

Academic Benefit of Outgroup Contact for
Immigrant and Non-Immigrant Students

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Abstract

Based on social network theories, outgroup contact does not only improve intergroup relations, but can also facilitate the academic development of students due to the social capital and the uniquely supportive information and resources it provides. In the present study, 12,376 students (14.42 years; 50% girls; 38% immigrant students) from 591 classes across three countries (Germany, Netherlands, and Sweden) provided information on social network data, academic achievement, SES, and cognitive ability. Social network analysis determined the intergroup network connectedness of students. As expected, country-specific multilevel models reveal a positive linear relationship between outgroup contact and academic achievement for immigrant students in all models and a negative curvilinear (i.e., concave) relationship between outgroup contact and academic achievement for non-immigrant students in two out of three models, while controlling for SES, cognitive abilities, and total network integration. These findings suggest the academic value of outgroup contact for immigrant students and signal its potential for non-immigrant students.

Keywords: intergroup contact, academic achievement, social network analysis

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Ethnic or racial inequalities in education have been a well-known matter of concern for many decades and across different contexts, including the US (Walters, 2001) and Western Europe (Jackson, Jonsson, & Rudolphi, 2012; Kristen & Granato, 2007). This paper examines a novel strategy to reduce these disparities by considering the value of diverse peer networks in ethnically mixed schools. Following the seminal intergroup contact theory (Allport, 1954; Brown & Hewstone, 2005), which received compelling evidence indicating that positive contact between different groups improves intergroup relations (Davies, Tropp, Aron, Pettigrew, & Wright, 2011; Pettigrew & Tropp, 2006), we propose that positive contact does not only reduce prejudice, but also provides a means to increase students' academic achievement within the educational system.

The theoretical explanation for this positive academic side effect is social capital within individuals' social networks. A social network structures relationships between network members (Borgatti, Mehra, Brass, & Labiance, 2009), while social capital describes the resources that spread across the relationships within the social network (cf., Bourdieu, 1986). More recently, Robert Putnam defined social capital as "*social networks and the associated norms of reciprocity and trustworthiness*" (2007, p. 137), and further differentiates this concept between bonding (ingroup network connections) and, particularly relevant for the present paper, bridging social capital (outgroup network connections). Recent research, in fact, suggests a positive effect of bridging social capital, or intergroup contact, for academic achievement, especially for immigrant or minority students. For example, Baysu, Phalet, and Brown (2014) demonstrated in a recent study that the amount of intergroup friendship is positively related to immigrant students' school performance across different European cities.

Moreover, Shook and Fazio (2008) found that intergroup contact, measured as interracial roommate relationship in college, fostered African Americans students' academic success.

Despite this evidence, however, this promising line of research tends to neglect two important aspects: the majority perspective and the responsible underlying social network processes. In this paper, we examine the effects of outgroup contact on academic achievement by considering immigrants (i.e., minority group members) and their native non-immigrant peers (i.e., majority group members) from three Western European countries (i.e., Germany, the Netherlands, and Sweden). Moreover, we adequately take into account the theoretically relevant social network processes, outlined in the following section.

Social Network Theory

The rationale for expecting outgroup contact to impact academic achievement is rooted in a social network perspective. This scientific approach assumes that the naturally-existing social structure of relationships between network members explains something about these network members (Borgatti et al, 2009). That is, the structure of relationships and the intermediating processes between related network members matter above and beyond individual characteristics. Figure 1 illustrates a sample social network with nodes representing students that are shaped by their group status (squares denote non-immigrant students; circles denote immigrant students) and lines representing relationships, whose surrounded grey-marked shades indicate the spreading social capital, defined above.

Insert Figure 1 about here

In general people in social networks group together on the basis of homophily, which is the preference for forming connections to similar others (McPherson, Smith-Lovin, & Cook, 2001; Wölfer & Hewstone, 2018). However, different theories in the field of network science emphasize the value of atypical connections (i.e., bridging social capital), which tend to connect dissimilar others who are more likely to exchange novel information and resources

(for an overview see Borgatti & Halgin, 2011). For example, the strength of weak ties theory (Granovetter, 1973) proposes that strong ties bond and weak ties bridge. More specifically, strong ties tend to connect equivalent worlds of similar others, while weak ties tend to connect network members who are different from each other and present a potential source for novel information. In Figure 1, ingroup connections between members of the same group will tend to exchange only a few new ideas and represent rather common resources (tie between #14 & #15), in contrast to outgroup connections between members of different groups (tie between #15 & #16). Phrased differently, there is little new that #15 will learn or experience from #14, which he or she does not learn or experience from #13. Relatedly, structural holes theory (Burt, 1992) postulates that network members benefit more from connections that are, in turn, unconnected among themselves (i.e., structural holes in ego networks), in contrast to connections that are strongly interrelated to each other and hence tend to spread redundant information and present redundant resources. Given the preference for homophily, it is likely that network members who engage in outgroup contact will form these beneficial structural holes, because this outgroup contact tends to be unconnected to the ingroup contacts of the same network member. For example, network member #15 has a structural hole because this individual has two dissimilar friends (i.e., #14 and #18) who are, in turn, unconnected with each other.

