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Contextualizing Oppositional Cultures: A Multilevel Network Analysis of Status Orders in Schools

Hanno Kruse Clemens Kroneberg

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UNIVERSITÄT BONN Universität zu Köln

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Abstract

Different lines of research have argued that specific groups, such as boys or ethnic minorities, are more prone to develop an anti-school culture than others, leading to group differences in the social acceptance of high performers. Taking an ecological view, we ask to what extent the school context promotes or prevents the emergence of group-specific oppositional cultures. Theoretically, we argue that group-based oppositional cultures become more likely in schools with low socio-economic resources and in schools where socio-economic differences align with demographic attributes. We test our hypotheses based on data from a large-scale, four-wave network panel survey among more than 3000 students in Germany. Applying stochastic actor-oriented models for the coevolution of networks and behavior, we find that group-based oppositional cultures in which students like high performers less are very rare. However, in line with theoretical expectations, boys tend to evaluate high-performing peers less positively than girls do in schools that are less resourceful. Moreover, ethnic minority boys tend to evaluate high performers less positively than majority boys do in schools where the former tend to come from socio-economically less resourceful families.

Keywords: gender; ethnicity; school performance; social networks; stochastic actor-oriented models

JEL classification codes: I24, Z13

* Authors: Hanno Kruse, Institute of Sociology and Social Psychology, University of Cologne, 50923 Köln, Germany, E-mail: hanno.kruse@uni-koeln.de; Clemens Kroneberg, Institute of Sociology and Social Psychology, University of Cologne, 50923 Köln, Germany, E-mail: c.kroneberg@uni-koeln.de. Acknowledgements: This work has been supported by funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement No 716461). We use data from the study 'Friendship and Violence in Adolescence,' funded by the German Research Foundation (DFG), Grant KR 4040/2. Funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) under Germany´s Excellence Strategy – EXC 2126/1– 390838866. Later versions of this paper were presented at the Fourth European Conference on Social Networks (EUSN) at ETH Zurich in September 2019 and at the Sunbelt Virtual Conference in July 2020. We thank the various participants for their helpful feedback. Our special thanks go to Tom Snijders, who provided us with detailed advice on the SAOM specification.

Introduction

Sociological observers have long noted the tendency of adolescents to develop youth cultures that are at odds with the official demands and values of the school system. Being institutionally separated from their parents and legally excluded from key adult domains and rituals (Collins 2000), youth come to build an 'adolescent society' (Coleman 1961) that can substantially deviate from mainstream values and norms. In particular, adolescent status orders often reward different attributes than academic performance and may at times even imply negative sanctioning of high effort and performance in school (Coleman 1961; Fordham & Ogbu 1986; Portes 1998; Bishop et al. 2004). Such informal sanctioning can take on different forms, from reduced popularity to active harassment, and it can lead to different forms of maladjustment, as social acceptance is a particularly great concern in early adolescence (LaFontana & Cillessen 2010; Dijkstra et al 2010).

The idea of oppositional status orders has also been a prominent explanation for achievement gaps between demographic groups. Different lines of research have argued that specific groups are more prone to develop an anti-school culture than others, thus leading to systematic group differences in the evaluation of academic performance. In particular, largely separate literatures have tied the tendency to develop an oppositional culture to gender ('the problem with boys'; e.g., Willis 1981; Steinberg et al. 1997; Legewie & DiPrete 2012) and to race or ethnic origin ('the burden of acting white'; Fordham & Ogbu 1986; Ogbu 1978; Ainsworth-Darnell & Downey 1998; Cook & Ludwig 1998; Fryer & Torelli 2010).

Although theoretical arguments about group-specific oppositional youth cultures have attained a strong foothold in the social sciences, empirical evidence has been mixed at best. Most prominently, the supposed tendency among black and Hispanic youth in the U.S. to resist schooling and devalue effort as 'acting white' stood not up in quantitative analyses of nationally

representative samples (Ainsworth-Darnell & Downey 1998; Cook & Ludwig 1997) as well as later ethnographic work (Carter 2005; Harris 2006).

While some have concluded that 'acting white' constitutes an urban legend, others have suggested the phenomenon might only exist in certain schools and attempted to identify the conditions for its emergence (Fryer & Torelli 2010; Tyson et al. 2005). For example, Fryer and colleagues have argued that 'acting white' originates in concerns about group loyalty that become particularly significant in mixed schools with sizable black and white student bodies (Austen-Smith & Fryer 2005; Fryer 2007; Fryer & Torelli 2010). Strikingly, a similarly contextual view has been adopted with respect to the gender gap in educational achievement. Here, the original argument has been that adolescent conceptions of masculinity tend to be at odds with behaviors conducive to school success and thereby contribute to lower achievement among boys (Willis 1981; Steinberg et al. 1997). The significance of contextual variation has been revealed by Legewie & DiPrete (2012) who showed that the gender gap in performance is particularly strong in schools that are less resourceful. They argued that achievement-oriented resourceful schools allow boys to reconcile their masculine identities with a competitive academic orientation.

Thus, largely separate strands of literature converge on a contextual view of the emergence of group-specific oppositional cultures. This resonates well with a large body of qualitative research that has documented how intersecting ethnic, gender and other identities attain relevance in particular school contexts (see Warikoo & Carter 2009). To realize the potential of this contextual view, theoretical accounts and empirical analyses need to identify the conditions under which particular attributes tend to become the basis of oppositional status orders.

In this article, we contribute to this task by mobilizing an ecological perspective and large-scale longitudinal network analysis to identify contextual conditions that are conducive to the emergence of a gender-based or ethnicity-based oppositional youth culture. A network-analytic

approach lends itself to the study of the emergence and reproduction of youth cultures, as these inherently relational processes are embedded in adolescents' peer networks (Fryer & Torelli 2010; Stark et al. 2017; Laninga-Wijnen et al. 2018a, 2018b). Moreover, in contrast to analyses that rely solely on subjective perceptions and attitudinal measures, a network-analytic approach considerably reduces the risk of desirability bias. From evolutionary-ecological theory (McFarland et al. 2014), we adopt the notion that characteristics of the school context affect which kinds of behavior become rewarded in social acceptance and which behaviors and ties are therefore selected, retained or dissolved among adolescents (as they vary in fitness across settings and over time). Specifically, we argue that group-based oppositional cultures become more likely in schools with low socio-economic resources and in schools where socio-economic differences align with demographic group membership.

In our empirical analyses, we apply stochastic actor-oriented models for the coevolution of networks and behavior (SAOM; Snijders et al. 2007; Steglich et al. 2010) across a large number of school networks in Germany. In doing so, we investigate how the composition of schools affects whether oppositional status orders will emerge among students of a specific gender or ethnicity. SAOM allow us to specify and capture how group-based oppositional cultures might become visible in and consequential for students' peer relations.

Our results show that group-based oppositional cultures in which students like high performers less are very rare. However, in line with theoretical expectations, our findings reveal contextual conditions under which this phenomenon is more likely to emerge and to become tied to gender or ethnicity. In schools that are less resourceful, boys tend to evaluate high-performing peers less positively than girls do. Moreover, ethnic minority boys tend to evaluate high performers less positively than majority boys do in schools where the former tend to come from socio-economically less resourceful families. Through these insights, our study contributes to an understanding of oppositional youth cultures that overcomes reified notions of gender and

ethnic differences while seeking to identify contextual drivers that promote their emergence in particular settings.

Theory and previous research

We argue for a contextualized perspective on the emergence of oppositional cultures in schools. Before we develop our arguments and derive hypotheses, we have to clarify the phenomenon of interest by specifying how we understand group-based oppositional cultures.

Specifying group-based oppositional cultures

As is often the case in the social sciences, existing theories require further elaboration and specification before we can derive implications and employ advanced statistical methods to perform informative tests. Based on a network-analytic perspective, it becomes obvious that one can distinguish different understandings of group-based peer opposition to high achievement.

A first question is which types of social ties are most indicative of oppositional cultures in the school context. Previous network studies have examined differences in friendship nominations, in different forms of popularity, and in liking (Dijkstra and Gest 2015; Flashman 2012; Fryer and Torelli 2010; Kretschmer, Leszczensky, and Pink 2018; Laninga-Wijnen et al. 2018a, 2018b; Stark et al. 2017). For theoretical and methodological reasons, we argue that liking relations are particularly suited to measure group differences in the social acceptance of high performing students. Compared to strong ties such as friendships, liking nominations are less susceptible to bias due to unmeasured differences in meeting opportunities - and they are also better at capturing informal everyday forms of peer acceptance. And while nominating someone as popular or unpopular will depend on very specific personal characteristics that evade most surveys (e.g., charisma, looks), perceiving others as likable or not is a judgment that gives rise

to a more evenly distributed structure of social acceptance. Finally, compared to disliking nominations, liking ties are prevalent enough to allow application of stochastic actor-oriented models for network change and behavior (SAOM; Snijders et al. 2010).

