

Navigating Diversity: A Social Network Perspective on Ethnic Relations in the School Context

Inauguraldissertation

zur

Erlangung des Doktorgrades

der

Wirtschafts- und Sozialwissenschaftlichen Fakultät

der

Universität zu Köln

2025

vorgelegt

von

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Tag der Promotion: 14.04.2026

Acknowledgments

First of all, I would like to thank my supervisor, Clemens Kroneberg, for his supportive guidance and comprehensive feedback throughout this project. As both a supervisor and an employer, his trusting, development-oriented, and constructive approach has been immensely valuable and inspiring. It has been a privilege to be part of his team and to learn from his expertise.

My sincere thanks also go to my colleagues from the research projects in which I participated: the FUGJ team, André Ernst and Maria Gerth, the SOCIALBOND team, Hanno Kruse, Heike Krüger, Sven Lenkewitz, Agnes Tarnowski, and Mark Wittek as well as my colleagues from the project Religion, Religiosity, and the Social-Emotional Integration of Muslim Youth — Lars Leszczensky and David Kretschmer. I greatly valued our teamwork, professional exchange, and mutual support.

I am also grateful to my colleagues at the Department of Sociology and Social Psychology. After the pandemic, it was a joy to return and find such kind and collegial people there. Special thanks go to my officemate, Fabian Hasselhorn, who was great company during the final stretch.

Many colleagues and friends supported me with valuable suggestions, feedback, and motivation. I am especially grateful to Mark Wittek and Heike Krüger for their essential support and feedback at several stages of this work. My sincere gratitude goes to Patrick Mayer and Karoline Mikus, my long-time friends from my bachelor's degree in sociology at the University of Mannheim, for their constant companionship, motivation, and professional feedback.

At this point, I would also like to thank my co-authors, Clemens Kroneberg, Mark Wittek, David Kretschmer, and Lars Leszczensky. Our collaboration has been greatly beneficial to me, and I have learned a lot through it. I would also like to highlight the acknowledgements for Study 1 and Study 2, which are included in the respective chapters as they appeared in the published articles.

My thanks also go to the First-Generation Doctorate Mentoring+ program, in particular to my mentor Andrea Löther, for her valuable perspectives and support.

Finally, I am deeply grateful to my parents for enabling me to attend Gymnasium and pursue higher education.

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1 Introduction

As in other Western European societies, immigration has transformed the ethnic, religious, and cultural composition of German society over the past few decades (e.g., Lochner and Jähnert 2020; Pew Research Center 2017; Pfündel, Stichs, and Tanis 2021). Since 1945, Germany has experienced more immigration than any other European country (Haas, Castles, and Miller 2020:309), with diverse migration inflows varying by country of origin, reason and period of immigration. Major immigrant groups include labour migrants from Turkey and Southern Europe in the 1950s until the economic downturn in 1973; ethnic Germans from Central and Eastern Europe and Central Asia in the late 1980s; and refugees and asylum seekers from former Yugoslavia in the late 1990s, from Syria, Afghanistan and Iraq in 2015-2017, and most recently also from Ukraine. The EU's eastern enlargement in 2004 and 2007 has also resulted in significant immigration from Eastern European countries (Lochner 2020:15–32; OECD 2024). Ongoing immigration from predominantly non-Christian regions further contributes to religious and cultural diversity in Germany, which is a key destination for Muslim refugees in Europe (Pew Research Center 2017; Pfündel et al. 2021:192). In 2019, according to estimates from the Federal Office for Migration and Refugees, Muslims comprised 6.4 to 6.7 per cent of Germany's population (Pfündel et al. 2021:37). Due to its younger demographics and higher fertility rates compared to the overall German population, Germany's Muslim population is projected to continue growing, even in the absence of additional immigration (Pew Research Center 2017; Pfündel et al. 2021:49–50). As a result of these developments, a significant proportion of Germany's younger population has a migration background (Federal Ministry of the Interior, Building and Community/Federal Office for Migration and Refugees (BMI/BAMF) 2019:194,198). In 2017, more than one-third (35.7%) of individuals under 20 had a migration background, most of whom were born in Germany as children or grandchildren of immigrants (Federal Statistical Office (Destatis) 2018:61; percentage calculated by the author)¹. Consequently, social contexts in Germany – especially those where young people meet, such as schools – have become more diverse.

¹ Notably, the composition of first, second, and third-generation individuals within the population with a migration background may have changed due to the influx of refugees following the Ukraine-Russia war, which began in 2022. As the data used in this dissertation were collected between autumn/winter 2013 and autumn/winter 2018/19, the statistics presented here refer to the years 2017 and 2019, which capture the relevant demographic and societal context corresponding to the period when the data was collected.

Against this background, a central political concern in Germany is integrating this diversity to foster social cohesion and societal resilience while preventing segmentation and polarisation between cultural, ethnic and religious groups. These integration objectives apply not only to the society as a whole but also to smaller social contexts, particularly schools, which are often diverse microcosms where integration processes unfold (e.g., Kroneberg 2022; Wölfer, Hewstone, and Jaspers 2018). Although most young people with a migration background are born in Germany, their cultural traits, values, and norms are often influenced by the culture of their family's country of origin, transmitted to them through primary socialisation by parents and relatives (e.g., Carol 2014; Kogan 2018; Simsek et al. 2018; Smith, Maas, and van Tubergen 2014b). Consequently, schools with ethno-religiously diverse student bodies are microcosms of varying norms and cultural practices, where students regularly encounter peers from different ethno-religious backgrounds, requiring them to navigate cultural diversity in their school-based social life.

One essential component of integration is the formation of positive social relations between members of different social groups. Research has shown that close, positive intergroup relationships, such as friendships between individuals of different ethnic origins, effectively foster social cohesion, build trust and reduce outgroup prejudice and stereotypes (Allport 1954; Crocetti et al. 2021; Davies et al. 2011; Tropp et al. 2022). Additionally, such relationships contribute to the cultural integration of immigrants by enhancing their knowledge of relevant cultural practices, codes, and norms, as well as host-country language acquisition (Kornienko and Rivas-Drake 2022; Moyer 2008). Contact between different cultural groups is also fundamental to negotiating and communicating cultural differences (Schwarzenthal et al. 2019; Vietze, Juang, and Schachner 2019). However, cultural factors may also act as barriers to positive intergroup relationships. Differences in values and behaviours increase the likelihood of friendship dissolution (Jugert and Leszczensky 2024; Laursen 2017). Additionally, social group norms may explicitly disapprove of close relationships outside the group while prescribing ingroup relationships, such as endogamy norms in some religions that require marriage within one's religious group (Carol 2014; Esser 1990:189). Thus, while intergroup contact can promote the integration of cultural differences, cultural aspects can influence the formation of such relationships in the first place.