Academic Benefit of Outgroup Contact

Applying this line of argumentation to the context of ethnically diverse schools implies that students can benefit academically from outgroup contact. This assumption is particularly plausible for immigrant students who, on average, experience language or socioeconomic barriers (Schmid, 2001; Sirin, 2005). We propose that the enhanced social capital that immigrant students experience via outgroup contact to non-immigrant students will facilitate their academic achievement given the increased likelihood of receiving novel

information and exploiting unique resources. The academic advantage of this information and resources, which flow among peer connections within the social network, covers indirect mechanisms such as the transmission of values, norms, and aspirations by peer role models (Brechwald & Prinstein, 2011; Buchmann & Dalton 2002) as well as direct mechanisms such as instrumental support, advice, and concrete instructions concerning procedures, skills, or facts (Berndt, 2004; Hanushek, Kain, Markman, & Rivkin, 2003). That is, the more immigrant students are connected to non-immigrant students, the more uniquely supportive information and resources they receive (i.e., social capital), and the better is their academic achievement.

Beyond the described general network mechanisms, additional factors contribute to the beneficial academic effect of outgroup contact for immigrant students, which primarily derives from the well-established effects of intergroup contact on intergroup relations (Pettigrew & Tropp, 2006). These include a) increased feelings of belonging and acceptance, which fosters school attachment and engagement (Chavous, Rivas, Green, & Helaire, 2002; Walton & Cohen, 2007); b) reduced negative stereotypes, which enhances the self-concept (Aronson & Steele, 2005); and c) reduced discrimination, which protects school motivation (Wong, Eccles, & Sameroff, 2003). All of these aspects have, in turn, a positive effect on the academic confidence, performance, and achievement of immigrant students.

Based on the outlined general network theory (cf., Burt, 1992; Granovetter, 1973), however, even the group of non-immigrants can benefit from outgroup contact to immigrants in schools, although the beneficial effect of outgroup contact on non-immigrants' academic achievement is less straightforward. That is, non-immigrant students with outgroup friends in school have a more diverse ego network that can also enrich and stimulate their development by providing novel information and unique resources. However, school settings with a high proportion of immigrant students tend to be characterized by poorer educational outcomes

(for a meta-analysis see: Mickelson, Bottia, & Lambert, 2013), which is not driven by the higher presence of immigrant students per se, but rather confounded with negative school characteristics in general (Geay, McNally, & Telhaj, 2013) or unfavorable mediating processes (Rjosk, Richter, Lüdtke, & Eccles, 2017). That is, schools with high levels of diversity are, in part, a consequence of immigrants' restricted access to schools with optimal resources and learning opportunities. As a result, immigrant students sometimes cluster together in so-called 'problem schools' in the segregated residential areas where they live, in which students tend to experience unfavorable mediating processes (i.e., factors explaining the link between high levels of diversity and academic performance) such as suboptimal learning conditions, lower achievement expectations by teachers, and an anti-learning climate by peers (Rjosk et al., 2017), which disadvantages both immigrant and non-immigrant students. As a consequence, we argue that the positive effect of outgroup contact in schools should rather be curvilinear for the group of non-immigrant students in that they benefit from outgroup contact with immigrants, until a high outgroup contact score reflects a disproportionately high level of school diversity which, in turn, indicates a problematic school environment that diminishes students' academic achievement.

Objectives and Hypotheses

In the present study, we tested the assumption that outgroup contact is positively linear related with academic achievement for immigrant students and negatively curvilinear related with academic achievement for non-immigrant students. For this purpose, we contribute to the existing literature by adequately considering the underlying social network processes that precisely measure intergroup relations between immigrant and non-immigrant students, which allows us to accurately capture a key aspect of social capital (cf., Putnam, 2000, 2007). A large-scale, international dataset enabled us to a) analyze multiple social networks of almost 600 school classes and b) test the robustness of results across three European countries. Given

the important role of SES (cf., Sirin, 2005) and cognitive abilities (Deary, Strand, Smith, & Fernandes, 2007) for students' academic achievement, we tested the hypothesized effects over and above these factors in order to examine the unique effect of outgroup contact. In order to account for the endogeneity problem of the present cross-sectional design (i.e., do students perform well in schools due to their intergroup connectedness, or do they present preferred friendship options due to their academic performance), we also controlled for students' total social network integration (i.e., ingroup and outgroup contact). If students are more socially integrated, because they perform well in schools, this effect should exist in general (i.e., for ingroup and outgroup contact); however, if students perform well in school, because of their outgroup contact while controlling for their total network integration, this result would support theoretical reasoning of the academic benefit of outgroup contact.

We tested the following hypotheses:

1. Immigrant students' outgroup contact to non-immigrant students will have a positive linear relationship with their academic achievement, while controlling for SES, cognitive abilities, social network integration, and relevant sociodemographics (i.e., age, sex, country of birth, aggregated outgroup contact, aggregated SES, diversity).
2. Non-immigrant students' outgroup contact to immigrant students will have a negative curvilinear relationship with their academic achievement (i.e., positive effect for low levels and negative effect for high levels of outgroup contact), while controlling for the same variables.