A second important difference concerns how we conceptualize group-based oppositional cultures at the structural level. Here, the concept of group-based oppositional cultures can be tied either to *absolute* or to *relative group differences in the social acceptance of high performers* (see Dijkstra and Gest 2015; Chen et al. 2020). Absolute differences exist whenever members of one given demographic group (e.g., boys) tend to like high-performing students less than low-performing students, while members of another group (e.g., girls) tend to like the former more than the latter. In contrast, relative differences may also exist in a school where social acceptance and high performance are always positively associated – as long as this association differs between demographic groups. For example, both boys and girls might prefer high-performing students over low-performing ones but this tendency might be significantly weaker among boys. In other words, absolute group differences imply a likability penalty for high-performing students when judged by one group, whereas relative group differences imply merely a different efficiency of high performance in producing social acceptance by members of different groups (Lindenberg and Frey 1993).[1]

At the interactional level, different social mechanisms could produce these associations at the network level. According to a common understanding of group-based oppositional cultures,

[1] These two understandings are not meant to be exhaustive. While we focus on the sending of liking ties by members of different demographic groups ("ego effects"), other conceptualizations could emphasize the demographic attributes of those who receive the nominations ("alter effects") or think of oppositional cultures as a purely ingroup phenomenon (ego and alter effects within the same group). Moreover, one could also focus on rejection (disliking) or popularity and unpopularity, as well as social influence processes (Laninga-Wijnen et al. 2018a, 2018b).

students who belong to different groups develop different *normative evaluations of school performance*. One example would be a school context where boys evaluate high performance as less socially desirable than girls do. This mechanism corresponds most closely to the idea of oppositional cultures and associated downward levelling pressures (see Fordham and Ogbu 1986; Portes 1998). We therefore adopt this understanding in our empirical analysis. However, it is important to recognize that there are also other mechanisms that could lead to group differences in the social acceptance of high performers. One such alternative mechanism is *performance homophily*: As people tend to prefer social interaction with similar others (Lazarsfeld and Merton 1954; McPherson et al 2001), a group (e.g., boys or minority students) composed mostly of low performers would also tend to evaluate low-performing peers more positively. Finally, group differences could also emerge due to *correlated forms of homophily*: A group dominated by low performers prefers not only similarly low-performing peers but also same-group peers. For example, in a school context where boys tend to be low performers, gender homophily would also produce network structures in which boys more often hold social ties to (male) low performers.

To summarize, the concept of group-based oppositional cultures is theoretically ambiguous, as it can be tied to different structural observations (such as absolute and relative group differences in the social acceptance of high performers) and to different social mechanisms producing these structures. Any attempt to identify one of these mechanisms empirically needs to take into account the potentially confounding nature of the other mechanisms.

Previous social network studies on group-based oppositional cultures

Previous social network studies that are relevant to our research question broadly fall into one of three categories. First, there are studies that examined average tendencies in selection and influence processes related to academic achievement – with mixed results concerning performance-related homophily in the school context (see Laninga-Wijnen et al. 2018b).

Moreover, longitudinal network studies have also probed gender and ethnic differences in these processes. Based on a sample of more than 1000 students (aged 13) from 12 grade-level networks in German secondary schools, Stark et al. (2017) found that ethnic minority students tended to select friends irrespective of the latter's academic achievement, while majority students preferred friends with higher grades. Using the same data set, Kretschmer et al. (2018) found achievement homophily only among girls, but not among boys. However, their data do not include the more achievement-oriented upper secondary schools. Most importantly, these studies do not examine variation across school contexts and Stark et al. (2017: 494) themselves conclude that "more research is needed to examine under which conditions oppositional culture theory holds."

A second group of studies adopts a contextual view and asks how status norms influence peer processes and learning outcomes. Here, status norms refer to the class-level associations between achievement and different status constructs, such as students' popularity, unpopularity, acceptance, or rejection (Cillessen & Marks, 2011; Gorman et al., 2011). Recent work has used longitudinal network analysis to investigate how such contextual characteristics affect friendship processes related to achievement (Laninga-Wijnen et al. 2018a, 2018b). Although this line of work has produced important insights, the contextual characteristics under study such as the popularity of high- or low-achieving are likely the endogenous result of peer processes themselves. In an ecological perspective (see McFarland et al., 2014), status norms are part of the classroom climate and may already indicate the presence of an oppositional culture in the school class. Hence, when approaching the task to explain the emergence of (group-based) oppositional cultures, the demographic composition is arguably a more promising, largely exogenous dimension of school or classroom ecologies.

Third, and most akin to our study, some scholars have attempted to identify what kind of socio-demographic composition promotes oppositional cultures in schools. Using AddHealth data,

Fryer and Torelli (2010) found that high achievement reduces peer popularity among Black and Hispanic students, particularly in mixed schools. However, this finding stood not up against a more thorough social network analysis of the same data by Flashman (2012) who showed that these patterns are largely due to differential opportunities to befriend high-achieving students of the same racial group. Thus, network studies have so far not been able to identify school characteristics that are conducive to the emergence of group-based oppositional youth cultures.

Contextual determinants of group-based oppositional cultures

In this article, we seek to identify contextual conditions that are conducive to the emergence of a gender-based or ethnicity-based oppositional youth culture. Building on previous quantitative and qualitative work (Legewie & DiPrete 2012; Tyson et al. 2005), we focus on two aspects of the school context: socio-economic resources (*resourceful contexts*) and the extent to which socio-economic differences align with demographic group membership (*demographic faultlines*). In short, we ask whether a lack of socio-economic resources in one's school or demographic (sub-)group promotes the development of oppositional cultures along gender or ethnic lines. In theorizing how these ecological characteristics affect boys and girls and ethnic minority and majority students, we also take into account the differential susceptibility of these groups to adopt an oppositional stance towards schooling.

Previous work on gender differences has argued that boys are particularly prone to develop an anti-school culture (e.g., Willis 1981; Steinberg et al. 1997; Legewie & DiPrete 2012). While putting effort into schoolwork is in line with common conceptions of femininity and tends to be rewarded among female peers, young boys tend to construct masculinity in ways that reward resistance to school. This claim has mostly grown out of ethnographic studies.

Building on this idea, Legewie and DiPrete (2012) developed a contextual explanation of the gender gap in school performance. In schools with greater socio-economic resources, teachers and curricula tend to be more achievement-oriented, and parents are more likely to foster a

competitive learning orientation among their children. According to Legewie and DiPrete (2012: 467), "(S)uch an environment promotes academic competition as an aspect of masculinity and encourages development of adaptive strategies that enable boys to maintain a show of emotional coolness toward school while being instrumentally engaged in the schooling process."

This argument resonates well with an evolutionary-ecological perspective (McFarland et al. 2014): Schools characterized by greater socio-economic resources suppress the emergence of anti-school norms among boys because the emphasis on competition allows them to reconcile an achievement orientation with their evolving masculine identities. In schools that are less resourceful, academic performance should be less rewarded by boys. Indeed, the gender gap in performance has been shown to be greater in less resourceful schools (Legewie & DiPrete 2012). While this constitutes important indirect evidence, we will use data on social networks to test whether academic performance is indeed less rewarded by boys in low-SES schools:

H1: In schools with fewer socio-economic resources, boys evaluate high performing peers less positively than girls do.

To generalize this argument to other demographic categories such as ethnic minority students, we would need to assume that – similar to boys – particular groups are generally at a higher risk of developing anti-school norms. Indeed, Fordham and Ogbu's original theory assumed this to be true for involuntary minorities – such as the descendants of slaves in the U.S. – who were forced to migrate to another country or who face similar levels of structural racism. However, subsequent empirical research has not supported this claim. Black youth in the U.S. do not generally resist schooling or devalue effort as 'acting white' (Ainsworth-Darnell & Downey 1998; Cook & Ludwig 1997; Tyson et al. 2005; Carter 2005; Harris 2006). Studies in Europe likewise found little or no support for the existence of an oppositional culture among ethnic minorities (Stark et al. 2017; Van Tubergen & Van Gaans 2016). This is hardly

surprising, given that minority students tend to hold high educational aspirations and to make more ambitious choices, even when their average school performance is lower than that of their majority group peers (Jackson 2012; Dollmann 2010; Kristen and Dollmann 2010). Against this background, it seems unjustified to generalize hypothesis 1 to ethnic differences: there are no theoretical or empirical grounds to assume that particular ethnic groups tend towards anti-school norms.

Instead, we expect that normative values of academic performance will tend to be associated with ethnicity in school settings where minority students tend to have a lower socio-economic origin than their fellow students from the ethnic majority.[2] Such demographic faultlines – the alignment of multiple demographic attributes that lead to hypothetical dividing lines – have received much attention in group diversity research and been shown to affect group processes and performance (Lau & Murnighan 1998; Bezrukova et al. 2009; Thatcher & Patel 2012; Mäs et al. 2012). In sociology, the same idea can be traced to the writings of Simmel (1908) and has been systematized by Blau (1977) as 'parameter consolidation.'