Scholars of integration and intergroup contact have repeatedly studied the peer relations of adolescents in the school context. The focus on adolescents is reasonable due to the relevance of this age group for societal integration. Research has found that intergroup friendships formed

early in life are particularly effective in reducing prejudice and increasing the likelihood of intergroup contact in later life (Stearns, Buchmann, and Bonneau 2009; Tropp et al. 2022; Wölfer et al. 2016). Intergroup relationships between ethnic minority and majority adolescents can also provide access to relevant skills and information that foster the economic and social mobility of ethnic minority members (Kornienko and Rivas-Drake 2022). Additionally, schools are ideal settings for studying the role of cultural, ethnic, and religious factors in relationship formation, as they are the social environments where adolescents of diverse ethnic backgrounds regularly meet and have routine, first-hand contact (e.g., Wimmer 2013; Wölfer et al. 2018). However, despite having opportunities for social mixing, empirical studies have repeatedly documented ethnic and religious segregation with students predominantly befriending peers of the same ethnicity or religion (Kalter and Kruse 2015; Leszczensky and Pink 2015, 2017; Simsek, van Tubergen, and Fleischmann 2022; Smith, Maas, and van Tubergen 2014a; Windzio and Wingens 2014; Wittek et al. 2022; Zhao 2023). In addition to this segregation pattern in social relations, research has found persistent cultural differences between ethnic minority and majority youth across immigrant generations (e.g., Jacob and Kalter 2013; Kogan 2018; Simsek et al. 2018). In Europe, including Germany, a particularly significant social and cultural divide has been observed between non-Muslims and Muslims (e.g., Drouhot and Nee 2019; Leszczensky and Pink 2017; Simsek et al. 2022).

Notwithstanding the growing research on intergroup relationships in schools, important questions about the integration processes remain, particularly on the role of cultural aspects in intergroup relationship formation. To address these questions, an essential analytical tool of this dissertation is the social network perspective, using comprehensive social network data on the social relations and relational structures of entire school grades, as well as the application of network-analytical methods. The network perspective will be complemented with an ecological perspective that frames adolescents' ethnic peer relations in school as embedded within a broader social ecology of multiple social contexts, cultural influences and ethno-religious group norms. Combining these perspectives creates new analytical possibilities to examine the interplay between social and cultural dimensions of integration among adolescents in educational settings. This approach enables the evaluation of previous research and provides new insights into the integration process.

The present dissertation addresses three gaps in current scientific knowledge regarding the interplay between the social and cultural dimensions of adolescent integration. Addressing

these gaps is not only of scholarly relevance but also of political significance, as they touch upon ongoing public and political debates linking cultural differences and disintegration:

First, against the backdrop of ominous depictions of ethnic segregation in friendship networks as an indicator of intergroup conflict, the initial study (Study 1, Chapter 2) will investigate how ethnic origin influences positive and negative relationships among students in the school context. Previous research commonly assumes that a lack of positive inter-ethnic relationships in a diverse social context is a symptom or cause of ingroup favouritism, threat perceptions, inter-ethnic hostility and even active violence (e.g., Boda and Néray 2015; Kawabata and Crick 2011; Smith et al. 2016; Walsh et al. 2016). However, previous research did not have the appropriate data to test these assumptions, which requires social network data on both positive and negative relationships among the same set of actors in a given context, as well as information on the ethnic origins of both perpetrators and victims. Against this background, the first study uses large-scale data containing complete social network information on positive and negative relationships from entire seventh grades across 39 secondary schools in Germany to investigate the role of ethnic background in friendship, dislike, and violence relations among students in the school context.

Second, perspectives differ regarding the beneficial or detrimental implications of intercultural contact. While much integration research has focused on beneficial outcomes, including enhanced mental wellbeing, engaging with peers from different cultural backgrounds can also present challenges. Navigating diverse norms and practices may prove psychologically demanding and stressful for individuals (e.g., Berry 2005; Sam and Berry 2010). Literature furthermore indicates that a particular contact structure, where individuals occupy brokerage positions and are intermediaries between different ethnic groups, produces particular psychological stress (Carboni and Gilman 2012; Goode 1960; Krackhardt 1999; Merton 1968; Mollenhorst, Edling, and Rydgren 2015). That said, previous research often lacks appropriate data to examine such complex inter-ethnic contact structures and their psychological implications for individuals. Using data on friendship network structures of over 2,700 German secondary school students across 39 schools, the second study (Study 2, Chapter 3) will focus on *ethnic brokerage* structures, defined as having friends of different ethnic backgrounds who are not friends with each other. The study investigates the relationship between ethnic brokerage and individual mental wellbeing, and whether this relationship differs between ethnic minority and majority students.

Third, there is both scholarly and societal debate on cultural barriers to the integration of Muslim immigrants and their children. Despite opportunities for interreligious friendships in religiously diverse schools, research has found that friendships between non-Muslims and Muslims tend to be segregated in these settings (e.g., Leszczensky and Pink 2017; Simsek et al. 2022; Windzio and Wingens 2014). Furthermore, prior studies have documented that cultural differences between Muslims and non-Muslims regarding religiosity, gender roles and sexual liberalism tend to persist across immigrant generations (e.g., Jacob and Kalter 2013; Kogan 2018; Kogan and Weißmann 2020; Kretschmer 2018; Simsek et al. 2018). These cultural differences, often attributed to the intergenerational transmission of more conservative attitudes and norms by ethnic minority parents, can complicate friendships with outgroup peers for Muslim adolescents (Carol 2014; Kogan 2018), particularly for Muslim girls (e.g., Saharso et al. 2023; Talbani and Hasanali 2000). While both Muslim and non-Muslim youth predominantly befriend peers of the same religious affiliation, recent research has shown a significant gender² difference among Muslim youth, with Muslim girls displaying a more substantial ingroup bias than boys (Kretschmer and Leszczensky 2022). This gender gap was found to be minimal in childhood but became pronounced during adolescence (Kretschmer and Leszczensky 2023). Scholars have suggested that religious norms targeting romantic relationships, such as endogamy norms, contribute to this gender gap (Carol 2014; Kretschmer and Leszczensky 2022). However, little is known about *how* these cultural aspects produce this gendered pattern in interreligious friendship formation among Muslims in adolescence. The third study (Study 3, Chapter 4) addresses this knowledge gap. Using German longitudinal social network data from 737 Muslim youths aged 11-17, it examines different channels, including individual religiosity, parental control, leisure time activities and discrimination by non-Muslims through which these norms might shape a gender gap in interreligious friendships from childhood to late adolescence.

This dissertation explores the interplay between cultural and social dimensions of integration by emphasising the role of social networks and their embeddedness in a broader sociocultural context. This approach offers novel perspectives on intergroup relations and integration

² The terms “gender” and “sex” are used interchangeably to refer to the binary distinction between “female” and “male”. All the data used in this dissertation came from surveys (see Table 1.1) that asked students to self-report whether they were a “girl” or a “boy”, with no additional answer options or explanations provided. I cannot determine whether students were referring to their biological sex, their gender identity, or both.

processes as it identifies and overcomes shortcomings in prior research. This dissertation leverages three comprehensive school-based datasets that provide information on adolescents' characteristics and complete social network data to analyse the social relations and their structure among students of different ethno-religious backgrounds in school.