Method

Sample

Participants were drawn from the "Children of Immigrants Longitudinal Survey in Four European Countries" (CILS4EU; Kalter et al., 2013), which studies the integration of

and intergroup relations between children of immigrants and their native non-immigrant peers in England, Germany, the Netherlands, and Sweden. All presented data in this study rely on the completed first wave of this ongoing international collaboration. The target population of 14-year-old children was recruited within a school-based stratified sample selection, standardized across countries. Given the main research goal of CILS4EU, the survey systematically oversampled students from immigrant groups. Participation rate was high (school participation rate = 84%; class participation within participating schools = 99%; student participation rate within participating classes = 85%). From all four initial countries, England could not be considered in the present study due to a technical problem during the collection of the social network data. In the remaining three countries, school classes with fewer than 15 students (11%) were excluded to restrict analysis to social networks of sufficiently large size.

These inclusion criteria left a total of 12,376 students from 591 classes with an average of 21.69 students per class ($SD = 3.97$). The analytic sample included $N = 4,698$ immigrant students (Germany: $n = 1,740$, mainly from Turkey, Russia, and Poland; the Netherlands: $n = 1,084$, mainly from Morocco, Turkey, and Suriname; Sweden: $n = 1,874$, mainly from Iraq, Bosnia & Herzegovina, and Serbia) and $N = 7,678$ non-immigrant students (Germany: $n = 2,560$; the Netherlands: $n = 2,620$; Sweden: $n = 2,498$). Participants' average age was $M = 14.96$ years ($SD = 0.61$) with an equally balanced gender ratio of 50/50 girls to boys ($n = 6,227$ girls; $n = 6,147$ boys; $n = 2$ without response).

Measures

Data were collected in the regular school setting by the middle of the school year 2010/2011. In a two-hour data assessment, participants were asked to answer a standardized questionnaire supported by trained test administrators. The complete questionnaire assessed

core dimensions of integration, social network data, and school achievement, from which the present study analyzed the measures described below.

Group status. This indicator represents the main grouping variable in the social networks that distinguishes ingroup and outgroup connections. Group status differentiates immigrant students versus non-immigrant students according to the second generation immigrant concept.¹ That is, participants who reported that their own, their mother's, or their father's country of birth differs from the respective survey country were categorized as immigrant students, whereas participants who reported that they were born and have parents that were born in the survey country were categorized as non-immigrant students.

Academic achievement. The main outcome variable was measured with a language test that focused on students' lexicon. Independent national language tests were administered in each country including 25 to 30 test items, which asked participants to identify the synonym for a target word out of five alternative answers (e.g., a synonym for "closed" had to be identified from "clear", "shut", "finished", "fallen" or "tired"). Given country-specific item difficulties (see technical report: CILS4EU, 2014), we created an academic achievement scale separately for each country. Rasch modeling was applied in order to adequately estimate students' academic ability (Mair & Hartzinger, 2007).² The resulting scales were standardized ($M = 500$, $SD = 100$) and displayed a satisfactory reliability (Cronbach's α in Germany, = .76, in the Netherlands = .78, and in Sweden = .82).

Outgroup contact. The main predictor of the present study was operationalized from a social network perspective. In a peer nomination procedure, participants were asked to nominate up to five friends in class ("Who are your best friends in class?") with the help of a class roster. Utilizing these data, we elicited social networks in all classes (see Figure 1). By means of information on students' group status (see above), we differentiated ingroup and outgroup network connections, which provided the basis for determining students' level of

outgroup contact. Based on the E-I index (Krackhardt & Stern, 1988), each student's number of ingroup ties was subtracted from the number of outgroup ties and divided by the total number of ties, so that the resulting score ranges from -1 (only ingroup connections) to 1 (only outgroup connections).³

Control variables.

Socioeconomic status (SES). Family SES was operationalized by combining student reports on their parents' education and occupational status, and home possessions. Parents' education was measured with a single variable assessing the highest educational level of either parent with a scale from 0 (*no qualification*) to 3 (*university degree*). Parents' occupational status was measured with a single variable assessing the highest occupational status of either parent. Occupational status was derived from mapping occupational categories onto the International Socioeconomic Index of Occupational Status (ISEI; Ganzeboom, Graaf, & Treiman, 1992). Observed ISEI scores ranged from 11 to 99 with higher values indicating higher occupational status. The home possessions index was measured by estimating a Rasch model based on six dichotomous items assessing students' possession at home (e.g., own computer). Observed scores ranged from -3.5 to 3.5 with higher values indicating greater value of possessions at home. These three socioeconomic indicators were summarized into a single SES variable using principal component analysis.

Considering diverse background information for this scaling procedure created missing data, which needed to be handled with multiple imputation. The expectation-maximization (EM) algorithm implemented in the R package 'Amelia' was employed to produce five imputed datasets by country (Honaker, King, & Blackwell, 2011). A large set of sociodemographic, academic achievement, and sampling variables were included in the respective imputation model to estimate the missing SES information.

