequent analyses, we control for this full set of structural characteristics.

Model 2 shows that, above and beyond these characteristics, other structural and attitudinal variables are not related to attribute alignment. This set of variables is extensive, including socio-economic background, age, survey country, basic network characteristics (i.e., the share of reciprocated ties and of closed triangles), ethno-national identification, gender role attitudes, religiosity, educational aspirations,[11] and students' results from a cognitive test conducted in the first wave (test scores ranging between 0 and 27, see CILS4EU, 2016). This lends credibility to our assumption that variation in attribute alignment is largely random after conditioning on its structural determinants.

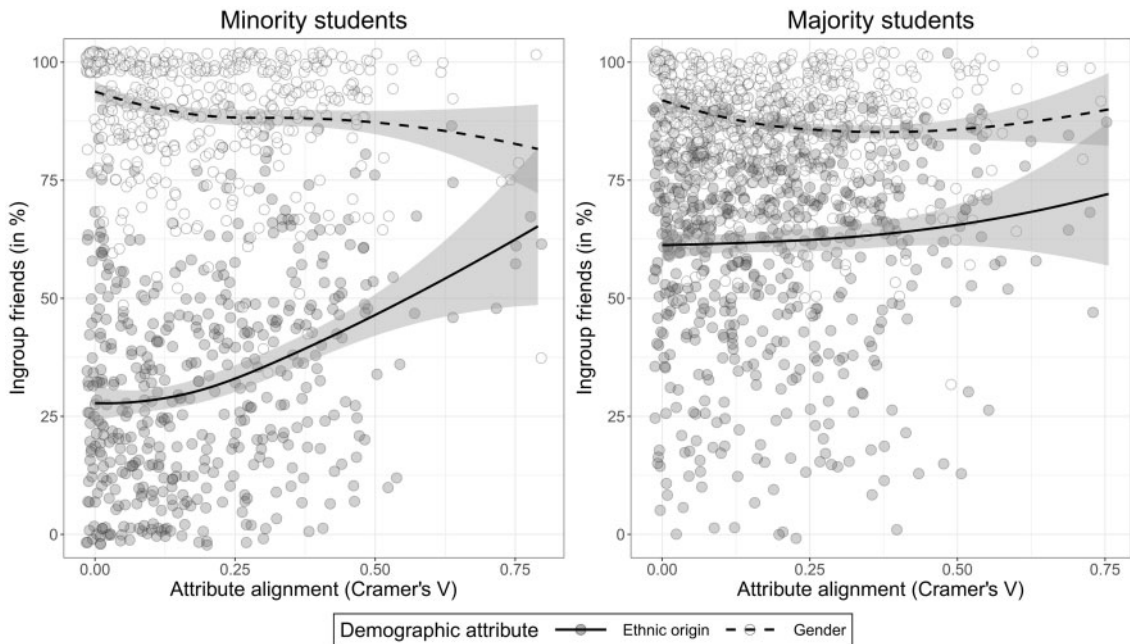## Attribute Alignment and Segregation in Friendship Networks

In the second step of the analysis, we examine the impact of attribute alignment on ethnic and gender segregation in friendship networks. Figure 1 visualizes this relationship non-parametrically for 468 ethnic minority

Table 1. Predictors of attribute alignment (OLS regressions)

	(1)			(2)		
	Coef.		(s.e.)	Coef.		(s.e.)
Constant	0.000		(0.030)	−0.075		(0.067)
Class size	−0.238	***	(0.033)	−0.224	***	(0.040)
Size ethnic group in the class	−0.009		(0.037)	0.004		(0.043)
Majority share in the class	−0.137	*	(0.065)	−0.120		(0.069)
Share of boys in the class	0.060	*	(0.027)	0.069	*	(0.028)
Ethnic homogeneity in the class	0.103		(0.065)	0.109		(0.069)
Gender homogeneity in the class	−0.359	***	(0.025)	−0.332	***	(0.031)
Country (ref.: England)						
Netherlands				0.066		(0.102)
Sweden				0.140		(0.116)
Germany				0.082		(0.104)
Mean age				−0.035		(0.043)
Mean socio-economic status (ISEI)				0.004		(0.040)
Mean cognitive test score				−0.075		(0.040)
Mean reciprocity				0.004		(0.036)
Mean transitivity				0.031		(0.036)
Mean ethno-national identification				−0.024		(0.043)
Mean gender norm attitudes				−0.002		(0.036)
Mean religiosity				0.014		(0.044)
Mean aspirations				0.018		(0.052)
N (ethnic groups)	1,125			1,125		

*Note: *P < 0.05; **P < 0.01; ***P < 0.001 (two-tailed tests). The unit of analysis is ethnic groups, i.e., sets of same-ethnic students within school classes. Results from 30 multiply-imputed datasets combined using Rubin's rules (Rubin, 1987). Standard errors are cluster-corrected at the level of classrooms. All non-categorical variables are z-standardized.*

Figure 1. Attribute alignment and segregation in friendship networks (all countries pooled)

Note: Lines depict bivariate, locally weighted scatterplot smoothing curves; jittered scatter plots.

groups (left-hand side) and 657 majority groups (right-hand side). For each ethnic group in a classroom, the figure plots the fraction of same-ethnic friends (grey circles) and the fraction of same-sex friends (white circles) against the attribute alignment that students of this group are exposed to.