In the following parts of the introduction, I will first provide a theoretical background on integration and describe the empirical evidence on the social and cultural integration of adolescents in German secondary schools (Chapter 1.1). I will then outline three gaps in previous research on the interplay between social and cultural dimensions of integration, each of which motivates one of the three studies in this dissertation (Chapter 1.2). Next, I will introduce the specific analytical approach employed in this dissertation to advance previous research, which combines a social network perspective with an ecological perspective (Chapter 1.3). In the following, I will integrate the previous considerations and present the general framework of the dissertation, positioning each study within this framework (Chapter 1.4). At the end of the introduction chapter, I will summarise the three studies and describe my contributions to each (Chapter 1.5). The subsequent chapters present each of the three studies in full (Chapters 2-4). A general discussion follows (Chapter 5), in which I delineate the broader insights and new perspectives generated by this dissertation's findings, identify and critically examine theoretical and methodological limitations, critically reflect on the analytical approaches used, and suggest directions for future research. Finally, I will demonstrate how the insights gained can inform the practical efforts of schools to promote and understand integration processes among their students. In my concluding remarks, I will share broader reflections on the findings of this dissertation for intergroup relations and integration, as well as for integration research.

1.1 Theoretical background and empirical evidence on integration

1.1.1 Integration in multi-ethnic societies and the interplay between the social and cultural dimensions of integration

Integration research commonly distinguishes three dimensions of integration – the cultural, the social and the structural dimension – which describe how actors and groups of actors integrate into a social system³ (Drouhot and Nee 2019:178; Esser 2000:271, 2001:3; Fajth and Lessard-

³ This understanding of integration corresponds to the concept of “social integration” as used by Esser (2000, 2001), following Lockwood (1964), which is not to be confused with the social dimension of integration. To avoid confusion, the term "social integration" in this dissertation refers exclusively to

Phillips 2023; Heath and Schneider 2021; Jonsson, Kalter, and van Tubergen 2018:6–7; Kalter 2022:137; van Tubergen 2020:377–79). These three dimensions can broadly be characterised as follows, whereby the particular aspects and subdimensions considered in research vary (for a review, see Fajth and Lessard-Phillips 2023):

- The *cultural* dimension refers to cultural competencies such as language but also to cultural norms, values and corresponding practices (e.g., Esser 2001:8–9; Fajth and Lessard-Phillips 2023:190–91; Heath and Schneider 2021:7; Kalter 2022:137; van Tubergen 2020:378).
- The *social* dimension refers to personal relationships between individuals, such as friendships and partnerships, as well as the relational structures that individuals establish through these relationships (e.g., Esser 2001:10–12; Kalter 2022:137; van Tubergen 2020:378). It also refers to the resources these social networks provide, such as information about the education system or social support (e.g., Berkman et al. 2000; Esser 2000:274; Kalter 2022:137; Thoits 2011).⁴
- The *structural* dimension refers to the allocation of socioeconomic resources and positions within a society, such as in the labour market or the education system (e.g., Esser 2000:273–74, 2001:9–10; Heath and Schneider 2021:7; Kalter 2022:137; van Tubergen 2020:378). Importantly, this also determines the social opportunities for establishing and maintaining relationships with other members of the social system.

These three dimensions condition each other. Previous integration research has focused on the structural dimension as it provides key resources for many areas of life (e.g., Esser 2000:271). This dimension also facilitates social and cultural integration by creating opportunities for individuals from diverse cultural backgrounds to form and sustain intergroup relationships (Esser 2000:271–74, 2001:73; Fajth and Lessard-Phillips 2023:197). However, less attention has been given to the social and cultural dimensions of integration and their interplay in particular (Jonsson et al. 2018; Kalter 2022), although these dimensions critically influence progress in structural integration. Intergroup relationships can provide valuable instrumental and informational support (Kornienko and Rivas-Drake 2022), which in turn can impact

the social dimension of integration, specifically the personal relationships between individuals of different ethnio-religious groups.

⁴ Notably, the social dimension may also refer to group-related aspects such as intergroup attitudes and trust (Drouhot and Nee 2019:179; Fajth and Lessard-Phillips 2023:192–93; van Tubergen 2020:378).

educational decisions and awareness of job opportunities. Additionally, specific cultural knowledge and competencies are necessary to attain valued positions in society (Esser 2001:272–73).

The social and cultural dimensions of integration are closely intertwined. On the one hand, cultural aspects condition interaction and intergroup relations, as social interaction and the formation of intimate relationships depend on the cultural repertoire of individuals. This repertoire refers to skills essential for communication, such as language, but also to the norms and values that interaction partners hold. Shared values and norms can facilitate the formation and maintenance of close relationships, such as friendships across groups (Esser 1990:189; Jugert and Leszczensky 2024; Laursen 2017; Lazarsfeld and Merton 1954:30; McPherson, Smith-Lovin, and Cook 2001). Dissimilarities in values and norms, as well as sociocultural barriers, such as endogamy norms or stigmatisation of outgroups, can impede the formation and maintenance of these relationships (Drouhot and Nee 2019; Esser 1990:189; Laursen 2017). On the other hand, social interaction and intergroup relationships influence cultural integration, as interaction with others can facilitate the acquisition of cultural knowledge and competencies (Esser 2000:274). Furthermore, significant relationships such as friendships can promote the formation of shared values and resolve value discrepancies between individuals (Esser 1990:190; Lazarsfeld and Merton 1954:33). Given the close intertwining between the social and cultural dimensions of integration, research on integration that focuses on social relations in culturally diverse contexts should devote greater attention to their interplay.

There are different theoretical perspectives on how individuals and groups are integrated into a social system in general, and on how social and cultural dimensions interact within the integration process in particular. Firstly, the assimilationist perspective posits that ethnic minority groups will, over time and across generations, assimilate into the host society's mainstream by adopting the practices, norms and values of the (native) majority population (Esser 2001:74; Gordon 1964; Jonsson et al. 2018:12; Kalter 2022:138–39). Through exposure and contact opportunities, social relationships between ethnic minority groups and the native majority will form. Social mixing, in turn, will facilitate the cultural assimilation of ethnic minorities towards the mainstream culture and promote their disengagement from their original culture (Esser 2000, 2001; Jonsson et al. 2018:12). More recent assimilation theories emphasise that this process is not one-sided, meaning that immigrants assimilate into the native host society. Rather, it is a multisided convergence process through which markers of difference between cultural groups decline (Alba and Nee 2003; Drouhot and Nee 2019:179). Secondly,

by contrast, multiculturalist and pluralistic approaches are based on the idea that cultural differences between groups can coexist and be integral parts of the larger society. While different cultural groups value and preserve their cultural heritage, they also appreciate social interactions with other cultural groups and participation in the broader society. These approaches understand integration as an interactive process between diverse sociocultural groups (Berry 1997:9–10; Pries 2015:15, 23–27). The interplay between social interaction and cultural aspects is central to multicultural and pluralist approaches. They conceive integration as a negotiation process between singular actors and sociocultural groups. In multicultural societies, individual actors and cultural groups have to deal with the cultural differences of each other and decide on the extent to which they interact with each other and adopt each other's language, values, cultural practices and behaviours (Pries 2015:25; Sam and Berry 2010).⁵