An alignment of socio-economic and ethnic differences provides a fertile ground for the development of anti-school norms. As performance varies by social origin, an alignment of socio-economic status and ethnic origin indirectly produces a correlation of performance with ethnicity. Striving for a positive self-image, students seek to highlight those social domains where they excel (e.g., sports, music taste, or clothing) and devalue those domains where they underperform. Consequently, students from a disadvantaged group will tend to evaluate high-performing peers less positively than their fellow students do. Establishing an alternative status order that negatively sanctions high achievement helps low-performing students to deal with

[2] Our theoretical argument implies a similar tendency among majority group students should they attend schools where minority students stem from more privileged families. While such schools exist in Europe, they are less frequent in the German secondary school system.

the constant devaluation by teachers. It is further motivated by "the zero sum nature of the competition for good grades caused by grading on a curve" (Bishop et al. 2004: 242). If in place, such a status order should tend to be relatively stable as low- to moderate-performing pupils receive behavioral confirmation and would risk getting sanctioned when increasing effort and performance. These arguments lead to our second hypothesis:

H2: In schools where ethnic minority (majority) students tend to come from socio-economically less resourceful families than majority (minority) students, they evaluate high performing peers less positively than majority (minority) students do.

Tentative support for this hypothesis comes from the qualitative study by Tyson et al. (2005) who suggest that a "burden" of high-achievement becomes racialized when "socio-economic status differences between blacks and whites are stark and perceived as corresponding to patterns of placement and achievement" (p. 601). However, as stressed in the review by Warikoo and Carter (2009: 385), there is a need to investigate the generalizability of such findings in more wide-scale studies – a task that we address in the following analyses.

In principle, our second hypothesis should generalize to other demographic groups. We will therefore also investigate whether an alignment of socio-economic differences and gender in the school setting is associated with gender-based oppositional youth cultures:

H3: In schools where boys (girls) tend to come from socio-economically less resourceful families than students of the opposite sex, boys (girls) evaluate high performing peers less positively than girls (boys) do.

Indeed, the classic study by Willis (1981) focused on the development of anti-school attitudes and behavior among working-class white boys. At the same time, the strength of such a faultline might be less relevant for gender differences: As argued in our derivation of Hypothesis 1, we expect that boys are generally at a higher risk of developing anti-school norms and that

resourceful and achievement-oriented schools might be able to counteract this tendency. These influences might well override the impact of faultlines on gender-based oppositional cultures.

Ethnicity-based oppositional cultures, however, might be a gendered phenomenon. For the reasons discussed above, girls might be almost immune to develop an oppositional culture as part of their peer relations. The greater predisposition for deviant attitudes and behaviors among boys has also been repeatedly observed in research on juvenile crime and delinquency (Junger-Tas et al. 2004; Steffensmeier & Allan 1996). In fact, studies have shown that prevalence and incidences of rule breakings are greatest among ethnic minority boys (Kroneberg 2018). Hence, this demographic subgroup might be particularly vulnerable to develop an oppositional culture – if the school environment is conducive to its emergence. In our analyses, we will therefore examine the relevance of faultlines between ethnic and socio-economic differences separately for boys and girls. In doing so, we will test the following variant of our second hypothesis:[3]

H4: In schools where minority (majority) boys tend to come from socio-economically less resourceful families than male majority (minority) students, they evaluate high performing peers less positively than majority (minority) boys do.

Data and measures

We base our analyses on data from a large-scale, four-wave network panel survey. Targeting 7th graders in all secondary schools (except special needs schools) in five adjacent cities in the Ruhr area in Germany, the survey provides detailed information on students' grade-level networks, on school-, sparetime- and family-related issues as well as on their socio-

[3] An additional reason for doing so is that cross-gender liking relations are not only less prevalent in adolescence but also driven by different considerations than within-gender liking relations.

demographics over the time span of four consecutive years (starting in 2013).[4] With the Ruhr area looking back on a long history of labor migration, the ethnically diverse sample provides an adequate basis to test our arguments related to sizable ethnic (and gender) groups. In total, the sample consists of 51 schools. To ensure sufficient coverage of the social relations present in a grade, we restricted the analyses to 31 schools whose student participation rates were above 75 % throughout all waves. Models converged successfully in 29 of these schools, resulting in an analytic sample of N = 3,074 students.[5]

Liking networks. To construct the grade-level networks for all time points we use students' responses to the question "Which students do you like most in your grade?" Here they could nominate up to ten of their peers, resulting in directed network data indicating social acceptance. The jaccard index reaches values between 0.2 and 0.4 across all school grades and waves in the analytic sample (see table A1 in the online supplement), indicating a balanced mixture of stable and changing ties that allows us to apply the method of stochastic actor-oriented models for network change and behavior (Ripley et al. 2020, see below).

Grades. To assess students' school performance, we rely on the grade point average across the subjects Math and English, rounded to the nearest integer on a scale ranging between 1 (worst)

[4] For nine schools in the final analytic sample, data collection started only in 2015, yielding two instead of four consecutive waves of longitudinal data. This shorter period nevertheless provided sufficient information for the estimations – allowing us to rely on identical model setups across all schools (with an adjusted number of the so-called rate parameters modeling the rate of change across the specific waves).

[5] To assess model convergence, we followed the criterion of that the maximum convergence t-ratio should not exceed the value of 0.25 (Ripley et al 2020). In nearly all schools, we attained values smaller than 0.20. In two schools, however, we were unsuccessful in satisfying the condition, due to small network sizes and little variation in liking nominations over time, which is why we excluded them from the analyses.

and 6 (best). The average grade over time of students in the analytic sample is 4.05 with a standard deviation of 0.73. Only 0.8 % of all students provided no information on their grades.

Demographics. The demographic categories of interest are defined according to students' reports on their gender as well as their own and their parents' country of birth. We define a student as having an ethnic minority background if he/she or at least one of his/her parents was born in a country other than Germany. Of all students in the analytic sample, 49.3 % reported to be boys (no missing information) and 46.5 % reported to have an ethnic minority background (0.5 % missing information). We measure the socio-economic status of the students based on their parents' level of education: students with at least one parent with an upper secondary education are defined as having a high educational background (low otherwise).

Contextual characteristics. As a first contextual variable, we measure the socio-economic resourcefulness of a given school grade by the *fraction of parents with an upper secondary education*. On average, the fraction equals 0.41 with a standard deviation of 0.14 across all school grades in the analytic sample. Second, we want to capture the extent to which socio-economic resources align with or crosscut demographic categories in a school grade, that is, the extent to which resources are unequally distributed among boys and girls or ethnic minority and majority students. Doing so, we rely on the measure of factional faultline strength between two given groups *A* and *B* (Li and Hambrick 2005; for an overview on faultline measures see Meyer and Glenz 2013), formally

$$d = \frac{\bar{X}_A - \bar{X}_B}{\frac{\sigma_A \sigma_B}{2} + 1},$$

with X_Z and σ_Z denoting the mean and standard deviation of an attribute *x* of group *Z*. In the present case, $\bar{X}_Z$ equals the fraction of parents in group *Z* with an upper secondary education. Groups are defined according to students' gender (*A*: boys, *B*: girls) or their ethnic origin (*A*: ethnic minority, *B*: ethnic majority), yielding two measures of faultline strength: d_{gender} and

$d_{ethnicity}$. While negative values indicate that boys (ethnic minority students) tend to be in a disadvantaged position in a given school grade with respect to their parents' educational level, positive values indicate that girls (majority students) are in a disadvantaged position; values close to zero indicate that differences in parental education are largely absent between groups. Empirically, d_{gender} ranges between the values of -0.20 and 0.24 and $d_{ethnicity}$ ranges between the values of -0.31 and 0.24. While their means are close to zero ($\bar{d}_{gender}$ = 0.07, $\bar{d}_{ethnicity}$ = -0.06), faultline strengths vary substantially across all school grades in the analytic sample (standard deviations equaling 0.125 and 0.118 respectively).