For ethnic minority groups, attribute alignment is strongly associated with ethnic friendship segregation (solid line): When their ethnic origin is not aligned with gender, about one-third of their friends are co-ethnics. This share is estimated to increase to almost two-thirds as attribute alignment takes on its maximum. In comparison, gender segregation is always very high and hardly related to attribute alignment (dashed line). The latter finding is also true for the 657 majority groups in the various classrooms (right-hand side sub-graph). The relationship between attribute alignment and ethnic segregation is also positive but considerably weaker, as the fraction of same-ethnic friends is already very high among majority students even when attribute alignment is absent.

To test H1 more rigorously, we estimated linear models that control for the set of potential confounders discussed above, as well as for country-specific ethnic group fixed effects. As shown in Table 2 (Models 1 and 2), the results support our expectations: The positive

associations between attribute alignment and ethnic segregation remain statistically significant. Net of controls, the fully standardized effect of attribute alignment on the fraction of same-ethnic friends is 0.30 standard deviations among minority students and 0.07 standard deviations among majority students.

In line with H2, the estimates of the multivariate models are statistically insignificant for gender segregation ($b = -0.052$, s.e. $= 0.063$ among minority students and $b = 0.012$, s.e. $= 0.044$ among majority students; see Models 3 and 4 in Table 2). We perform equivalence tests to formally evaluate the hypothesis of a null effect on gender segregation. Based on two one-sided tests, we test the null hypothesis that the observed effects are at least as large as the smallest effect size of interest, which we defined as a Cohen's d of 0.1. For majority groups, we can reject this hypothesis ($Z = -2.009$, $P = 0.0223$) and conclude that the effect is trivially small. For ethnic minority groups, the equivalence test was non-significant ($Z = 0.755$, $P = 0.225$), although the average effect is small. So while evidence for the absence of a (very) small effect is inconclusive for minority groups, we can conclude that the effect of attribute alignment on gender-based friendship segregation is statistically insignificant for both minority and majority groups and trivially small for the majority group.

Table 2. Attribute alignment and segregation in friendship networks (OLS regression)

	(1) Same-ethnic friends (majority students)		(2) Same-ethnic friends (majority students)		(3) Same-sex friends (minority students)		(4) Same-sex friends (majority students)	
	Coef.	(s.e.)	Coef.	(s.e.)	Coef.	(s.e.)	Coef.	(s.e.)
Constant	0.812 ***	(0.097)	0.029	(0.054)	0.781 ***	(0.108)	−0.417 ***	(0.096)
Attribute alignment	0.300 ***	(0.051)	0.072 **	(0.026)	−0.052	(0.063)	0.012	(0.044)
Class size	−0.201 ***	(0.051)	0.124	(0.084)	0.099	(0.064)	0.355 **	(0.129)
Size ethnic group in the class	0.491 ***	(0.051)	−0.136	(0.139)	0.008	(0.067)	−0.258	(0.234)
Majority share in the class	0.023	(0.089)	0.944 ***	(0.133)	0.037	(0.093)	0.333	(0.230)
Share of boys in the class	−0.058	(0.045)	0.023	(0.025)	−0.050	(0.041)	−0.016	(0.028)
Ethnic homogeneity in the class	0.078	(0.086)	−0.004	(0.062)	−0.042	(0.079)	−0.115	(0.121)
Gender homogeneity in the class	0.081	(0.054)	0.020	(0.028)	0.357 ***	(0.063)	0.451 ***	(0.036)
Ethnic group fixed effects (country-specific)	Yes		Yes		Yes		Yes	
N (ethnic groups)	468		657		468		657	

Note: $*P < 0.05$; $**P < 0.01$; $***P < 0.001$ (two-tailed tests). The unit of analysis is ethnic groups, i.e., sets of same-ethnic students within school classes. Results from 30 multiply-imputed datasets combined using Rubin's rules (Rubin, 1987). Standard errors are cluster-corrected at the level of classrooms. All non-categorical variables are z-standardized.