1.1.2 Empirical evidence on the social and cultural integration of adolescents in German secondary schools

Research on integration has revealed a general trend of intergenerational assimilation across the structural, social, and cultural dimensions of integration in Germany, as in other Western societies. At the same time, empirical evidence points to specific challenges and persistent divides in the social and cultural dimensions of integration (Drouhot and Nee 2019; Jonsson et al. 2018), painting a more complex picture of the integration process than is suggested by both assimilationist and multiculturalist theoretical perspectives.

On the structural dimension, adolescents in Germany, including immigrants and children of immigrants, are integrated through compulsory school attendance. Schools are formal organisations where adolescents routinely interact and spend a significant amount of their time.

⁵ Throughout this dissertation, I treat ethnic and religious groups as social groups with tendencies towards certain cultural characteristics that their members tend to share, often shaped by similar socialisation experiences (Polavieja 2015:170). This approach aligns with the main theoretical perspectives in immigration studies, including assimilationist and multiculturalist perspectives. Accordingly, individuals of ethnic origin A differ, on average, in their cultural values, norms and practices from individuals of ethnic origin B (van Tubergen 2020:378). This assumption also applies to children of immigrants with different ethnic origins, as parents and ethno-religious communities transmit the norms and values of their country of origin or religion to their children through primary socialisation (Jonsson, Kalter, and van Tubergen 2018; Kalmijn and Kraaykamp 2018; Kretschmer 2018). However, I do not negate intra-group variance, as previous research has cautioned against pre-assuming cultural similarity of individuals with the same ethnic origin (Brubaker 2002; Wimmer 2013). This within-group diversity suggests that adopting specific cultural beliefs and their relevance for social relations can vary across individuals. In turn, an individual's social network position will affect exposure to peers of different backgrounds and beliefs.

Given Germany's increasingly diverse young population, many schools are ethnically, culturally, and religiously mixed environments. These shared interaction spaces (Small 2017:156) thus provide opportunities to interact with adolescents of diverse cultural backgrounds and are key contexts for intergroup mixing (Wölfer et al. 2018).⁶ On the social dimension, however, empirical research has repeatedly found that students' friendships tend to be segregated along ethnic and religious lines in Germany – at least to some extent – a pattern also discovered in other European countries. Despite structural integration and opportunities for intergroup relations in ethnically and religiously diverse schools, prior studies have repeatedly observed that friendships between students of the same ethnic origin tend to be more common than friendships between students of different ethnic backgrounds (Kalter and Kruse 2015; Leszczensky and Pink 2015; Smith et al. 2014a; Wittek et al. 2022; Zhao 2023). The same applies to religious affiliation, whereby prior research has documented that the social divide between Muslims and non-Muslims is particularly pronounced (Leszczensky and Pink 2017; Simsek et al. 2022; Windzio and Wiggins 2014). On the cultural dimension, integration research in Germany and other European countries has reported assimilation tendencies and growing similarities between majority and minority youth in certain aspects, but also slow intergenerational change and persistent gaps in other aspects of this dimension. For instance, researchers have found that the German language skills of ethnic minority children and adolescents become increasingly similar to those of the native German majority across generations, although this process varies by ethnic origin group (Dollmann, Rudolphi, and Parameshwaran 2018; Drouhot and Nee 2019:185). Proficiency in the German language is a crucial prerequisite for both structural and social integration. However, prior research has found no clear assimilation trend with regard to other cultural aspects that are less functional for structural integration, such as norms, values, and aspects related to religion and religiosity (Drouhot and Nee 2019; Jacob and Kalter 2013; Kogan 2018; Kogan and Weißmann 2020; Kretschmer 2018; Ng 2022a; Simsek et al. 2018).

Kogan (2018), using data from the Children of Immigrants Longitudinal Survey in Four European Countries (CILS4EU; Kalter, Kogan, and Dollmann 2019), examined the cultural

⁶ Of course, the relative numbers of minority and majority ethno-religious students, as well as the levels of diversity in schools, vary. Factors such as residential segregation and ethnically segregated parental networks can affect schools' ethno-religious composition, thereby contributing to ethnic segregation and limiting opportunities for intergroup contact within educational settings (Kroneberg 2022; Kruse 2017; Mouw and Entwisle 2006; Windzio 2015).

integration of adolescents in Germany and three other European countries. The study focused on sexual liberalisation values, such as openness to premarital cohabitation, abortion and homosexuality. It revealed enduring discrepancies between youth with immigrant background and their native-born majority peers, whereby minority youth tended to be more conservative than their native-born majority peers. The greatest difference was evident for descendants of immigrants from the Middle East, Northern Africa and South-East Asia. Notably, the majority-minority gap appears to be rather persistent, as no significant differences between first- and second-generation minority youth in sexual liberalisation values were evident, suggesting that cultural change towards more liberal values might be a slow and lengthy process. Moreover, the study found that religiosity was generally connected with more conservative attitudes among adolescents and also found strong evidence for intergenerational transmission of conservative attitudes between parents and children, particularly in highly religious families. In the German sample, Muslims proved to be significantly more conservative, even after taking into account their country of origin, sociodemographic characteristics and religiosity. Relatedly, Simsek et al. (2018) examined cultural integration by focusing on religion and religiosity among both majority and minority youth, using the same dataset. They found that minority youth were more often affiliated with a religion than majority youth. Concerning religiosity, their findings indicate that Muslim minority youth are significantly more religious than Christian minority and majority youth. Also investigating intergenerational change, this study documented a general decline in the importance of religion between parents and their children. This intergenerational decline, though, was less pronounced among minority youth, particularly Muslim youth, among whom considerable intergenerational stability was evident, a pattern that corresponds to the findings of other studies (Simsek et al. 2018; see also Drouhot and Nee 2019; Guveli and Platt 2023; Jacob and Kalter 2013).

Taken together, these empirical insights suggest that, despite structural integration and opportunities for interaction and relationship formation with individuals from diverse ethno-religious groups, significant barriers to adolescents' social and cultural integration persist. Relational divides and cultural differences exist between members of different ethnic and religious groups, in particular between ethno-religious minority youths and members of the native majority, and remain across generations. This overall empirical pattern contradicts assimilationist perspectives, which assume that, given structural integration, personal relationships between members of different groups will develop over time and through exposure, and that cultural differences will dissolve almost automatically, either by the

assimilation of ethnic minority groups into the majority or by multisided convergence processes. At the same time, it also deviates from a multicultural and interactionist perspective on integration, which maintains that social mixing and close intercultural personal relationships should occur while cultural differences can remain when people of different cultural backgrounds come into contact. This inconclusiveness calls for a closer focus on the interplay of social and cultural dimensions of integration than has been done in previous integration research.