Analytic strategy

The analysis proceeds in three steps. In the first step, we provide a descriptive overview at the structural level – reporting absolute and relative group differences in the social acceptance of high performers across all school grades and time points in the analytic sample. In the second step, we turn to the interactional level and derive estimates of group differences in the normative evaluation of school performance in each school separately. We do so by applying stochastic actor-oriented models for network change and behavior (SAOM; Snijders et al. 2010) to the longitudinal liking networks.[6] SAOM assume that changes in ties and behaviour unfold in the course of sequential decisions taken interdependently by the actors involved. Simulating these interdependent decisions in terms of sequential mini-steps, SAOM allow us to infer various relational mechanisms underlying the emergence of the observed networks and behaviour (*here*: liking networks and grades), while taking into account the bounded set of alternatives actors face in the defined context. In a third step, we examine how these school-specific SAOM

[6] We executed all analyses in *R* (version 3.5.1; R Core Team 2020) and made foremost use of the packages *RSiena* (version 1.2-12; Ripley et al. 2020) and *mvmeta* (version 0.4.11; Gasparrini et al. 2012).

estimates vary across schools that exhibit different levels of socio-economic resources and demographic faultlines. Using multivariate meta regressions (see An 2015), this allows us to test our hypotheses on how the school context may promote the emergence of a group-based oppositional culture. In our test of Hypothesis 4, we investigate the liking networks of boys and girls separately and compute our demographic faultline measures separately for both groups.[7]

SAOM specification

With SAOM, we aim to infer credible estimates of (group-based) normative values of school performance, that is, group differences in the evaluation of high performing peers. Importantly, such estimates can be confounded by different forms of homophily (see above) but also by social influence in performance: Students who like each other will spend more time together, thereby affecting each other's behavior and grades. Consequently, an observed association between liking and grades may not necessarily be indicative of differential evaluations of low- and high-performers. SAOM allow us to account for such forms of confounding by explicitly modeling the co-evolution of liking and grades. To do so, we have to specify two equations with different dependent variables guiding actors' decisions: actors' *selection function* modeling their liking dynamics and actors' *influence function* modeling their grade dynamics. Estimating both functions simultaneously, we end up with estimates of (group-specific) evaluations of high-performing peers net of confounding via social influence.

[7] Although it is common practice to compare model coefficients across networks (McFarland et al. 2014; Smith et al. 2016; Kruse and Kroneberg 2019; Wittek et al. 2020; Simpson 2020), their sizes are not directly comparable (for reasons similar to those in logistic regression, see Mood 2010). We address this issue in two ways: In the meta analysis, we additionally conduct Fisher tests that are based only on the direction of the estimates, without assumptions about the general population of networks. In the meta regressions, we control for relative group sizes in order to improve the cross-network comparability of the estimates.

Selection function. To account for a set of general relational mechanisms known to affect the emergence of positive ties among adolescents, we include the structural effects *outdegree*, *reciprocity*, *geometrically weighted edgewise shared partners (GWESP)*, *reciprocity x GWESP*, *3-cycles, in-* and *outdegree popularity*, and *outdegree activity*. In addition, we include a set of effects related to individual actor attributes, namely *boy ego*, *boy alter*, *same gender*, *ethnic minority ego*, *ethnic minority alter*, *same ethnic origin*, *high educational background ego*, *high educational background alter, same educational background*, and *same school class*. These effects account for not only group differences in activity or popularity but also homophilous tendencies with respect to students' gender, ethnic origin, educational background, and the school class they attend. Finally, to specifically account for relational mechanisms tied to students' grades, the phenomenon of main interest, we rely on a quadratic model specification and include the effects *grades alter*, *grades squared alter*, *grades ego*, *grades ego minus alter squared*. A quadratic specification provides the advantage that it flexibly models students' tendencies towards both grade homophily and a normative value, which could lie anywhere along the range of possible grades (see Snijders and Lomi 2019). We extend the quadratic model specification by the additional interaction effects *boy ego x grades alter* (model setup 1) and *ethnic minority ego x grades alter* (model setup 2). Doing so, the two resulting model setups are able to capture group-specific shifts in the functional relation between students' grades and their likelihood to receive liking nominations. In substantial terms, the two interaction effects thus indicate gender / ethnic differences in the normative value of school performance net of grade homophily, correlated forms of homophily (see above), and other relational mechanisms – our school-specific estimates of a group-based oppositional culture.

Influence function. We model the grade dynamics parsimoniously, given that they serve as controls (see above) and are not central to our research question.[8] In line with previous work, we include as basic controls the *linear shape* and *quadratic shape* effects (see Ripley et al. 2020). To account for the possibility that boys and girls have different tendencies toward higher grades, we include the *effect from boy*; to account for different tendencies of ethnic minority and majority students, we include the *effect from ethnic minority;* to account for socio-economic differences in the development of grades we include the *effect from a high educational background*. Finally, to account for social influence in grades, as students' grades may well be affected by those of their friends, we include the *average similarity* effect.

Results

Descriptive analysis at the structural level

Figure 1 plots the social acceptance of high performers – i.e., pearson correlations between students' liking indegrees and their grade point average – across all school grades and time points in the analytic sample. Each network is represented by two vertically connected points (triangle and circle) – capturing gender (upper panel) and ethnic differences (lower panel). The observed correlations between students' liking indegrees and their grade point averages vary considerably across networks as well as within them between demographic groups.

[8] In particular, we test for the existence of an oppositional status order in the selection function only – that students with a particular demographic attribute less often like high-performing students. We do not address the subsequent question of whether and to what extent such an oppositional status order will lead students to reduce their effort and give rise to group differences in school performance. While theoretical arguments and ethnographic evidence may point towards such a coping strategy, tracing this effect on students' grades goes beyond the scope of this article.

We begin with the gender-specific associations depicted in the upper panel of Figure 1. We have ordered the networks in such a way that boys evaluate high performers less positively than girls do in the leftmost networks, while the opposite pattern holds on the right-hand side. This makes it easy to assess the prevalence of the different forms of group-specific oppositional cultures at the structural level. Recall that we speak of *absolute group differences* in the social acceptance of high performers whenever we observe a negative association between academic performance and social acceptance among one demographic group but not among another. On average, this is the case in the leftmost 30 networks where boys show a negative association whereas girls show a positive association. In nearly the same number of networks on the right-hand side, we observe the opposite, such that performance comes with lower social acceptance among girls, but not among boys. However, only two of all observed negative associations are statistically different from zero at conventional levels ($p < 0.05$) – one association found among boys and the other among girls. Hence, there are hardly any schools in which gender-based oppositional cultures exist in the absolute sense of high performers facing a likability penalty. The second, weaker understanding of group-based oppositional cultures requires only *relative* group differences in the social acceptance of high performers. In the leftmost 62 networks, high-performing boys receive fewer liking nominations than high-performing girls. Again, however, the differences between groups are statistically significant only in ten networks – five of them with boys at a disadvantaged position (statistical tests not shown here, available upon request).

The lower panel of Figure 1 shows that ethnic differences in the social acceptance of high performers are even less visible: We observe negative associations between academic performance and social acceptance for ethnic minority students and positive associations among majority students in the leftmost 24 networks and the reverse pattern in the rightmost 32 networks. Relative group differences that involve fewer liking nominations among ethnic minority students exist in the leftmost 56 networks. Importantly, however, none of the observed

negative associations is statistically significantly different from zero, and only in seven networks are the relative group differences statistically significant.

To summarize, while this descriptive analysis reveals variation in the social acceptance of high performers, there are hardly any schools for which we find reliable evidence for the existence of group-based oppositional cultures. This is true for gender and even more so for ethnic origin. In the next step, we will trace group-based oppositional cultures at the interactional level and use longitudinal data to examine the different network mechanisms related to the phenomenon.