Cognitive ability. Cognitive ability was measured with a standard German cognitive ability test (CFT 20-R; Weiß 2006). The test consists of 27 items with graphical tasks, which are regarded as language free and "culturally fair" and, as such, allowed for cross-country comparisons. Items were scaled with a Rasch model applied to the total international sample of students participating in this study ($M = 500$, $SD = 100$). The resulting scale was reliable (Cronbach's $\alpha = 0.83$).

Social network integration. Based on the peer network nomination procedure, we also determined each student's total network integration by considering both ingroup and outgroup contact ties, or connections. For this purpose, we utilized the *degree centrality* measure (i.e., the total number of network connections), which captures each network member's overall embeddedness within the entire social network (cf., Freeman, 1979). In Figure 1, for example, network members #4, #6, #9, and #15 have the strongest social network integration (degree centrality = 5).

Sociodemographics. On the individual level, we controlled for age, sex, and first generation immigrant status (i.e., whether participants reported that they were born outside the survey country). The latter control accounted for the fact that students were – in line with the applied second generation immigration concept – categorized as immigrants, independently of their own country of birth. On the contextual level, we controlled for class-aggregated outgroup contact, school-aggregated SES, and diversity (i.e., proportion of immigrants in schools).

Statistical Analyses

Hypotheses were tested by estimating multilevel models of students nested within school classes (Bates, Maechler, Bolker, & Walker, 2014). For hypothesis 1, we tested the hypothesized linear effect of immigrant students' outgroup contact on academic achievement, while controlling for SES, cognitive abilities, social network integration, and socio-

demographics. For hypothesis 2, we tested the hypothesized curvilinear effect of non-immigrant students' outgroup contact on academic achievement by additionally modelling the quadratic term of outgroup contact and while controlling for the same variables (except for first generation immigrant status, because all non-immigrant students are by definition born in the survey country). Models were analyzed separately for each country. All continuous predictors were z-standardized to facilitate the interpretation and comparability of regression effects.

Results

In the following section we start to present descriptive statistics, covering social network data that were used to measure the main predictor (outgroup contact) and the relevant study variables to inspect psychometric properties of analyzed measures and their robustness across countries. The following two subsections test the two main hypotheses, which are both, in turn, structured by starting to describe the analyzed model, followed by reporting effects relevant for the hypothesis, before reporting other consistently significant effects and, if necessary, robustness checks.

General Descriptives

In the full sample, social network analyses were performed based on a total of 57,751 network ties. Of these, 40,761 network ties were ingroup connections (per student: $M = 3.29$, $SD = 1.96$) and 16,990 network ties were outgroup connections (per student: $M = 1.37$, $SD = 1.53$). This ratio of in- versus outgroup connections can be replicated for both immigrant students (21,559 ties including 13,072 ingroup ties, $M = 2.78$, $SD = 2.01$, and 8,487 outgroup ties, $M = 1.81$, $SD = 1.83$), and non-immigrant students (36,192 ties including 27,689 ingroup ties, $M = 3.61$, $SD = 1.86$, and 8,503 outgroup ties, $M = 1.11$, $SD = 1.25$). Although immigrant students, compared to non-immigrant students, have on average fewer ingroup friends ($d =$

0.43) and more outgroup friends ($d = 0.47$), results in both groups support the phenomenon of ethnic homophily in social networks.

Insert Table 1 about here

Table 1 presents the means, standard deviations, and intercorrelations of individual study variables for immigrant and non-immigrant students, separately for each of the three countries. Findings largely follow the expected pattern: On average, immigrant students, compared to non-immigrant students, scored below average in academic achievement, come from rather disadvantaged socioeconomic backgrounds, and have lower cognitive abilities. Moreover, students from both groups have a tendency to form ingroup connections and they were both socially integrated in the network of their school class with, on average, 4 to 5 friends. Table 1 also shows the expected moderate intercorrelations between academic achievement, SES, and cognitive ability for both immigrants and non-immigrants, whereas students' total social network integration seems to be largely unrelated with the other study variables. These descriptives are robust across the different countries.

Immigrant Students' Academic Achievement

Multilevel analyses (level 1: students, level 2: school classes) estimated immigrant students' academic achievement in three country-specific models. The unconditional models without any predictors revealed intraclass coefficients (ICC) of .31, .32, and .13 for Germany, the Netherlands, and Sweden, respectively (see bottom of Table 2). Hence a considerable proportion of variance (i.e., 13% to 32%) in immigrant students' academic achievement is attributable to the class level, which underscores the adequacy of the applied multilevel approach. Results of the country-specific main effect models including all individual and contextual predictors are summarized in Table 2. The presented betas can be interpreted as the change in students' academic achievement ($M = 500$; $SD = 100$), if the respective z -standardized predictor ($M = 0$; $SD = 1$) increases by one standard deviation.