This dissertation will contribute to this task by exploring how adolescents navigate cultural differences in their social lives in school, focusing on how cultural aspects shape their relationships with peers and how adolescents handle cultural differences within their social networks. Gaining insights into these sociocultural dynamics of integration is crucial for a more comprehensive understanding of the integration of different ethno-religious groups. Such insights will also help to qualify previous research assumptions about the integration process.

Specifically, this dissertation will address three key gaps in scientific knowledge on the interplay between social integration and cultural diversity. In the following (Chapter 1.2), I will outline these gaps, each of which is the subject of a study in this dissertation. Two things will become evident: the need for a more nuanced and comprehensive analytical approach to integration processes among adolescents in school, and the need to rigorously test previous assumptions with appropriate data and methods, which also allow for the development of new explanatory mechanisms. In the subsequent chapter (Chapter 1.3), I will outline the analytical approach used in this dissertation to tackle these tasks: a social network perspective that includes sociometric data and network analysis methods, complemented by an ecological perspective on the social integration of adolescents in school.

1.2 Three gaps in knowledge on the interplay between social and cultural dimensions of integration

1.2.1 The interplay between social and cultural integration: Is this interplay connected to frictions among students of different ethnic backgrounds? (Study 1)

Research on peer relations in educational settings has long recognised the significance of ethnicity in shaping peer relationships. Previous studies have focused on positive interactions, particularly friendships, and have repeatedly shown that these relationships tend to be segregated along ethnic lines. The pattern of ethnic segregation in positive relations also holds after considering the structural opportunities to meet peers from other ethnic backgrounds and

controlling for general relational mechanisms that indirectly contribute to ethnic segregation of friendships in a social setting (e.g., Kalter and Kruse 2015; Smith et al. 2016; Wittek et al. 2022). Network studies in educational settings have frequently documented at least some degree of this net ethnic segregation in friendship networks, commonly considered as evidence for ethnic homophily (e.g., Baerveldt et al. 2004; Kalter and Kruse 2015; Leszczensky and Pink 2015; Leszczensky and Stark 2020; Moody 2001; Mouw and Entwisle 2006; Smith et al. 2016, 2014a; Windzio and Bicer 2013). Homophily describes the social-psychological preference to befriend individuals who are similar to oneself (e.g., Laursen 2017; McPherson et al. 2001; Wimmer and Lewis 2010), which can be based on cultural traits such as norms, practices and experiences (e.g., Lazarsfeld and Merton 1954). Similarity is attractive because it facilitates interaction and communication, and also promotes mutual understanding and solidarity (e.g., Jugert and Leszczensky 2024; Kossinets and Watts 2009; Laursen 2017). Ethnic homophily – the preference to befriend co-ethnics rather than ethnic outgroup members – thus contributes to the degree of ethnic segregation in students' positive social relations.

What does this imply for the integration of ethnic groups? Research on integration and intergroup relations has argued that certain ethnic compositions, ethnic segregation and homophily in friendship relations in schools are linked to *adverse* pathways of integration processes, frictions and even violent interactions between ethnic groups (e.g., Agirdag et al. 2011; Boda and Néray 2015; Durkin et al. 2012; Kawabata and Crick 2011; Smith et al. 2016; Thijs and Verkuyten 2014; Vervoort, Scholte, and Overbeek 2010; Walsh et al. 2016). Ethnic segregation and homophily in friendships among students may reflect or contribute to a hostile intergroup climate, bearing the potential for conflicts and aggression between students of different ethnic backgrounds in school.

As already delineated by Kroneberg (2022:77), these assumptions are based on socio-psychological and sociological theories on integration and conflict: Contact theory suggests that a lack of positive intergroup contact is detrimental, as such contacts are crucial for reducing prejudice and promoting positive intergroup relations. Friendship across ethnic groups is even considered helpful in reducing or preventing conflict between ethnic groups (e.g., Al Ramiah and Hewstone 2013:537; Allport 1954; Hewstone 2009; Tropp et al. 2022). Social identity theory (Tajfel and Turner 1979) or integrated threat theory (Stephan and Stephan 2000) posit that exposure and interaction with members of ethnic outgroups can give rise to social comparisons and competition. These mechanisms, in turn, can harm intergroup relations as

they may lead to ingroup favouritism, derogation of outgroups, discrimination, and potentially intergroup aggression and victimisation.

Previous research has suggested that a lack of positive inter-ethnic relationships may be associated with higher levels of inter-ethnic conflict in social contexts. Even so, this linkage has rarely been rigorously tested empirically. To start with, much previous research on ethnic peer victimisation often lacks the appropriate data and measurements to distinguish between inter- and intra-ethnic peer conflicts. For example, the studies by Walsh et al. (2016) and Vervoort, Scholte, and Overbeek (2010) found that higher percentages of ethnic minorities in schools correlated with increased victimisation, physical fighting and bullying. The authors of both studies attributed their findings in part to intergroup tensions rooted in status differences and competition between ethnic groups. However, based on the data and methods they used, they cannot differentiate whether these conflicts occurred between or within ethnic groups. To illustrate, Walsh et al. (2016) relied on conventional survey data, including measures of general prevalence, asking students, 'During the past 12 months, how many times were you involved in a physical fight?' (Walsh et al. 2016:5). Moreover, while Vervoort et al. (2010) went beyond self-reports by using peer nominations, they still relied on aggregate peer assessments. They asked students to nominate "Which classmates are being bullied by other classmates?" (Vervoort et al. 2010:4). Yet, to better understand the role of ethnicity in peer conflicts, the ethnic origin of the perpetrator *and* the victim of that negative interaction must be identifiable. As a result, previous peer victimisation research falls short in answering the question of 'who fights with whom' and the role that the ethnicity of both interaction partners plays in this interaction.

In addition, Walsh et al. (2016) and Vervoort et al. (2010) have suggested a positive association between the level of intergroup tensions and the extent of ethnic segregation in positive relations or ethnic homophily and have proposed that positive inter-ethnic contact may mitigate these dynamics (Vervoort et al. 2010:9; Walsh et al. 2016:10-11,13). Similarly, Smith et al. (2016), who examined ethnic friendship segregation and ethnic composition in schools, have argued that ethnic homophily in friendships may be indicative of inter-ethnic threat perceptions and competitive climates in ethnically diverse schools (Smith et al. 2016:1229–35). Nevertheless, none of these studies tested the whole argument, requiring information on positive *and* negative peer relationships among students and how these are related to each other.