Attribute Alignment, Ethno-National Identification, and Gender Role Attitudes

In the third step of the analysis, we ask whether attribute alignment leads minority students (but not majority students) to identify more or less with the national majority and whether it contributes to the development of more traditional gender role attitudes.

Model 1 in Table 3 shows that, net of an extensive set of potentially confounding covariates, minority students who face stronger attribute alignment identify less as a majority group member over time compared to minority students who face lower levels of alignment ($b = -0.094$, s.e. $= 0.037$, $P < 0.05$). While the size of the fully standardized coefficient is relatively small, it is relevant from a interventionist point of view: Spending the school year in a classroom with complete attribute alignment compared to a classroom without any such alignment leads minority students to identify less strongly with the nation by 0.47 standard deviations. Moreover, one has to take into account that we measure the change in identification over the time span of only 1 year.

Model 2 assesses the change in ethno-national identification among majority students, revealing no statistically significant association with attribute alignment, in line with our theory and hypotheses. As we expected this null effect, we again perform an equivalence test. In support of H4, this test shows that the effect of attribute alignment on the change of ethno-national identification among majority students is trivially small ($Z = -5.171$, $P < 0.001$).

Model 3 shows a similar pattern with respect to how students' gender role attitudes develop over time: Contrary to H5, the effect of attribute alignment is statistically insignificant and close to zero. Hence, the gender role attitudes of students develop similarly, irrespective of whether they are exposed to stronger or weaker attribute alignment.[12]

Discussion and Conclusion

The idea that cross-cutting cleavages provide a safeguard against social disintegration is a cornerstone of sociological theory (Simmel, 1908; Lipset, 1960; Blau, 1977). While its original formulations as well as more recent applications in political science (Selway, 2010; Cederman, Weidmann and Gleditsch, 2011) have focused on entire societies, our study explored how attribute alignment shapes the social relations and emerging identities of adolescents in the school context. Our findings revealed that minority students will have mostly same-ethnic friends when classmates of different ethnic origins tend to be of the opposite sex as well. Moreover, when majority group classmates tend to be of the opposite sex, minority students will, over time, become less likely to identify as members of the nation.

An interesting question is through which mechanisms attribute alignment affects ethno-national identification. Blau's original argument implies that attribute alignment will increase barriers to interaction across social categories, solidify in-groups and intensify social control

Table 3. Attribute alignment and changes in ethno-national identification and gender role attitudes (OLS regressions)

	(1) Δ Ethno-national identification (minority students)		(2) Δ Ethno-national identification (majority students)		(3) Δ Gender norm attitudes (all students)	
	Coef.	(s.e.)	Coef.	(s.e.)	Coef.	(s.e.)
Constant	−0.466	0.563	0.110	0.067	−0.316	0.212
Attribute alignment	−0.094 *	0.037	0.008	0.018	0.007	0.016
Class size	0.027	0.040	−0.035	0.076	−0.007	0.025
Size ethnic group in the class	−0.151	0.087	0.063	0.138	0.058	0.045
Ethnic homogeneity in the class	0.071	0.078	−0.005	0.052	−0.030	0.044
Gender homogeneity in the class	−0.052	0.040	−0.019	0.021	0.014	0.018
Majority share in the class	−0.132	0.089	−0.048	0.126	−0.018	0.042
Share of boys in the class	0.065	0.035	0.025	0.020	0.010	0.016
Sex (ref.: female)	−0.119	0.071	−0.101 **	0.037	0.105 **	0.033
Socio-economic status (ISEI)	−0.038	0.037	0.013	0.018	0.047 **	0.016
Age	0.057	0.038	0.027	0.021	−0.045 **	0.017
Time between waves	0.119 **	0.044	0.028	0.024	−0.100 ***	0.020
Immigrant generation (ref.: first)						
Second	0.017	0.095			0.039	0.086
Interethnic	0.079	0.144			0.153	0.141
No immigrant background					0.463 *	0.221
Ethnic group fixed effects (country-specific)	Yes		Yes		Yes	
N (students)	1,064		3,954		5,209	

Note: *P < 0.05; **P < 0.01; ***P < 0.001 (two-tailed tests). Results from 30 multiply-imputed datasets combined using Rubin's rules (Rubin, 1987). Standard errors are cluster-corrected at the level of classrooms. All non-categorical variables are z-standardized.

within them (Blau and Schwartz, 1984: p. 83), thus by implication also reinforcing identification with the members of one's own social categories and dis-identification with others. In our setting, this means that attribute alignment would lead minority students to dis-identify with the national majority because of increased friendship segregation. As an alternative mechanism, the effect of attribute alignment on ethno-national identification could work more directly through how students perceive their classroom environment. In the small-scale contexts of European classrooms, pupils observe all their classmates and their varying attributes on an everyday basis, irrespective of the structure of their friendship network. And they make sense of who they are by assessing the degree to which they are similar to (or different from) others in these immediate environments (Smith and Moore, 2000). In school classes in which most girls are from one ethnic group and most boys from another, it appears evident that minorities are fundamentally different from majorities, thus inhibiting identification with the super-ordinate identity. In the Supplementary data, we explore the first, Blauian mediation mechanism but find little evidence to support the idea that attribute alignment works through network composition. Whether there is empirical support for the alternative, perception mechanism remains to be tested in future research.