Insert Table 2 about here

Consistently across all countries, we revealed the hypothesized positive linear relationship of immigrant students' outgroup contact and academic achievement. It should be noted that this effect occurs while controlling for SES, cognitive ability, total social network integration as well as individual and contextual sociodemographics. Interestingly, class-aggregated outgroup contact had no effect in any of the countries studied, suggesting that the individual structure of specific relationships, rather than the overall contextual network structure, is driving the positive effect of immigrant students' outgroup contact. Further variables that were found to be consistently related to immigrant students' academic achievement across all countries were cognitive ability, first generation status (disfavoring first compared to second generation immigrants), and family SES on the individual as well as contextual level. That is, immigrant students with higher cognitive skills, who were born in the host country, or have higher socioeconomic status, perform better in school.

Finally, although a language test is a standard outcome variable for measuring academic achievement, this operationalization might be problematic when testing the relationship of outgroup contact and academic achievement among immigrants using cross-sectional data. That is, the outcome variable (immigrant students' language skills level) also, vice versa, predetermines the hypothesized predictor (outgroup contact) to some extent in that higher linguistic skills make it easier for immigrants to engage in outgroup contact. In other words, the plausible bidirectional relationship between outgroup contact and linguistically measured academic achievement might inflate the observed effect. Therefore, we replicated our main model in this subsample by operationalizing the outcome variable as cognitive ability. This robustness check confirms the beneficial effect of outgroup contact on academic achievement ($B = 5.63$, $SE = 2.18$, $p < .05$), while considering all relevant control variables.

Non-Immigrant Students' Academic Achievement

Similarly to the previous analysis, multilevel analyses (level 1: students, level 2: school classes) estimated non-immigrant students' academic achievement in three country-specific models by additionally modelling the quadratic term of outgroup contact in order to test hypothesis 2, which postulates a curvilinear relationship between outgroup contact and academic achievement. The unconditional models revealed intraclass coefficients (ICC) of .33, .33, and .10 for Germany, the Netherlands, and Sweden, respectively (see bottom of Table 3). Thus a considerable proportion of variance (i.e., 10% to 33%) in non-immigrant students' academic achievement is attributable to the class level, which underscores again the adequacy of the applied multilevel approach. Results of the country-specific main effect models including all individual and contextual predictors are summarized in Table 3.

Insert Table 3 about here

Two out of three country-specific models (i.e., Germany and Sweden) revealed the hypothesized negative curvilinear relationship between outgroup contact and academic achievement among non-immigrant students, indicated by the negative effect of the quadratic outgroup term whereas outgroup contact is non-significant. This finding suggests that outgroup contact has a positive effect for non-immigrants, but only up until a certain level. In contrast to our hypothesis, however, in the Netherlands outgroup contact is negatively related with academic achievement whereas its quadratic term is non-significant. Although this country-specific model does not provide support for our hypothesis, it is worth noting that the total model across all countries still confirms our hypothesis (outgroup contact: $B = -2.67$, $SE = 1.47$, $p > .05$; outgroup contact 2 : $B = -1.96$, $SE = 0.81$, $p < .05$). Again, this negative curvilinear effect occurs while considering all relevant control variables.

Similarly to the previous immigrant models, class-aggregated outgroup contact had no effect in any country, which further supports the importance of individuals' direct connections

rather than the overall contextual network structure. Other variables that were found to be consistently related to non-immigrant students' academic achievement across all countries were cognitive ability and SES on the individual as well as contextual level. That is, comparable to immigrant students, non-immigrant students with higher cognitive skills or higher socioeconomic status perform better in school.

Discussion

The primary purpose of the present study was to evaluate the academic benefit of students' outgroup contact by considering both immigrants and non-immigrants as well as the underlying social network processes, which represent a key aspect of the social capital that is theorized to drive this effect. We discuss now the main findings — the positive linear effect of outgroup contact for immigrant students' academic achievement and the negative curvilinear effect of outgroup contact for non-immigrant students' academic achievement — and end by acknowledging some limitations of our research that signal future research directions.

Immigrants' Outgroup Contact facilitates their Academic Achievement

In line with our first hypothesis, we found that outgroup contact is positively associated with immigrant students' academic achievement. In line with our proposed theoretical background, outgroup contact seem to increase social capital in the form of uniquely supportive information and resources. In this way, the present research extends recent literature (e.g., Baysu et al., 2014; Shook & Fazio, 2008) by taking into account the underlying social network processes, by controlling for relevant factors such as family SES and cognitive ability, and by demonstrating the robustness of effects across different countries.

This finding is promising, because during the process of integration, immigrants have not only a higher risk of facing prejudice and discrimination, but also tend to experience structural inequalities in the educational setting and in the labor market (Heath, Rethon, &

Kilpi, 2008; Shapira, 2012), which frequently arise due to language or socioeconomic barriers (Schmid, 2001; Sirin, 2005). Therefore, encouraging and supporting the development of outgroup contact of immigrants to non-immigrants will not only help to reduce intergroup tension and potential conflicts (cf., Pettigrew & Tropp, 2006), but also seems to have a positive academic side effect, which in the long run decreases structural inequalities and exploits the academic and economic potential offered by immigrants within increasingly diverse societies.