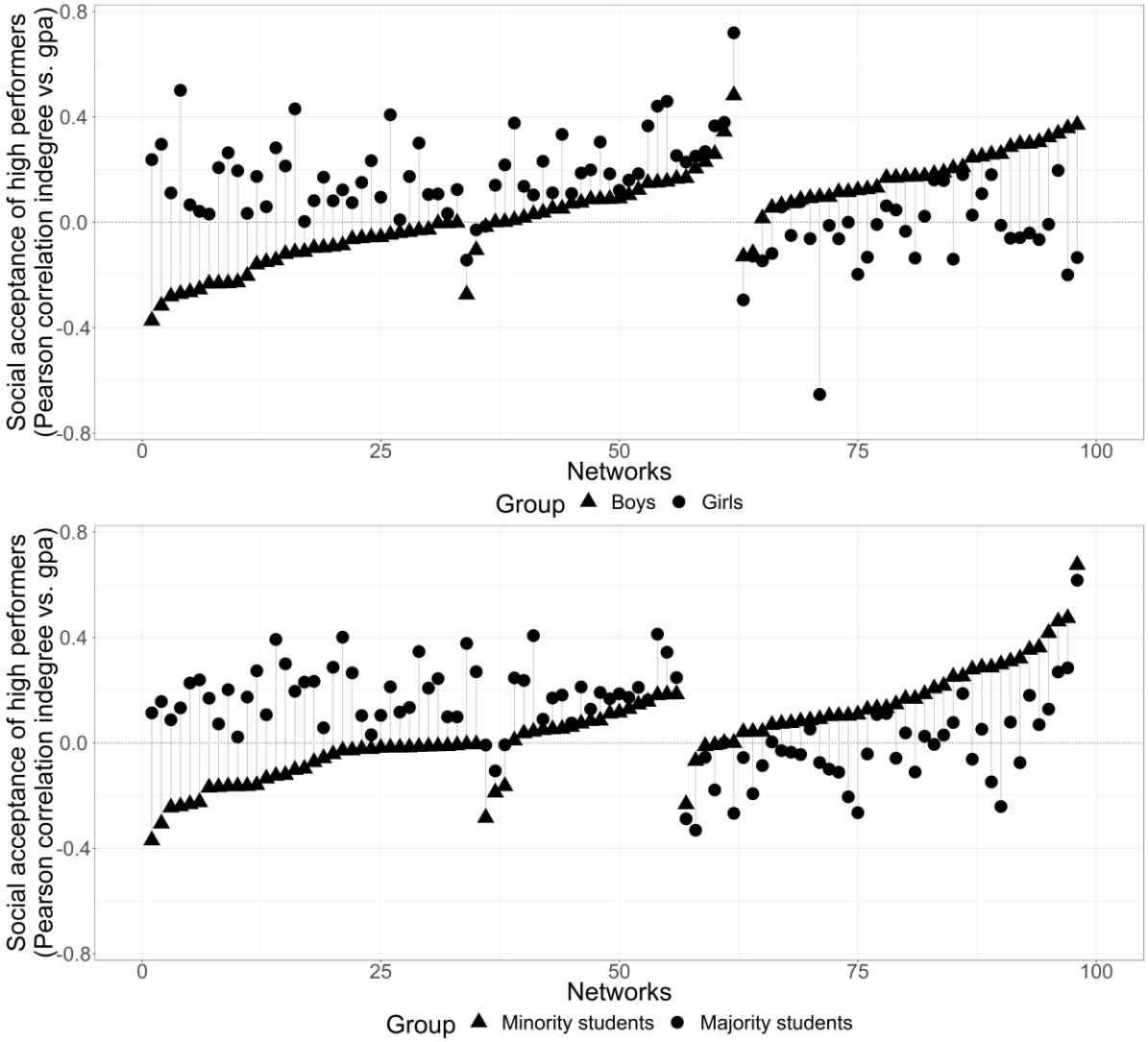

Figure 1: Gender-specific (upper panel) and ethnicity-specific (lower panel) associations between students' social acceptance (liking indegrees) and their school performance (grade point averages) across all school grades and observed time points in the analytic sample.

SAOM meta analysis

Table 1 provides results from the model-specific meta analyses across all 29 schools. Before we turn to our main effects of interest, we describe findings with respect to general relational mechanisms that underlie liking and grade dynamics. In both model setups, the basic structural effects in the selection function confirm the existence of general relational mechanisms affecting liking, such as tendencies towards reciprocity, transitivity, and local hierarchy (see respective estimates $\hat{\mu}$ in M1 and M2 of *outdegree*, *reciprocity*, *3-cycles*, *GWESP*, and *activity* and *popularity* effects). Moreover, we observe substantial indication of homophily – with respect to gender ($\hat{\mu}$ = 0.26, s.e. = 0.01), ethnic origin ($\hat{\mu}$ = 0.17, s.e. = 0.02), parents' education ($\hat{\mu}$ = 0.03, s.e. = 0.01), and attended school class ($\hat{\mu}$ = 0.22, s.e. = 0.04). Looking at the grade dynamics (i.e., as modelled in the influence function), we observe a tendency towards a unimodal grade distribution (given that $\hat{\mu} > 0$ for *linear shape* and $\hat{\mu} < 0$ for *quadratic shape*); that is, on average, students tend towards a specific grade over time instead of dispersing randomly across the range of grades. In addition, boys less strongly tend toward better grades than girls do (*effect from boy*: $\hat{\mu}$ = -0.22, s.e. = 0.05); students with at least one parent with an upper secondary education tend toward better grades than those who lack such parental resources (*effect from high educational background*: $\hat{\mu}$ = 0.34, s.e. = 0.06); differences between ethnic minority and majority students are statistically insignificant (*effect from ethnic minority*: $\hat{\mu}$ = 0.05, s.e. = 0.06). Finally, the strong and statistically significant *average similarity* effect points towards social influence processes: over time, students become more similar in their grades to students they like ($\hat{\mu}$ = 3.9, s.e. = 0.5).

Our main analytic interest concerns the selection effects related to students' grades. The quadratic model specification shows a clear indication of performance homophily in liking (*grades diff. squared*: $\hat{\mu}$ = -0.11, s.e. = 0.01). Most central to our research question are the interactions between ego's demographic category and alter's grades, as they indicate whether

the normative values of school performance differ between groups, above and beyond performance homophily. Model 1 shows that, contrary to our expectations, boys tend to evaluate peers with good grades no different than girls do (*boy ego x grades alter*: $\hat{\mu} = 0.02$, s.e. = 0.02). Fisher's method, a statistical test without assumptions on the population of networks, confirms this impression: In none of the school grades are high performers evaluated worse by boys than by girls at statistically significant levels ($p_l > 0.025$). Instead, there seems to be at least one school grade where they are evaluated worse by girls than by boys ($p_r < 0.025$). Turning to model 2, we observe no different evaluations of high performers by students' ethnic origin: On average, minority and majority students evaluate high performers equally (*ethnic minority ego x grades alter*: $\hat{\mu} = 0.00$, s.e. = 0.02). Fisher's method further corroborates this finding ($p_l > 0.025$, $p_r > 0.025$).

Overall, mirroring our descriptive findings at the structural level, these results provide no evidence for the existence of group-based oppositional cultures. Importantly, however, we observe substantial variation in the estimates across contexts, as the Q statistics and their respective p-values show (*boy ego x grades alter*: Q =44.3, $p_l < 0.05$; *ethnic minority ego x grades alter*: Q =48.5, $p_l < 0.05$). To illustrate the substantive meaning of such variation, Figure 2 shows how the selection effects related to students' grades vary across two selected schools. In both schools, we observe strong levels of performance homophily: students with low grades (solid lines) are more likely to send liking nominations to low-performing peers, whereas students with high grades (dotted lines) prefer high-performing peers. The schools vary, however, with respect to gender differences: While we observe no differences between girls (black lines) and boys (grey lines) in school 8 (left panel), girls more strongly prefer high-performing peers than boys do in school 18 (right panel). In the subsequent meta regressions we systematically investigate this contextual variation in relative group differences.

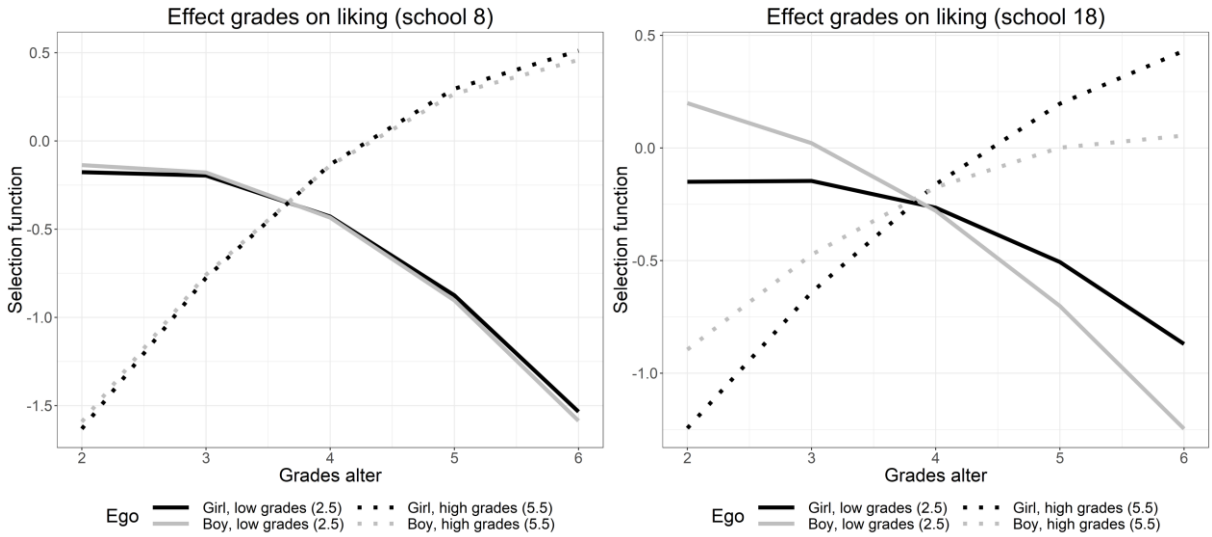

Figure 2. Selection effects related to students' grades in two example schools.
NOTE. The plotted predictions rely on school-specific estimates from model setup 1.