From a policymaking point of view, our findings suggest that school administrators can affect identity formation by making sure that gender and ethnic boundaries crisscross each other when admitting students to schools and when assigning them to classrooms. The currently prevailing focus on an even representation of boys and girls could be extended by taking other social categories into consideration that may strongly align with gender. Such policies face legal, ethical, and practical limitations. Within these restrictions, however, it might still be possible to improve on current practices in order to avoid the polarization of students' friendship ties and identities along ethnic divides.

Our results suggest that the degree of attribute alignment makes little difference for majority students. Even when ethnic origin does not align with gender, they mostly form friendships with other majority students. Previous analysis of the same data suggests that this is not due to higher levels of homophily (Smith *et al.*, 2016), but because the larger size of the majority group in most classrooms offers more opportunities for friendship formation with co-ethnics. Attribute alignment also does not affect the ethno-national identities of majority students, albeit for different reasons: They take their membership in the nation for granted to such a degree

that the topography of boundaries in the classroom simply does not matter. This is what our theory expects, as taken-for-granted boundaries are much less governed by context-dependent choice, rendering the Blauian mechanism of boundary reinforcement ineffective.

We also did not observe any effects of attribute alignment on gender relations, which we expected only in part. In line with our theory and hypotheses, high levels of attribute alignment did not lead to more gender segregation in friendship networks. In the transition from early to mid-adolescence, social closure along gender boundaries is still so strong that they shape these networks irrespective of the topography of boundaries in the classroom. But contrary to our expectations, high levels of alignment also did not increase the extent to which students embraced traditional gender role attitudes. This may very well be because gender role attitudes are likely influenced by more important social contexts than the classrooms. More specifically, Kretschmer (2018) found, based on the same dataset, that adolescents' gender role attitudes are strongly influenced by those of their parents. At least during this age, this strong intergenerational transmission might leave little room for the school context to influence gender role attitudes.

Future research should extend our study and aim to overcome some of its obvious limitations. First, our conditional hypotheses need to be tested in other contexts. Particularly interesting are cases with strong racial boundaries, such as the black-white boundary in the United States or the situation of the Roma in Hungary (Boda, 2018). Based on our theory, we would expect that the alignment of racial boundaries and gender does not affect ethno-racial identities among students whose categorical membership is widely taken for granted. However, it should be relevant for children whose belonging is more contested (such as individuals of multi-racial backgrounds). Similarly, future research could examine whether the development of non-binary gender identities is affected by attribute alignment (Sullivan, 2020). Finally, during adulthood, the relative weakening of gender identities and the reduction in gender segregation might make gender-related perceptions and attitudes more responsive to contextual factors, including the local topography of boundaries, particularly in settings where occupational roles become central to categorize self and other (Ridgeway, 2011: p. 69).

Second, it will be interesting to see whether some of our arguments also hold for other types of boundaries. While the study by Smith, Maas and van Tubergen (2014) has shown that ethnic homophily in friendship ties is not reinforced by sharing a range of other cultural

and socio-economic characteristics (excluding gender), it is still possible that such attribute alignment may affect ethnic identities. Of course, such analyses would have to find ways to solve the endogeneity problem that characterizes the alignment of ethnic origin with many other attributes.

Finally, future work should study how attribute alignment affects identities over longer time periods. Beyond the school context, long-term exposure to attribute alignment might have significant effects for the development of collective identities and cultures in other contexts as well. Consider the frequent situation in which women are under- or unrepresented among the leadership of large-scale organizations, such as companies. In addition to its implications for gender inequality, such vertical segregation could also have unintended and undesirable consequences for the social and cultural integration of companies. Extrapolating from our research, we would expect that the alignment between gender and hierarchical position will lead to a differentiation of organizational sub-cultures (e.g., understanding of performance criteria or leadership styles) between different levels of hierarchy. We hope that future research will explore in how far our approach can be fruitfully applied to these and other topics as well.