To this end, the present findings also highlight the usefulness of social network analysis for studying intergroup relations. Social network analysis has proved to be a valuable approach for studying the naturally existing social structure that channels intergroup relations (Wölfer, Faber, & Hewstone, 2015; Wölfer & Hewstone, 2017). In particular, examining interethnic network connectedness in school classes provides important information, over and above students' socioeconomic background and their cognitive abilities.

Although our data are only correlational (see limitations below), the hypothesized direction of this effect, from immigrant students outgroup contact to their academic achievement, is supported by two important findings. First, while immigrant students' outgroup contact was positively related to academic achievement, their total social network integration was found to be less important. The fact that academically successful immigrant students are not better integrated indicates that academic achievement is not driving immigrant students' outgroup contact, but, *vice versa* and in line with our theoretical background, that immigrant students' outgroup contact in the form of a diverse social network affects their academic achievement. Second, the finding that outgroup contact facilitates academic achievement is stable across different operationalizations; that is, we were able to replicate the effect whether we modelled academic achievement linguistically or cognitively. Although the applied language test provides us with an objective, reliable, and valid

measurement of academic achievement, this operationalization might be problematic for the present research question, given that language skills, at least to some extent, predetermine immigrant students' outgroup contact. For cognitive skills, however, it is less plausible that immigrant students with higher cognitive skills have an initial preference for outgroup contact, but, *vice versa* and in line with our theoretical background, a diverse social network enriches their cognitions or academic achievement.

Non-Immigrants' Outgroup Contact can facilitate their Academic Achievement

In line with our second hypothesis, we found that non-immigrants' outgroup contact has a negative curvilinear association with their academic achievement in two out of three models. That is, outgroup contact seems to be positively related with non-immigrants' academic achievement until a certain point, after which it becomes a negative relationship. This tipping point plausibly occurs when high outgroup contact scores within non-immigrants' ego networks start to reflect a disproportionately high level of diversity which is, in turn, characterized by a suboptimal school environment; not because of a higher presence of immigrants per se, but – as outlined in the introduction – due to negative school characteristics in general (Geay et al., 2013) or unfavorable mediating processes (Rjosk et al., 2017).

This inverted u-shape effect, however, does not directly challenge the outlined network theories and the consequently hypothesized beneficial effect of enriching resources and uniquely supportive information that outgroup contact can provide. Instead, the negative effect of high outgroup contact on non-immigrants' academic achievement seems rather to be a structural problem of unsuccessful integration, high levels of segregation, and specific problems or educational demands in schools with a particularly high ethnic composition. Phrased differently, diverse schools can be academically beneficial for everyone, including both immigrant and non-immigrant students, even though this association is less

straightforward for the latter group, where it requires an optimal level of mixing that does not undermine academic support, educational resources, and learning opportunities.

Limitations and Future Research Directions

The main limitation of the present study refers to its cross-sectional design, which prevents us from confirming the causal order of the examined key constructs. However, the present data support the hypothesized link from outgroup contact to academic achievement, given that total social network integration was unrelated to academic achievement and, particularly relevant for the examined immigrant models, findings are stable across different operationalizations of the outcome variable (i.e., language and cognitive test scores). Nonetheless, future longitudinal research is needed to confirm the temporal order of hypothesized effects, and to further explain this main relationship by testing mediating processes (see next paragraph) or facilitating antecedents (e.g., SES of immigrant students may reduce barriers for outgroup contact).

A second limitation of this research refers to the need to specify the actual mechanisms that underlie the academic benefit of students' outgroup contact. Although the applied social network approach advances this line of research by precisely assessing the amount of outgroup contact, this social network parameter does not elucidate the direct and indirect mechanisms provided by social capital, which are assumed to flow between the interrelated network members in the form of unique network resources. This level of analytic detail is difficult to realize in a large-scale study like this, but — but providing initial evidence regarding the general existence of this effect — future studies with other research methods (i.e., observation, experiments) can improve our understanding concerning the operating mechanisms responsible for the academic benefits of students' outgroup contact.

A final limitation of our research regards the focus on the classroom setting, which is only one of many social contexts that students experience. This network boundary is,

however, particularly relevant given that students spend the majority of their waking hours in the school, where they regularly come into contact with peers who have an influential impact on their attitudes, norms, beliefs, and behavior (Brechwald & Prinstein, 2011). Nonetheless, future studies should try to capture a more complete picture of students' intergroup contact by additionally considering other relevant settings of students (e.g., neighborhood, sport clubs).

To conclude, the present study advances the conceptual and empirical understanding of academic achievement as a positive side effect of intergroup contact for immigrant students and, until a certain tipping point that is a likely result of negative school characteristics and unfavorable mediating processes in general, also for non-immigrant students. Future research should now seek to provide a) longitudinal studies, which b) carefully assess the actual mechanisms that flow within the networks, in c) other relevant social contexts beyond the school class.

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Footnotes

¹We used one broad immigrant group because students from the main immigrant groups of the present study (i.e., Bosnia & Herzegovina, Iraq, Morocco, Poland, Russia, Serbia, Suriname, Turkey) can be considered to be similarly disadvantaged by facing comparable challenges in the course of integration into their respective host countries, regarding language, social status, or acculturation.