Network data from social network surveys can illuminate how ethnicity shapes positive and negative relations between students, as it can identify the ethnic origin of both interaction partners and differentiate inter- and intra-ethnic relationships (as described in more detail in Chapter 1.3.2 on the social network perspective). Yet, in contrast to research on positive relationships, network research on negative relationships is generally rare. Previous network studies on negative peer relations in educational settings have yielded inconclusive results about the role of ethnicity. Using network data, Boda and Néray (2015) found a tendency toward ethnic heterophobia between Roma and non-Roma students in terms of dislike and hate in a sample of Hungarian secondary schools. At the same time, Kisfalusi et al. (2018), using the same dataset, observed a relative tendency toward *intra*-group bullying when considering ethnic perceptions: both Roma and non-Roma students were more likely to bully peers they perceived as Roma compared to those they perceived as non-Roma. Additionally, Tolsma et al. (2013) reported no clear tendency toward inter-ethnic bullying in a study of Dutch primary schools, while they found that bullying across and within one's own ethnic group increased with the level of ethnic diversity. Using panel data on negative networks in Dutch high schools, Kros, Jaspers, and van Zalk (2021) found no evidence that avoidance, antipathy and aggression are more likely to be inter-ethnic than intra-ethnic among students.

To shed light on assumptions about ethnic segregation and homophily in friendships and their potential detrimental implications for ethnic intergroup relations, it is essential to examine the role of ethnicity in both positive and negative relationships, as well as their interrelation. Recent descriptive research by Bracegirdle, Jonsson, and Spiegler (2023) raises doubts about whether ethnic segregation in friendship networks is linked to inter-ethnic conflict. The authors analysed data from 981 students (aged 11–14) in the sixth, seventh, and eighth grades in two British schools, comparing the degree of ethnic segregation in friendship *and* bullying networks. They observed similarly high levels of segregation in both networks and concluded that students may simultaneously avoid both positive *and* negative inter-ethnic interactions. However, their analyses of ethnic segregation in friendship and bullying networks were descriptive. Without adequate analytical methods that can control for relevant intertwined mechanisms, such as students' opportunities to form same-ethnic relations in schools or general relational mechanisms such as the tendency to reciprocate relations, their study cannot assess ethnic homophily in friendship or ethnic heterophobia in bullying networks. Nor could Bracegirdle et al. (2023) have assessed how ethnic segregation in friendship and in bullying networks are related using the data and analytical approach they employed. Such an assessment

would require analytical methods capable of examining how these variables co-vary across school networks, which would also have required a larger number of (school) networks in the analysis sample. (For more details on the advantages of network analysis methods, see Chapter 1.3.2).

The inconclusiveness of existing findings cautions against overly alarming interpretations of ethnic segregation and homophily in friendships. To address this puzzle, insights from network science and adolescent research suggest that a closer look at the nature and interrelatedness of positive and negative interactions in adolescents' social lives might be fruitful. Literature indicates that friendships and negative relations condition each other, but this varies, depending on whether the negative relation is an affective cognition or an actual interaction and behaviour. Dislike could be classified as a negative affective, relational cognition (Borgatti, Everett, and Johnson 2013:4). As friendship is characterised by mutual affection and liking, antipathies such as dislike should be rare among friends (Bukowski, Motzoi, and Meyer 2009:218–19). Recent research has furthermore found that friends tend to align in their negative affections, such as dislike towards other students (Berger and Dijkstra 2013; Fujimoto, Snijders, and Valente 2017; Pál et al. 2016; Rambaran et al. 2015). Moreover, research suggests that dislike as a negative sentiment generally leads individuals to create social distance and avoid those they dislike (Harrigan and Yap 2017).

In comparison, physical violence in the form of hitting and kicking a schoolmate represents a negative interaction and behaviour towards others (Borgatti et al. 2013:4). This negative interaction often occurs within close relationships and social circles, including friendships. Friends frequently interact and spend time together (e.g., Bukowski et al. 2009), for example, during school breaks or in their leisure time. This frequent exposure creates numerous opportunities for conflicts and aggressive incidents to arise. Additionally, since achieving and maintaining status is a central goal in adolescence (Hensums et al. 2023; LaFontana and Cillessen 2010), rivalry among friends related to status struggles, such as competition for the admiration and respect of mutual friends, has been argued to foster aggressive behaviour among socially close peers (Felmlee and Faris 2016; Gould 2003).

These theoretical insights from network science call for a more nuanced perspective on ethnic segregation in friendships and its potential detrimental implications for intergroup relations, as this may depend on the nature of the negative relation in question – whether violence or dislike is considered. Given the conducive conditions for physical violence within close social circles

and among friends on one side, and the common tendency toward ethnic segregation in friendships on the other, physically violent interactions should be more likely among students of the same ethnic background than between students of different ethnic backgrounds. Conversely, dislike is likely to be more prevalent between students who are not socially close, and given ethnic segregation in friendships, thus more likely between students from different ethnic backgrounds.

In sum, previous research has offered inconsistent findings and often lacks appropriate social network data for rigorous empirical testing. Against this background, further qualification of the assumed connection between ethnic homophily in friendships and frictions between ethnic groups in the school context is warranted, especially as insights from network science on the varying interrelatedness of positive and negative relationship types call for more nuanced investigations. Study 1 will tackle this task.

1.2.2 The interplay between social and cultural integration: Is this interplay connected to lower mental wellbeing for individuals in ethnic brokerage positions? (Study 2)

While the interplay between the social and cultural dimensions of integration may become evident in negative externalising behaviour, such as physical violence, it may also become evident in negative internalising behaviour and lower mental wellbeing of individuals. The traditional perspective on risk factors for adolescent mental wellbeing emphasises the role of the family environment, including parenting styles and family conflict, as well as experiences of socioeconomic deprivation. Additional factors include school-related issues, such as low school connectedness and academic pressure, as well as peer-related difficulties, such as social isolation and bullying (Bor et al. 2014; Kieling et al. 2011; Patalay and Fitzsimons 2018). Integration research, however, increasingly considers integration-related experiences and intercultural contact as crucial aspects of adolescents' social lives that can affect their mental wellbeing (Berry 1997; Fajth and Lessard-Phillips 2023; Jonsson et al. 2018).

Psychological acculturation research, for instance, considers the psychological dimension and outcomes of integration processes, particularly in the context of intercultural contact (Sam and Berry 2010). It describes how acculturation affects individual mental wellbeing, recognising that intercultural contact and acculturation experiences can generate stress and strain (Berry

2005; Lay and Nguyen 1998; Sam and Berry 2010:474; Vega and Rumbaut 1991).⁷ Although intercultural contact is central to its theoretical conceptualisation of acculturation and the associated individual psychological changes (Sam and Berry 2010), intercultural contact has often remained implicit in this scholarship. Much acculturation research lacks a social network perspective that examines actual social relations between individuals with different cultural backgrounds and the structures that these relations form. Adopting such an approach would allow researchers to explore how network structures influence the social-psychological aspects of intercultural contact and gain deeper insights into how individuals navigate different cultural meaning systems within their intercultural social networks. A social network perspective thus offers a valuable theoretical and methodological lens for studying acculturation processes (see also Repke and Benet-Martínez 2018; Bilecen, Gamper, and Lubbers 2018). It is particularly suited for studying the interplay between social integration and cultural factors of integration, as described in more detail in Chapter 1.3.