Notes

1 In this article, we use 'gender' and 'sex' interchangeably to refer to the binary distinction between 'female' and 'male', which strongly shapes friendship segregation and gender role attitudes in adolescence. The data of our study come from a survey that was collected in 2010 and 2011 and asked respondents whether they were 'female' or 'male' without further options or specification. We therefore do not know whether some answers reflected a gender identity that deviates from respondents' biological sex. A recent survey among adolescents under 21 years estimated the prevalence of opposite-sex identification to be 0.6 per cent and that of non-binary identification to be 3.3 per cent (Kaltiala-Heino and Lindberg, 2019), while another study found 2.7 per cent of adolescents to express trans, non-binary, and genderqueer identities (Eisenberg *et al.*, 2017).

2 The sampling scheme selected schools with a probability proportional to their size and stratified on the number of immigrant students. As a rule, at least two classes were randomly selected in every school that participated. Schools that refused to

participate were replaced by schools in the same stratum that belonged to the same school type or region. The overall response rate at the school level was 85 per cent after replacement.

3 Requiring a higher minimum size of an ethnic group would further reduce our sample (requiring a minimum of four students per ethnic group would let the number of students drop from 10,388 to 8,412). On the other hand, reducing the minimum size to just two students per ethnic group increases sensitivity to missing data (e.g., due to a co-ethnic classmate being absent on the day of the interview). For robustness purposes, we replicated our analyses for the larger sample ($N = 13,037$) with a minimal ethnic group size of 2 and found substantively identical results.

4 Robustness tests using alternative measures of attribute alignment yielded substantively identical results. In particular, we replicated all results based on the Spearman rank correlation between classmates' sex (own sex = 1) and their ethnic origin (co-ethnic = 1). This accounts not only for the strength of the association between ethnic origin and gender but also for its direction from ego's point of view. In the prototypical case of strong alignment, most co-ethnics are of ego's own sex while most outgroup members are of the opposite sex (+1). However, there is a second case of strong alignment in which most outgroup members are of ego's own sex while most co-ethnics are of the opposite sex (−1). As these analyses show substantively identical patterns for both directions of attribute alignment, we present results for the simpler Cramer's V measure.

5 Supporting evidence comes from a survey that we carried out among the headmasters of 23 German secondary schools. When asked about possible criteria used to assign students to school classes at the beginning of secondary school, 17 out of 23 confirmed to take into account gender, while only 4 selected migration background and only 6 an unspecified alignment of characteristics.

6 Gender homogeneity reaches its maximum in classes with either very many or very few boys. In combination with the share of boys, it allows us to take into account possible non-linear influences of gender composition.

7 The CILS4EU data do not allow us to focus on the effects of *changes* in attribute alignment between waves 1 and 2. While students were exposed to the attribute alignment measured in wave 1 from fall

2010 until summer 2011, the interviews in wave 2 took place shortly after attribute alignment might have changed due to new incoming or leaving students.

8　These change score models are estimated as linear regressions with standard errors clustered at the classroom level. Multilevel models that come with a number of challenges (see Heisig and Schaeffer, 2019), yield substantively identical results.

9　Another way of modelling change would be to include the wave 1 outcome variable among the set of predictors. Using this alternative strategy produces substantively identical results.

10　This result supports our assumption that attending a school class with weaker or stronger attribute alignment is exogenous to these outcome variables. It also implies that our estimates are not biased due to regression to the mean, which would yield an artificial negative correlation between the level of the dependent variable at wave 1 and its subsequent change over time. Finally, it supports our modelling strategy since change score models assume selection on fixed characteristics, rather than on time-varying variables, such as national identification or gender role attitudes (Allison, 1990).

11　Our measures capture the subjective importance of religion ('How important is religion to you?' 1: 'not at all important', 2: 'not very important', 3: 'fairly important', 4: 'very important', used as a metric measure) and the highest level of education students wish to attain (1: 'no degree', 2: 'degree below upper secondary school', 3: 'degree from upper secondary school', 4: 'university degree', used as a metric measure).

12　Additional analyses in which we used STEM preferences in students' favourite school subjects as an alternative outcome also found no effects of attribute alignment.

Supplementary Data

Supplementary data are available at *ESR* online.

Acknowledgements

Funding

References

Alba, R. (2005). Bright vs. blurred boundaries: second-generation assimilation and exclusion in France, Germany, and the United States. *Ethnic and Racial Studies*, **28**, 20–49.

Allison, P. D. (1990). Change scores as dependent variables in regression analysis. *Sociological Methodology*, **20**, 93–114.

Anvari, F. and Lakens, D. (2019). Using anchor-based methods to determine the smallest effect size of interest. *PsyArXiv*. doi: 10.31234/osf.io/syp5a.

Baerveldt, C. *et al.* (2004). Ethnic boundaries and personal choice. Assessing the influence of individual inclinations to choose intra-ethnic relationships on pupils' networks. *Social Networks*, **26**, 55–74.