²Rasch modeling is a psychometric technique that improves the accuracy of analyzing raw test scores. Based on the item response theory, this approach models the likelihood for correctly answering an item as a function of a person parameter (individual's ability) and an item parameter (item difficulty), which are both estimated on a shared continuum representing the latent variable of interest (e.g., students' performance). In doing so, Rasch modeling translates raw test scores into a linear, equidistant, and thus more accurate performance scale.

³All social network nominations were symmetrized — a common transformation in social network analysis (cf., Wasserman & Faust, 1994) — which increases the amount of information substantially by treating in- and outdegrees equally as an undirected indicator of students' overall network embeddedness.

Tables

Table 1.

Descriptives and Intercorrelations of Individual Study Variables

GERMANY										
	1 Academic		2 Outgroup		3 Family		4 Cognitive		5 Social	
	Achievement		Contact		SES		Ability		Integration	
M (SD) Immigrants	471	(94)	-.20	(.65)	-.74	(1.03)	504	(83)	4.92	(1.95)
M (SD) \cap Immigrants	534	(91)	-.45	(.54)	-.14	(.85)	529	(84)	5.01	(1.91)
1			-.11		.35		.42		.04	
2	.29				-.11		-.08		-.02	
3	.37		.28				.22		.05	
4	.38		.17		.19				.01	
5	.07		.08		-.03		.03			
THE NETHERLANDS										
	1 Academic		2 Outgroup		3 Family		4 Cognitive		5 Social	
	Achievement		Contact		SES		Ability		Integration	
M (SD) Immigrants	459	(101)	-.14	(.79)	-.52	(1.16)	496	(105)	4.37	(1.83)
M (SD) \cap Immigrants	530	(88)	-.65	(.44)	-.03	(.76)	531	(88)	4.60	(1.82)
1			-.07		.18		.36		-.02	
2	.33				.05		-.05		-.04	
3	.27		.33				.13		.05	
4	.31		.14		.18				.01	
5	.00		.02		.02		-.01			

SWEDEN										
	1 Academic		2 Outgroup		3 Family		4 Cognitive		5 Social	
	Achievement		Contact		SES		Ability		Integration	
M (SD) Immigrants	467	(100)	-.29	(.69)	-.20	(1.20)	460	(116)	4.41	(1.97)
M (SD) \neg Immigrants	528	(88)	-.48	(.55)	.30	(.98)	496	(105)	4.52	(1.85)
1				-.07		.22		.49		.07
2		.27				-.03		-.03		-.01
3		.23		.22				.16		.09
4		.43		.15		.15				.09
5		.14		-.01		.07		.14		

Note. Correlations for immigrants below and for non-immigrants above the diagonal.

Table 2

Multilevel Prediction of Immigrant Students' Academic Achievement

	Germany			The Netherlands			Sweden		
	<i>B</i>	<i>p</i>	<i>SE</i>	<i>B</i>	<i>p</i>	<i>SE</i>	<i>B</i>	<i>p</i>	<i>SE</i>
<i>Level 1: Students</i>									
Outgroup Contact	8.67	*	2.57	14.25	*	4.90	13.39	*	2.93
Family SES	15.96	*	2.20	5.90		3.20	10.46	*	2.44
Cognitive Ability	18.78	*	1.99	14.97	*	3.22	33.25	*	2.05
First Generation ¹	-15.12	*	4.53	-19.22	*	6.33	-38.48	*	4.45
Sex ²	20.83	*	3.80	21.78	*	5.25	-12.96	*	3.95
Age	-7.05	*	2.02	-6.15	*	2.79	-0.93		2.10
Social Integration	2.71		1.92	-4.48		2.71	8.39	*	2.06
<i>Level 2: Classes</i>									
Outgroup Contact ^A	-1.96		2.38	-2.89		4.96	-4.80		2.74
Family SES ^A	33.23	*	3.30	36.47	*	6.22	5.83		3.40
Diversity	8.52	*	3.54	6.10		7.07	-5.64		3.71
ICC (Null Model)	.31			.32			.13		
L1-Variance (R)	74.65			81.53			82.67		
L2-Variance (U ₀)	16.90			29.22			16.47		

Note. ¹0 = 2nd generation immigrants and 1 = 1st generation immigrants; ²0 = girls and 1 = boys; ^Aaggregated scores;

two-tailed significance, * $p < 0.05$

Table 3.