Psychological acculturation research could thus benefit from adopting a social network perspective to rigorously examine its theoretical mechanisms related to intercultural contact. At the same time, integration research that already applies a social network approach reveals certain theoretical blind spots regarding the implications of intercultural contact, including its effects on individual mental wellbeing. Intergroup contact research, for example, predominantly highlights the beneficial aspects of contact between members of different ethnic groups, particularly positive contact such as inter-ethnic friendships. Studies on inter-ethnic friendship among adolescents have often focused on its role in reducing prejudice and improving intergroup attitudes (Pettigrew and Tropp 2006; Titzmann, Brenick, and Silbereisen 2015; Tropp et al. 2022; Wölfer et al. 2016). Such friendships have also been associated with a range of individual psychosocial benefits (Jugert and Feddes 2017), including reduced perceived vulnerability, as assessed by perceived peer victimisation, perceived school safety, and feelings of loneliness in school (Graham, Munniksmá, and Juvonen 2014), as well as enhanced psychological wellbeing (Bagci et al. 2017) and reduced adverse effects of discrimination on socioemotional wellbeing (Benner and Wang 2017). However, as scholars have noted, studies on intergroup contact have primarily focused on its positive aspects,

⁷ As noted by Pries (2015:25), the concept of acculturation in this literature is used in a very broad sense, as an umbrella term for various processes and phenomena resulting from contact between cultures (e.g., Sam and Berry 2010:472), similar to how German integration and migration research uses the term “integration”.

potentially overlooking its adverse outcomes (Graf and Paolini 2016:92,105; Pettigrew 2008; Pettigrew and Tropp 2006:767). Adding to that “positivity bias” (e.g., Graf and Paolini 2016), previous integration research has often relied on broad measures of intergroup contact, such as the number of different ethnic friends, which theoretically and methodologically ignores more complex forms of intercultural contact and its implications.

Network science offers a different perspective on intergroup contact. It suggests that a specific way in which inter-ethnic friendships are structured – the brokerage structure – may be detrimental to the mental wellbeing of those occupying a brokerage position in their friendship network. While friends generally enhance mental wellbeing, for example, through providing a sense of belonging, social support and normative as well as behavioural guidance (Rook and Underwood 2000; Taylor and Stanton 2007; for an overview see Thoits 2011), network research has revealed that disconnections in one's friend group can have adverse effects on mental wellbeing (e.g., Carboni and Gilman 2012; Krackhardt 1999; Mcfarland and Pals 2005; Stovel and Shaw 2012). According to balance theory (Heider 1946), individuals prefer affectively consistent relationships among their close contacts. When someone's friends are not friends with each other, this inconsistency causes cognitive dissonance and strain to those in between – the brokers. For individuals in such brokerage positions, the lack of connection between their close friends can turn their friendship network into a potential source of stress and strain, rather than belonging and social support, ultimately reducing their mental wellbeing. Moreover, prior theoretical accounts and empirical studies have suggested that the detrimental effects on mental wellbeing due to disconnections between close contacts multiply when brokerage takes place between different social groups with distinct value and norm systems, such as ethnic groups (Carboni and Gilman 2012; Krackhardt 1999; Mollenhorst et al. 2015; Stovel and Shaw 2012). Against this backdrop, three main areas and gaps in knowledge arise in previous research on the interplay between interethnic friendship, network structure, and psychological wellbeing.

First, the relational divide between one's different ethnic friends likely points to rather salient and substantial discrepancies between them, as argued by Mollenhorst, Edling, and Rydgren (2015:912). Brokers can have friendships with quite dissimilar individuals by sharing different similarities with each of them (Small 2017:155). Consequently, instead of receiving normative and behavioural guidance from friendships, brokers between friends of different ethnic backgrounds may have to deal with ambiguous or conflicting norms and behavioural expectations within their friendships and social circles. This might lead to over-demanding

stress and ultimately to lower mental wellbeing. Along this line, Mollenhorst et al. (2015) found that brokerage between friends of different ethnic backgrounds was significantly associated with lower mental wellbeing of brokers in an adult sample of native and immigrant Swedes. Importantly, this was not the case for brokerage between friends of the same ethnic origin.

Second, previous literature suggests that the broker's own ethnic origin may also contribute to the detrimental aspects of inter-ethnic brokerage. If the broker shares ethnic group membership with one friend but not the other, this can indicate a biased alliance with the ingroup friend, supposed or actual, leading to additional external and internal conflicts (see Stovel and Shaw 2012:142–44 for a general argument regarding bias in brokerage). The broker is motivated or expected to show equal commitment and loyalty to both friends. However, there should be particular pressure on the broker to conform to the ingroup friend due to shared ethnic group membership (Deaux and Martin 2003), giving rise to special tensions. Such dynamics likely create more internal strain for the broker and, thereby, adverse effects on mental wellbeing. So far, previous research on inter-ethnic brokerage has acknowledged the potential role of the broker's own ethnic origin in theoretical discussions, but has not systematically addressed it empirically (see Mollenhorst et al. 2015).

Third, it remains an open question whether the association between inter-ethnic brokerage and mental wellbeing differs for ethnic majority and minority individuals. Previous integration research examining the challenges of navigating different cultures and associated strains has primarily focused on ethnic minority individuals. A traditional assimilationist perspective would suggest that internal and external pressures should be more significant for ethnic minority inter-ethnic brokers than brokers belonging to the ethnic majority (see Mollenhorst et al. 2015). Relatedly, research on acculturative stress has predominantly paid attention to individuals with a migration background or ethnic minorities (e.g., Jonsson and Mood 2018; Romero and Piña-Watson 2017). Recent acculturation and integration literature, though, has emphasised that integration is not a one-sided process and that (native) majority members are also subject to acculturation processes and potentially experience acculturative stress – an area that warrants further empirical investigation (e.g., Kunst et al. 2021).

It is important to examine the relationship between ethnic brokerage in friendships and mental wellbeing. Ethnic segregation and ethnic homophily are common features of adolescent friendship networks in educational settings, at least to some degree (e.g., Kalter and Kruse 2015; Smith et al. 2016; Wittek et al. 2022). This, in turn, creates gaps in the social fabric of

school grades. Some individuals will therefore occupy brokerage positions in these networks by maintaining friendships with peers from different ethnic groups who are not friends with each other. Examining the mental health implications of such ethnic brokerage positions – and their conditionalities – is of social importance and will be the objective of Study 2. Such a research endeavour, however, requires a social network perspective, including social network data and analysis methods to capture the structure of inter-ethnic friendships and rigorously assess ethnic brokerage in adolescents' friendship networks (see Chapter 1.3.2). This perspective can thereby generate new insights into the micro-level social psychological processes that underlie the interplay between cultural and relational dimensions of integration.