Barth, F. (1969). Introduction. In Barth, F. (Ed.), *Ethnic Groups and Boundaries: The Social Organization of Culture Difference*. Oslo: Universitetsforlaget, pp. 9–38.

Belfi, B. *et al.* (2012). The effect of class composition by gender and ability on secondary school students' school well-being and academic self-concept: a literature review. *Educational Research Review*, **7**, 62–74.

Bernardi, F., Chakhaia, L. and Leopold, L. (2017). 'Sing Me a Song with Social Significance': the (Mis)use of statistical significance testing in European Sociological Research. *European Sociological Review*, **33**, 1–15.

Blau, P. M. (1977). *Inequality and Heterogeneity: A Primitive Theory of Social Structure*. New York: Macmillan Co.

Blau, P. M. (1994). *Structural Contexts of Opportunities*. Chicago: University of Chicago Press.

Blau, P. M. and Schwartz, J. E. (1984). *Crosscutting Social Circles Testing a Macrostructural Theory of Intergroup Relations*. New York: Academic Press.

Block, P. and Grund, T. (2014). Multidimensional homophily in friendship networks. *Network Science*, **2**, 189–212.

Boda, Z. (2018). Social influence on observed race. *Sociological Science*, **5**, 29–57.

Brewer, M. B. (2000). Reducing prejudice through cross-categorization: effects of multiple social identities. In Oskamp, S. (Ed.), "*The Claremont Symposium on Applied Social*

Psychology" *Reducing Prejudice and Discrimination*. Lawrence Erlbaum Associates Publishers, pp. 165–183.

Brubaker, R. (2004). *Ethnicity without Groups*. Cambridge: Harvard University Press.

Bruch, E. E. (2014). How population structure shapes neighborhood segregation. *American Journal of Sociology*, **119**, 1221–1278.

Cederman, L.-E., Weidmann, N. B. and Gleditsch, K. S. (2011). Horizontal inequalities and ethnonationalist civil war: a global comparison. *American Political Science Review*, **105**, 478–495.

CILS4EU (2016). *Children of Immigrants Longitudinal Survey in Four European Countries. Technical Report. Wave 1—2010/2011, v1.2.0.* Mannheim: Mannheim University.

Connor, W. (1994). *Ethnonationalism: The Quest for Understanding*. Princeton: Princeton University Press.

Crisp, R. (2010). Cross-categorization. In Levine, J. M. and Hogg, M. A. (Eds.), *Encyclopedia of Group Processes & Intergroup Relations*. Thousand Oaks: SAGE Publications, pp. 164–166.

Dollmann, J., Jacob, K. and Kalter, F. (2014). *Examining the diversity of youth in Europe: a classification of generations and ethnic origins using CILS4EU data (Technical report)*. MZES Working Paper 156. Mannheim: Mannheimer Zentrum für Europäische Sozialforschung.

Eisenberg, M. E. *et al.* (2017). Risk and protective factors in the lives of transgender/gender nonconforming adolescents. *Journal of Adolescent Health*, **61**, 521–526.

Ganzeboom, H. B. G., De Graaf, P. M. and Treiman, D. J. (1992). A standard international socio-economic index of occupational status. *Social Science Research*, **21**, 1–56.

Goodreau, S. M., Kitts, J. A. and Morris, M. (2009). Birds of a feather, or friend of a friend? Using exponential random graph models to investigate adolescent social networks. *Demography*, **46**, 103–125.

Gordon, M. M. (1964). *Assimilation in American Life: The Role of Race, Religion, and National Origins*. New York: Oxford University Press.

Heisig, J. P. and Schaeffer, M. (2019). Why you should always include a random slope for the lower-level variable involved in a cross-level interaction. *European Sociological Review*, **35**, 258–279.

Jenkins, R. P. (1997). *Rethinking Ethnicity: Arguments and Explorations*. London: SAGE Publications Ltd.

Kalmijn, M. (1998). Intermarriage and homogamy: causes, patterns, trends. *Annual Review of Sociology*, **24**, 395–421.

Kalter, F. *et al.* (2016a). *Children of Immigrants Longitudinal Survey in Four European Countries (CILS4EU) - Full version.* Data file for on-site use. GESIS Data Archive, Cologne, ZA5353 Data file Version 1.2.0, doi:10.4232/cils4eu.5353.1.2.0.

Kalter, F. *et al.* (2016b). *Children of Immigrants Longitudinal Survey in Four European Countries (CILS4EU) - Full version.* Data file for on-site use. GESIS Data Archive, Cologne, ZA5353 Data file Version 2.3.0, doi:10.4232/cils4eu.5353.2.3.0

Kaltiala-Heino, R. and Lindberg, N. (2019). Gender identities in adolescent population: methodological issues and prevalence across age groups. *European Psychiatry: The Journal of the Association of European Psychiatrists*, **55**, 61–66.