Table 1. Random effects meta analysis

	M1							M2						
	Theta		(s.e.)	Q	p-value	Fisher test (p-value) negative	positive	Theta		(s.e.)	Q	p-value	Fisher test (p-value) negative	positive
Selection function														
Density	-2.632	***	(0.096)	178.563	0.000	0.000	1.000	-2.631	***	(0.100)	194.528	0.000	0.000	1.000
Reciprocity	2.412	***	(0.037)	42.594	0.038	1.000	0.000	2.415	***	(0.039)	44.758	0.023	1.000	0.000
3-cycles	-0.105	***	(0.014)	104.610	0.000	0.000	1.000	-0.106	***	(0.015)	102.777	0.000	0.000	1.000
GWESP	1.827	***	(0.041)	122.330	0.000	1.000	0.000	1.831	***	(0.042)	130.234	0.000	1.000	0.000
Reciprocity x GWESP	-0.646	***	(0.029)	34.221	0.194	0.000	1.000	-0.649	***	(0.029)	35.373	0.159	0.000	1.000
Indegree popularity	-0.006		(0.004)	51.002	0.005	0.001	0.814	-0.006		(0.004)	44.936	0.022	0.001	0.891
Outdegree popularity	-0.055	***	(0.009)	79.604	0.000	0.000	1.000	-0.055	***	(0.008)	71.725	0.000	0.000	1.000
Outdegree activity	-0.037	***	(0.002)	61.290	0.000	0.000	1.000	-0.038	***	(0.002)	64.335	0.000	0.000	1.000
Same school class	0.222	***	(0.039)	242.714	0.000	0.935	0.000	0.222	***	(0.039)	242.132	0.000	0.915	0.000
Boy alter	0.025	*	(0.012)	38.105	0.096	0.922	0.003	0.023		(0.012)	38.569	0.088	0.894	0.005
Boy ego	-0.023		(0.013)	35.960	0.144	0.008	0.929	-0.023		(0.014)	38.180	0.095	0.005	0.912
Same sex	0.263	***	(0.015)	69.245	0.000	1.000	0.000	0.259	***	(0.015)	65.492	0.000	1.000	0.000
High educational background alter	0.010		(0.010)	27.294	0.502	0.843	0.165	0.010		(0.010)	28.782	0.424	0.825	0.143
High educational background ego	0.017		(0.016)	60.949	0.000	0.511	0.001	0.017		(0.016)	58.576	0.001	0.501	0.001
Same educational background	0.028	**	(0.009)	27.914	0.469	0.999	0.001	0.031	***	(0.009)	29.828	0.371	1.000	0.000
Ethnic minority alter	0.029	*	(0.012)	40.097	0.065	0.904	0.001	0.029	*	(0.012)	40.671	0.058	0.904	0.001
Ethnic minority ego	-0.020		(0.014)	49.548	0.007	0.003	0.719	-0.020		(0.014)	49.332	0.008	0.002	0.734
Same ethnic origin	0.169	***	(0.011)	40.829	0.056	1.000	0.000	0.171	***	(0.011)	40.283	0.062	1.000	0.000
Grades alter	0.032	*	(0.014)	37.499	0.108	0.963	0.002	0.047	***	(0.014)	37.930	0.100	0.990	0.000
Grades squared alter	0.027	*	(0.012)	33.397	0.221	0.889	0.008	0.022		(0.012)	36.249	0.136	0.793	0.016
Grades ego	0.025		(0.015)	53.038	0.003	0.665	0.002	0.022		(0.015)	55.566	0.001	0.559	0.002
Grades diff. squared	-0.110	***	(0.011)	51.143	0.005	0.000	1.000	-0.109	***	(0.011)	51.062	0.005	0.000	1.000
Male ego x grades alter	0.024		(0.022)	44.250	0.026	0.619	0.014							
Ethnic minority ego x grades alter								0.000		(0.023)	48.522	0.009	0.129	0.156
Behavior function														
Linear shape	0.077		(0.052)	22.126	0.775	0.947	0.165	0.066		(0.052)	22.007	0.781	0.933	0.204
Quadratic shape	-0.268	***	(0.049)	16.527	0.957	0.000	1.000	-0.272	***	(0.048)	16.728	0.954	0.000	1.000
Average similarity	3.980	***	(0.553)	15.126	0.977	1.000	0.000	3.855	***	(0.558)	15.693	0.970	1.000	0.000
Effect from boy	-0.240	***	(0.053)	18.837	0.903	0.002	1.000	-0.224	***	(0.050)	17.390	0.940	0.004	1.000
Effect from high educational background	0.345	***	(0.059)	19.566	0.880	1.000	0.000	0.346	***	(0.058)	19.129	0.894	1.000	0.000
Ethnic minority	0.043		(0.056)	21.320	0.812	0.836	0.402	0.064		(0.057)	22.062	0.778	0.885	0.285
N(schools)				29							29			

NOTE. * p < .05; ** p < .01; *** p < .001 (two-tailed tests).

SAOM meta regressions

To test our hypotheses on how group-based normative values of school performance vary with contextual characteristics, we estimated several random effects meta regressions.[9] We first focus on the resourcefulness of the school context and then turn to the strength of demographic faultlines.

Figure 3 summarizes the main results with respect to the association between the estimated group differences and the fraction of parents with an upper secondary education (resourcefulness). The left-hand panel illustrates the gender difference in the effect of alter's grades on liking. All negative estimates – indicating that boys evaluate high performers on average less positively than girls do – stem from schools where few parents have an upper secondary education (with fractions smaller than 0.4). Hence, even though we observe no school where these negative estimates are statistically different from zero (see table 1 above), the contextual variation in these estimates is systematic, resulting in a strongly positive and statistically significant coefficient in the respective meta regression (coef. = 0.41, s.e. = 0.138). This finding supports hypothesis 1. For the sake of comparison, the right-hand panel of figure 1 illustrates the estimated ethnic differences in the effect of grades on liking. Here, we see no association: the size and direction of the estimates is unrelated to the fraction of parents with an upper secondary education in the respective schools (coef. = 0.126, s.e. = 0.207).

To test hypotheses 2 and 3, we examine the associations between the estimated group differences and the strength of demographic faultlines in the schools. As evident from the upper panels in figure 4, we see no systematic variation across contextual characteristics. Neither d_{gender} (upper left panel) nor $d_{ethnicity}$ (upper right panel) is associated with the size and direction of the estimated group difference. Accordingly, the respective meta regression coefficients are

[9] For the complete results of all meta regressions, see tables A3 and A4 in the online supplement.

small and far from statistical significance (coef. = 0.082, s.e. = 0.158; coef. = 0.016, s.e. = 0.192). Hence, in contrast to our second and third hypotheses, an alignment of socio-economic status and gender or ethnic categories is not associated with group differences in the evaluation of high performers.

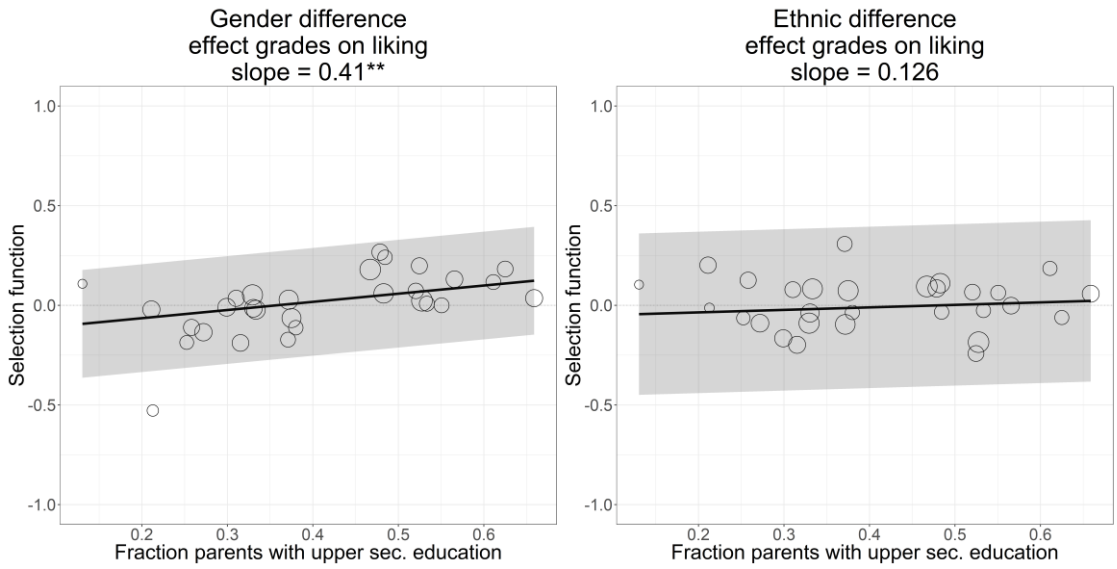

Figure 3: Varying group differences in the effect of grades on liking across schools with different fractions of parents with an upper secondary education.