Multilevel Prediction of Non-Immigrant Students' Academic Achievement

	Germany			The Netherlands			Sweden		
	<i>B</i>	<i>p</i>	<i>SE</i>	<i>B</i>	<i>p</i>	<i>SE</i>	<i>B</i>	<i>p</i>	<i>SE</i>
<i>Level 1: Students</i>									
Outgroup Contact	-0.56		2.34	-5.99 *		2.54	-2.21		2.43
Outgroup Contact ²	-3.69 *		1.42	1.03		1.19	-3.26 *		1.42
Family SES	10.56 *		1.82	3.27 *		1.61	9.81 *		1.73
Cognitive Ability	20.73 *		1.63	15.08 *		1.63	38.98 *		1.56
Sex ¹	23.53 *		2.97	12.28 *		2.97	-12.71 *		3.10
Age	-2.44		1.58	3.60 *		1.50	-1.02		1.55
Social Integration	-2.55		1.56	-4.48 *		1.56	2.23		1.63
<i>Level 2: Classes</i>									
Outgroup Contact ^A	-4.51		2.77	-1.10		3.45	-1.80		2.21
Family SES ^A	34.82 *		3.09	26.94 *		3.20	8.42 *		2.10
Diversity	13.76 *		3.04	2.13		2.95	4.40		2.35
ICC (Null Model)	.33			.33			.10		
L1-Variance (R)	70.85			71.01			73.65		
L2-Variance (U ₀)	23.39			33.44			14.02		

Note. ¹0 = girls and 1 = boys; ^Aaggregated scores;

two-tailed significance, * $p < 0.05$

Figures

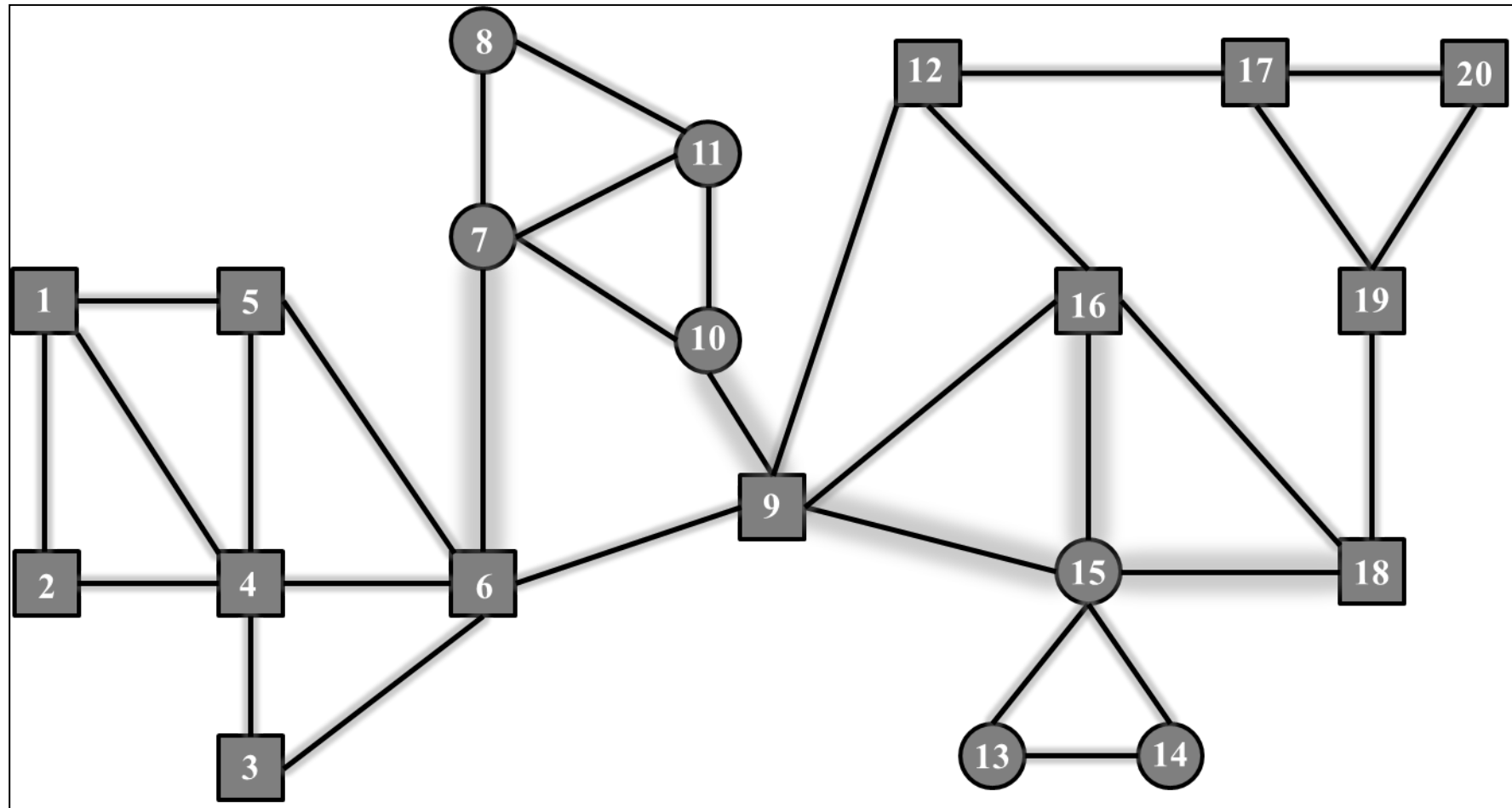


Figure 1. Sample Social Network of a School Class