Kennedy, R. J. R. (1944). Single or triple melting-pot? Intermarriage trends in New Haven, 1870-1940. *American Journal of Sociology*, **49**, 331–339.

Kessels, U. and Hannover, B. (2008). When being a girl matters less: accessibility of gender-related self-knowledge in single-sex and coeducational classes and its impact on students' physics-related self-concept of ability. *British Journal of Educational Psychology*, **78**, 273–289.

Kretschmer, D. (2018). Explaining differences in gender role attitudes among migrant and native adolescents in Germany: intergenerational transmission, religiosity, and integration. *Journal of Ethnic and Migration Studies*, **44**, 2197–2218.

Kruse, H. and Kroneberg, C. (2019). More than a sorting machine: ethnic boundary making in a stratified school system. *American Journal of Sociology*, **125**, 431–484.

Kruse, H. *et al.* (2016). From neighbors to school friends? How adolescents' place of residence relates to same-ethnic school friendships. *Social Networks*, **44**, 130–142.

Kutzner, F. and Fiedler, K. (2017). Stereotypes as pseudocontingencies. *European Review of Social Psychology*, **28**, 1–49.

Lakens, D., Scheel, A. M. and Isager, P. M. (2018). Equivalence testing for psychological research: a tutorial. *Advances in Methods and Practices in Psychological Science*, **1**, 259–269.

Lamont, M. and Molnár, V. (2002). The study of boundaries in the social sciences. *Annual Review of Sociology*, **28**, 167–195.

Lau, D. C. and Murnighan, J. K. (1998). Demographic diversity and faultlines: The compositional dynamics of organizational groups. *Academy of Management Review*, **23**, 325–340.

Lee, V. E. and Bryk, A. S. (1986). Effects of single-sex secondary schools on student achievement and attitudes. *Journal of Educational Psychology*, **78**, 381–395.

Lee, V. E. and Lockheed, M. E. (1990). The effects of single-sex schooling on achievement and attitudes in Nigeria. *Comparative Education Review*, **34**, 209–231.

Leszczensky, L. and Pink, S. (2015). Ethnic segregation of friendship networks in school: testing a rational-choice argument of differences in ethnic homophily between classroom- and grade-level networks. *Social Networks*, **42**, 18–26.

Lipset, S. M. (1960). *Political Man: The Social Bases of Politics*. Garden City, New York: Doubleday.

Maccoby, E. E. (1998). *The Two Sexes: growing Up Apart, Coming Together*. Cambridge: Harvard University Press.

Marmaros, D. and Sacerdote, B. (2006). How do friendships form? *The Quarterly Journal of Economics*, **121**, 79–119.

Massey, D. S. and Denton, N. A. (1988). The dimensions of residential segregation. *Social Forces*, **67**, 281–315.

McPherson, M. (2004). A Blau space primer: prolegomenon to an ecology of affiliation. *Industrial and Corporate Change*, **13**, 263–280.

Moody, J. (2001). Race, school integration, and friendship segregation in America. *American Journal of Sociology*, **107**, 679–716.

Morgan, S. L. and Winship, C. (2007). *Counterfactuals and Causal Inference*. New York: Cambridge University Press.

Mouw, T. and Entwisle, B. (2006). Residential segregation and interracial friendship in schools. *American Journal of Sociology*, 112, 394–441.

Mummendey, A. *et al.* (1999). Strategies to cope with negative social identity: predictions by social identity theory and relative deprivation theory. *Journal of Personality and Social Psychology*, 76, 229–245.

Ridgeway, C. L. (2011). *Framed by Gender: How Gender Inequality Persists in the Modern World*. Oxford: Oxford University Press.

Ridgeway, C. L. and Correll, S. J. (2004). Unpacking the gender system: a theoretical perspective on gender beliefs and social relations. *Gender & Society*, 18, 510–531.

Rosenbaum, P. R. and Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70, 41–55.

Rubin, D. B. (1987). *Multiple Imputation for Nonresponse in Surveys*. New York: John Wiley & Sons.

Ruble, D. N. *et al.* (2004). The development of a sense of 'we': the emergence and implications of children's collective identity. In Bennett, M. and Sani, F. (Eds.), *The Development of the Social Self*. New York: Psychology Press, pp. 29–76.

Rudman, L. A. and Kilianski, S. E. (2000). Implicit and explicit attitudes toward female authority. *Personality and Social Psychology Bulletin*, 26, 1315–1328.