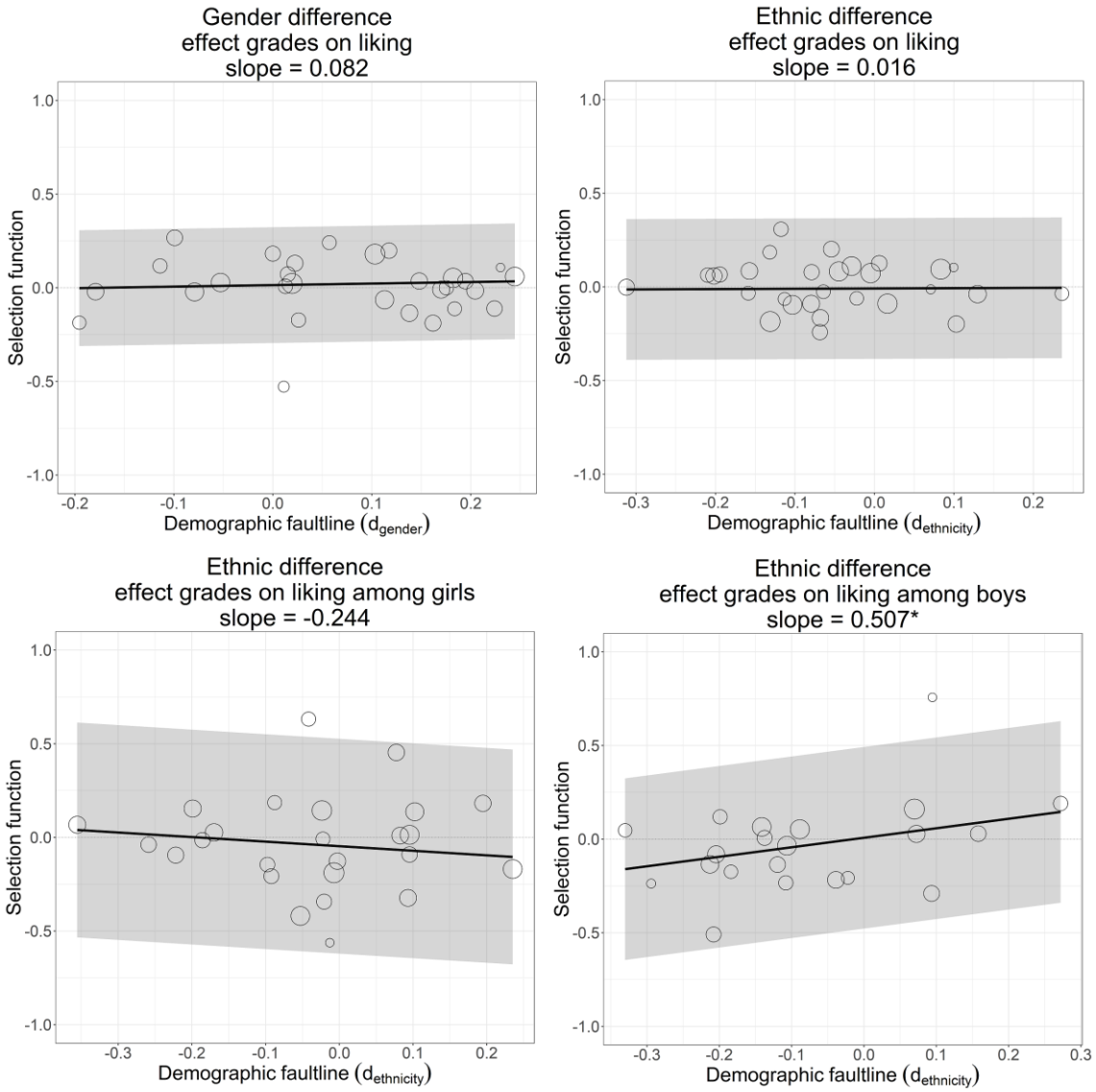

Figure 4: Varying group differences in the effect of grades on liking across schools with different demographic faultlines.

In the final step, we repeat this analysis separately for boys and girls to test hypothesis 4.[10] Based on the liking network among girls, we again observe no significant relation between the estimated ethnic difference and the demographic faultline strength (lower left panel). For liking

[10] Due to their smaller sizes, some gender-specific networks provided too little variation to provide credible estimates that would satisfy the convergence criterion for SAOM (i.e., max. convergence ratios < 0.25). Hence, results with respect to liking among boys rely on data from 21 schools, those with respect to liking among girls on data from 25 schools.

among boys, however, we find systematic contextual variation across schools (lower right panel). The estimated ethnic differences in the effect of grades on liking among boys are positively associated with our contextual variable of interest: In support of hypothesis 4, negative estimates – i.e., less positive evaluation of high-performers by ethnic minority boys than by majority group boys – are more likely in schools where ethnic minority boys are in a disadvantaged position (lower right panel: coef. = 0.507, s.e. = 0.247).

Discussion and Conclusions

In this article, we attempted to identify school characteristics that promote the emergence of a gender-based or ethnicity-based oppositional culture. The first important finding is a descriptive one: Overall, we found hardly any evidence for group-based oppositional cultures in the German schools under study: At the structural level, nearly all observed (group-specific) negative associations between students' social acceptance and their school performance were statistically insignificant – indicating that high-performing students generally face no likability penalty. More than this, there were relatively few networks where boys and girls or majority and minority students differed in their acceptance of high performers. At the interactional level, our longitudinal actor-oriented models confirmed this picture: There was no school in which high performers were evaluated worse by boys than by girls and we found that, on average, minority and majority students evaluated high performers equally.

Without qualifying this important null finding, we still found systematic variation *across schools* in the extent to which demographic groups tend to evaluate high performers differently. In line with two of our hypotheses, the difference between girls and boys in the normative value of school performance was larger in less resourceful schools; and the difference between male ethnic majority and minority students in the normative value of school performance was larger

when socio-economic differences aligned with ethnic origin. In sum, we found evidence that the theoretically expected contextual forces are at play, but their effects seem to be too small to give rise to strong oppositional cultures in particular schools.

These findings carry three important implications. First, oppositional status orders seem to be no characteristic of "adolescent societies" in secondary school. This null finding is all the more informative as our sample is located in an urban, ethnically diverse, socio-economically deprived area of Germany, where chances to find oppositional cultures should have been particularly high. Our study echoes the results of previous large-scale studies that found no evidence for oppositional cultures in other countries and educational settings (Ainsworth-Darnell & Downey 1998; Cook & Ludwig 1997; van Tubergen & van Gaans 2016). Given that our network-analytic approach allows for a particularly adequate and sensitive modelling of peer relations, our study might be considered the last nail in the coffin of oppositional culture theories.

Second, although largely absent or insignificant in the school grades under study, the observed evidence for group-based oppositional cultures varied systematically across schools with different compositional features. In support of our theoretical arguments, we found that the resourcefulness of a school and the existence of certain demographic faultlines promote group differences in the normative value of school performance. Our study therefore shows the fruitfulness of adopting an evolutionary-ecological perspective in social network analysis (McFarland et al. 2014).

Third, the role of local contexts should not be overstated but needs to be theorized and examined in its interplay with other causes. Our analyses show that the school context alone does not explain the emergence of oppositional status orders and that demographic attributes like gender or ethnicity are not analytically interchangeable. Oppositional tendencies become more likely among boys in less resourceful schools (Legewie & DiPrete 2012), while they become tied to

being a male ethnic minority student in schools where minority boys tend to come from socio-economically less resourceful families. Moreover, irrespective of the school context, girls hardly evaluate high performers less positively. These different patterns suggest that group-based oppositional cultures are not just the emergent result of local contextual characteristics, but build on already existing, more generally available cultural repertoires tied to the involved demographic groups, such as norms of masculinity among boys.

Future research should extend our study and aim to overcome some of its limitations. First, although we think that the relevance of anti-school oppositional cultures has been overstated, some questions deserve further attention. One possibility is that this phenomenon exists at a lower level of aggregation, e.g., particular friendship cliques. Another possibility is that students lead their peers to lower performance via social influence. Our analysis focused on selection because a sanctioning of high performance is the more basic mechanism through which oppositional cultures might affect students' effort and performance (Fryer & Torelli 2010). Given that we found little evidence for the differential liking of high performance across groups, we did not extend our analysis to cover influence effects.

Second, it would be fascinating to collect data on teachers' and students' subjective perceptions of the prevalence of anti-school attitudes in their classes. It may well be that teachers or students perceive anti-school norms to be present and tied to a specific demographic group in a school class, even when social network analysis does not lead to the same diagnosis. Recall that we did find clear indication of performance homophily: students preferred peers with similar school performance. If demographic groups differ in their performance, this tendency alone may give rise to group differences in the social acceptance of high performers (e.g., if low-performing boys prefer low performers while high-performing girls prefer high performers). Our more specific conceptualization of group-based oppositional cultures and corresponding analytic strategy focused on group differences in the liking of high performance students *above and*

beyond performance homophily and correlated forms of homophily. In everyday life, but also in most ethnographic research, perceptions might not take these latter, more basic processes into account, leading to a lower threshold for diagnosing oppositional cultures.

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Appendix

Table A1. Descriptive overview across all schools in the analytic sample

School	N	Jaccard index			Hamming distance			Fraction boys	Fraction minority students	Fraction parents with upper sec. education	Grades (mean)	Demographic faultline (ethnic origin)	Demographic faultline (gender)
		W1-W2	W2-W3	W3-W4	W1-W2	W2-W3	W3-W4						
1	65	0.361	0.309	0.436	287	336	279	0.508	0.154	0.625	4.144	-0.022	0.000
2	68	0.257	0.151	0.230	352	449	331	0.632	0.537	0.258	3.656	0.006	0.224
3	123	0.364	0.300	0.292	736	827	780	0.520	0.418	0.330	3.837	0.130	0.204
4	124	0.328	0.277	0.289	731	897	864	0.516	0.363	0.483	4.161	-0.029	0.244
5	91	0.316	0.311	0.353	468	495	462	0.462	0.396	0.310	3.760	-0.079	0.195
6	65	0.385	0.415	0.367	406	375	422	0.446	0.328	0.525	4.115	-0.069	0.117
7	55	0.199	0.353	0.311	281	251	268	0.691	0.407	0.380	3.970	0.236	0.184
8	134	0.319	0.298	0.356	864	882	768	0.381	0.396	0.333	4.193	-0.045	-0.079
9	113	0.269	0.270	0.277	669	715	654	0.566	0.496	0.315	3.857	0.103	0.162
10	124	0.237	0.269	0.296	819	739	668	0.468	0.366	0.272	3.928	-0.080	0.138
11	178	0.247	0.236	0.195	1022	1044	1054	0.567	0.619	0.329	3.827	0.016	0.182
12	63	0.258	0.263	0.265	432	400	404	0.540	0.587	0.371	3.877	-0.117	0.026
13	99	0.226	0.316	0.302	625	503	464	0.485	0.724	0.211	3.637	-0.054	-0.179
14	118	0.285	0.339	0.272	836	753	800	0.483	0.475	0.372	3.990	-0.103	-0.053
15	129	0.243	0.284	0.334	865	837	689	0.496	0.659	0.299	3.684	-0.068	0.170
16	50	0.282	0.212	0.281	239	349	300	0.720	0.694	0.130	3.858	0.100	0.230
17	52	0.350	0.270	0.298	281	260	200	0.462	0.519	0.213	3.727	0.071	0.011
18	172	0.254	0.206	0.290	1163	1513	1180	0.483	0.372	0.528	4.212	-0.131	0.019
19	179	0.280	0.308	0.276	1091	1118	1059	0.520	0.360	0.467	4.166	0.084	0.103
20	186	0.275	0.258	0.263	1256	1108	977	0.570	0.465	0.375	4.125	-0.005	0.113
21	75			0.271			622	0.507	0.280	0.611	4.029	-0.132	-0.114
22	144			0.201			1110	0.375	0.507	0.479	4.291	-0.157	-0.099
23	70			0.345			412	0.414	0.514	0.484	4.291	-0.159	0.057
24	87			0.269			638	0.448	0.322	0.659	4.495	-0.202	0.148
25	93			0.260			639	0.462	0.678	0.551	4.263	-0.210	0.175
26	101			0.253			738	0.327	0.703	0.520	4.409	-0.194	0.015
27	106			0.246			857	0.472	0.302	0.533	4.239	-0.064	0.013
28	103			0.292			817	0.447	0.359	0.566	4.411	-0.312	0.022
29	107			0.385			622	0.477	0.519	0.252	3.833	-0.113	-0.196
OVERALL													
Mean	106	0.287	0.282	0.293	671	693	658	0.498	0.466	0.406	4.034	-0.055	0.070
S.D.	39.4	0.051	0.057	0.053	318.4	341.9	271.2	0.085	0.144	0.139	0.243	0.118	0.125

Table A2. Random effects meta analysis (gender-specific networks)

	M2 (girls only)							M2 (boys only)						
	Theta		(s.e.)	Q	p-value	Fisher test negative	Fisher test positive	Theta		(s.e.)	Q	p-value	Fisher test negative	Fisher test positive
Selection function														
Density	-2.544	***	(0.109)	70.453	0.000	0.000	1.000	-2.516	***	(0.103)	64.695	0.000	0.000	1.000
Reciprocity	2.725	***	(0.056)	27.187	0.296	1.000	0.000	2.344	***	(0.102)	49.780	0.000	1.000	0.000
3-cycles	-0.112	***	(0.024)	66.613	0.000	0.000	1.000	-0.137	***	(0.014)	26.831	0.140	0.000	1.000
GWESP I -> K -> J (69)	1.922	***	(0.055)	53.038	0.001	1.000	0.000	1.920	***	(0.076)	71.910	0.000	1.000	0.000
Reciprocity x GWESP	-0.701	***	(0.042)	22.015	0.578	0.000	1.000	-0.662	***	(0.066)	31.599	0.048	0.000	1.000
Indegree popularity	-0.002		(0.008)	31.721	0.134	0.173	0.528	-0.017	*	(0.007)	35.180	0.019	0.000	0.973
Outdegree popularity	-0.095	***	(0.014)	41.115	0.016	0.000	1.000	-0.058	***	(0.010)	30.658	0.060	0.000	1.000
Outdegree activity	-0.044	***	(0.003)	44.827	0.006	0.000	1.000	-0.038	***	(0.003)	22.542	0.312	0.000	1.000
Same school class	0.260	***	(0.040)	77.049	0.000	1.000	0.000	0.310	***	(0.043)	66.493	0.000	1.000	0.000
High educational background alter	0.023		(0.022)	32.020	0.126	0.761	0.054	0.005		(0.019)	21.932	0.344	0.698	0.224
High educational background ego	0.031		(0.031)	43.404	0.009	0.566	0.009	0.000		(0.023)	28.939	0.089	0.308	0.257
Same educational background	0.031		(0.021)	33.879	0.087	0.793	0.015	0.020		(0.018)	23.357	0.272	0.821	0.088
Ethnic minority alter	0.026	*	(0.013)	15.411	0.908	0.985	0.140	0.059	**	(0.021)	30.962	0.056	0.976	0.000
Ethnic minority ego	0.039		(0.021)	29.379	0.206	0.907	0.023	-0.033		(0.024)	27.964	0.110	0.025	0.767
Same ethnic origin	0.165	***	(0.016)	25.039	0.404	1.000	0.000	0.228	***	(0.030)	51.910	0.000	1.000	0.000
Grades alter	0.068	*	(0.032)	47.403	0.003	0.801	0.000	0.076	***	(0.019)	13.844	0.838	0.999	0.004
Grades squared alter	0.027		(0.020)	27.273	0.292	0.633	0.133	0.079	***	(0.018)	15.359	0.756	0.997	0.001
Grades ego	0.010		(0.022)	36.612	0.048	0.392	0.113	0.031		(0.028)	35.016	0.020	0.590	0.020
Grades diff. squared	-0.099	***	(0.015)	35.179	0.066	0.000	1.000	-0.124	***	(0.014)	17.758	0.603	0.000	1.000
Ethnic minority x grades alter	-0.027		(0.044)	44.876	0.006	0.023	0.368	-0.026		(0.036)	21.678	0.358	0.149	0.817
Behavior function														
Linear shape	-0.035		(0.058)	15.798	0.895	0.746	0.621	-0.060		(0.043)	6.524	0.998	0.638	0.936
Quadratic shape	-0.196	***	(0.054)	11.410	0.986	0.026	1.000	-0.326	***	(0.036)	3.959	1.000	0.002	1.000
Average similarity	2.785	***	(0.570)	11.021	0.989	1.000	0.012	3.869	***	(0.512)	5.755	0.999	1.000	0.003
Effect from high educational background	0.406	***	(0.095)	17.295	0.836	0.998	0.003	0.257	***	(0.066)	8.824	0.985	0.999	0.040
Effect from ethnic minority	0.056		(0.072)	12.771	0.970	0.833	0.659	0.050		(0.077)	12.099	0.913	0.886	0.457
N(schools)				25							21			

NOTE. * p < .05; ** p < .01; *** p < .001 (two-tailed tests).

Table A3. Random effects meta regressions

	Dep. Var.: Boy ego x grades alter		Dep. Var.: Ethnic minority ego x grades alter	
	Coef.	(s.e.)	Coef.	(s.e.)
Constant	0.076	(0.165)	-0.136	(0.143)
Fraction parents with upper sec. education	0.410 **	(0.138)	0.126	(0.207)
Demographic faultline[1]	0.082	(0.158)	0.016	(0.192)
Fraction demographic group[2]	-0.459	(0.285)	0.163	(0.171)
N(schools)	29		29	

NOTE. * p < .05; ** p < .01; *** p < .001 (two-tailed tests). [1] M1: gender-specific; M2: ethnic-specific [2] M1: boys; M2: ethnic minority students

Table A4. Random effects meta regressions (gender-specific networks)

	Dep. Var.: Ethnic minority ego x grades alter (girls only)		Dep. Var.: Ethnic minority ego x grades alter (boys only)	
	Coef.	(s.e.)	Coef.	(s.e.)
Constant	0.135	(0.227)	-0.738 *	(0.307)
Fraction parents with upper sec. education	-0.305	(0.363)	0.779 *	(0.393)
Demographic faultline (ethnic origin)	-0.244	(0.292)	0.507 *	(0.247)
Fraction ethnic minority students	-0.137	(0.258)	0.906 *	(0.355)
N(schools)	25		21	

NOTE. * p < .05; ** p < .01; *** p < .001 (two-tailed tests).