Salikutluk, Z. and Heyne, S. (2017). Do gender roles and norms affect performance in Maths? The impact of adolescents' and their peers' gender conceptions on Maths grades. *European Sociological Review*, 33, 368–381.

Selway, J. S. (2010). Cross-cuttingness, cleavage structures and civil war onset. *British Journal of Political Science*, 41, 111–138.

Shwed, U., Kalish, Y. and Yossi, S. (2018). Multicultural or assimilationist education: contact theory and social identity theory in Israeli Arab–Jewish integrated schools. *European Sociological Review*, 34, 645–658.

Sidanus, J. and Pratto, F. (1999). *Social Dominance. An Intergroup Theory of Social Hierarchy and Oppression*. Cambridge: Cambridge University Press.

Simmel, G. (1908). *Soziologie. Untersuchungen über die Formen der Vergesellschaftung*. Frankfurt/Main: Suhrkamp.

Skey, M. (2010). 'A sense of where you belong in the world': national belonging, ontological security and the status of the ethnic majority in England: sense of belonging in England. *Nations and Nationalism*, 16, 715–733.

Smith, S., Maas, I. and Van Tubergen, F. (2014). Ethnic ingroup friendships in schools: testing the by-product hypothesis in England, Germany, the Netherlands and Sweden. *Social Networks*, 39, 33–45.

Smith, S. *et al.* (2016). Ethnic composition and friendship segregation: differential effects for adolescent natives and immigrants. *American Journal of Sociology*, 121, 1223–1272.

Smith, S. S. and Moore, M. R. (2000). Intraracial diversity and relations among African-Americans: closeness among black students at a predominantly white university. *American Journal of Sociology*, 106, 1–39.

Stark, T. H. and Flache, A. (2012). The double edge of common interest: ethnic segregation as an unintended byproduct of opinion homophily. *Sociology of Education*, 85, 179–199.

Steiber, N. and Haas, B. (2012). Advances in explaining women's employment patterns. *Socio-Economic Review*, 10, 343–367.

Steinberg, L. and Morris, A. S. (2001). Adolescent development. *Annual Review of Psychology*, 52, 83–110.

Sullivan, A. (2009). Academic self-concept, gender and single-sex schooling. *British Educational Research Journal*, 35, 259–288.

Sullivan, A. (2020). Sex and the census: why surveys should not conflate sex and gender identity. *International Journal of Social Research Methodology*, 23, 517–524.

Thatcher, S. M. B. and Patel, P. C. (2012). Group faultlines: A review, integration, and guide to future research. *Journal of Management*, 38, 969–1009.

Turner, K. L. and Spears Brown, C. (2007). The centrality of gender and ethnic identities across individuals and contexts. *Social Development*, 16, 700–719.

van Buuren, S. *et al.* (2015). *Package 'Mice'*. Vienna: Comprehensive R Archive Network.

Warikoo, N. and Carter, P. (2009). Cultural explanations for racial and ethnic stratification in academic achievement: a call for a new and improved theory. *Review of Educational Research*, 79, 366–394.

Wimmer, A. (2008). The making and unmaking of ethnic boundaries: a multilevel process theory. *American Journal of Sociology*, 113, 970–1022.

Wimmer, A. (2013). *Ethnic Boundary Making: Institutions, Power, Networks*. New York: Oxford University Press.

Wimmer, A. and Lewis, K. (2010). Beyond and below racial homophily: ERG models of a friendship network documented on Facebook. *American Journal of Sociology*, 116, 583–642.

Clemens Kroneberg is Professor of Sociology at the Institute of Sociology and Social Psychology at the University of Cologne where he directs the ERC Starting Grant project Social Integration and Boundary Making in Adolescence (SOCIALBOND). His research interests include analytical sociology, migration and integration, crime and deviance, and social boundary making. His articles have been published by the *American Journal of Sociology*, *Annual Review of Sociology*, *Criminology*, and *Social Networks*, among others.

Hanno Kruse is an Assistant Professor in the Department of Sociology at the University of Amsterdam. His research examines how social structure operates behind the backs of those involved, with a focus on the origins and effects of segregation in schools, neighbourhoods, and social networks. He has published in the *American Journal of*

Sociology, *European Sociological Review*, *Social Forces*, and *Social Networks*, among others.

Andreas Wimmer is the Lieber Professor of Sociology and Political Philosophy at Columbia University. His research is aimed at understanding the dynamics of nation-state formation, ethnic boundary making and

political conflict from a comparative perspective. He is the author of Nation Building: Why Some Countries Come Together While Others Fall Apart (Princeton University Press, 2018). His articles have been published by the *American Journal of Sociology*, the *American Sociological Review*, *World Politics*, *Sociological Theory*, and *Ethnic and Racial Studies*, among others.