1.2.3 The interplay between social and cultural integration: Is this interplay connected to the emergence of a gender gap in Muslim youths' interreligious friendships? (Study 3)

While individuals may have to deal with different cultural norms within their intercultural friendship networks due to social integration, cultural norms can also influence whether intercultural relationships are formed or maintained in the first place, thereby shaping social integration. For instance, politicians and academics have frequently discussed the Muslim religion and culture as potential challenges to social integration and cohesion in Western European societies. These debates revolve around two behavioural patterns: on the one hand, ethnic minorities' self-segregation, and on the other hand, exclusionary behaviour by non-Muslims (Crozier and Davies 2008; Drouhot and Nee 2019; Kornienko, Rambaran, and Rivas-Drake 2022; Kretschmer and Leszczensky 2022; Sniderman and Hagendoorn 2007). Additionally, integration and social network research have documented a significant relational divide between Muslims and non-Muslims in Western Europe (Drouhot and Nee 2019; Foner and Alba 2018), meaning that personal relations, such as friendships, are more likely within these groups than between them. This segregation pattern has also been found in friendship networks of young people in educational settings (e.g., Simsek et al. 2022). Research on friendship segregation in German schools has found that, net of intergroup contact opportunities, Muslim youth prefer to befriend Muslim rather than non-Muslim peers, while non-Muslims (Christian and non-religious youth) demonstrate reluctance to befriend Muslim youth (Kretschmer and Leszczensky 2022; Leszczensky and Pink 2017; Simsek et al. 2022).

Importantly, recent research has discovered that among Muslim youth, this ingroup bias is *gendered*, whereas among non-Muslims, no gender difference in their interreligious friendship choices is evident (Kretschmer and Leszczensky 2022, 2023). In a German sample of secondary school students, Kretschmer and Leszczensky (2022) found that Muslim girls'

friendship choices displayed a stronger ingroup bias compared to Muslim boys. Further research has suggested that this gender difference is not yet present in childhood, where Muslim girls and boys exhibit similar levels of ingroup bias in friendships, but that it emerges during adolescence (Kretschmer and Leszczensky 2023). Insights from research on Muslims' interreligious romantic relationships have pointed to *gendered religious norms* – specifically endogamy and chastity norms and their gendered manifestations – as potential contributors to gender differences in these relationships (Abo-Zena 2019; Cila and Lalonde 2014; Kogan and Weißmann 2020; van Pottelberge et al. 2019; Saharso et al. 2023), which also extends to interreligious friendships (Giuliani, Olivari, and Alfieri 2017; Kretschmer and Leszczensky 2022, 2023).

This is grounded in the interplay between the motif for cultural preservation, gendered religious rules and social lives in religious communities: Ethno-religious minorities, such as the Muslim minority in German society, emphasise transmitting and maintaining their heritage culture and religious norms across generations (Carol 2014, 2016; Drouhot and Nee 2019; Giuliani et al. 2017; Munniksmä et al. 2012; Smith et al. 2014b). Relationships with members who do not belong to the ingroup may introduce competing cultural values and practices, potentially threatening the cohesiveness of the group and the preservation of cultural identity (Carol 2014:1554; Kalmijn 1998). Beyond that, it is also traditional interpretations of the Qur'an that uphold an endogamy norm, which explicitly discourages marriage with non-Muslims, whereby this rule applies differently to men and women. While Muslim men are permitted to marry Christian or Jewish women, Muslim women are generally prohibited from marrying a non-Muslim person (Haji 2023; Leeman 2009:754–58). This gendered distinction is tied to the role of women as the primary preservers of cultural and religious continuity across generations. Linked to this is the idea that a Muslim woman married to a non-Muslim man may not be free to practice her faith or raise her children as a Muslim (Cila and Lalonde 2014:359; Haji 2023; Leeman 2009:757). Taken together, the traditional Islamic perspective conceives of Muslim women's interreligious marriage as a threat to religious transmission and group cohesion. In addition to endogamy norms, the traditional Islamic perspective provides moral rules. It sets religious group norms about premarital sexual activity and social behaviour connected to it, like several other religions. Chastity norms reject premarital sexual activity, emphasise the value of premarital virginity and modest behaviour, and have been documented to promote gender segregation in the social lives and relationships of Muslim youth (Abo-Zena 2019; Hawkey, Ussher, and Perz 2018; Kogan and Weißmann 2020; Saharso et al. 2023; Yip 2009;

Yip and Page 2016). Although these norms apply to both genders, they are much stricter for females (e.g., Dion and Dion 2001; Giuliani et al. 2017; Hawkey et al. 2018). Female purity is closely linked to individual and family honour, leading to intense social pressure for girls to adhere to these norms, as previous research has shown (e.g., Abo-Zena 2019; Cense 2014; Hawkey et al. 2018; Saharso et al. 2023). Against this background, premarital romance is perceived as a direct threat to Muslim youths' reputation and marriage prospects in the ethno-religious community, particularly for girls (Hennink, Diamond, and Cooper 1999; Saharso et al. 2023). Taken together, Muslim *girls'* intergroup friendships, and the potential sexual or romantic relationships that may develop from them, put the intergenerational transmission of religious culture, the cohesiveness of the group and both the individual's and the family's reputation within the religious community particularly at stake.

Qualitative and quantitative research have documented that endogamy and chastity norms remain important among Western European ethnic minorities and Muslim youth, applying particularly to Muslim girls (e.g., Carol and Teney 2015; Giuliani et al. 2017; Kogan 2018; Kogan and Weißmann 2020; van Pottelberge et al. 2019; Saharso et al. 2023). For example, Kogan's (2018) study of German adolescents observed that Muslim youth were significantly less tolerant of sexual liberalisation (including openness to premarital cohabitation, abortion, and homosexuality) compared to non-religious youth. Moreover, across the religious denominations considered in the analyses, they were the least tolerant, after controlling for individual religiosity. A recent study by Kogan and Weißmann (2020), which focused on the attitudes of adolescents towards premarital cohabitation in England, Germany, the Netherlands and Sweden, revealed that highly religious Muslim adolescents were more opposed to sexual relationships outside of marriage than highly religious Christians from both majority and minority groups. Among less religious young people, however, no differences were evident between religious groups. Studying attitudes towards intergroup dating among Brussels adolescents, Carol and Teney (2015) found that only ethnic minority adolescents from countries with large Muslim majorities are significantly less likely to approve of intergroup dating than the majority group.

Why should endogamy and chastity norms, which primarily target interreligious romantic relationships, affect the formation of interreligious friendships in Muslim youth? The reason is that adolescent friendships constitute key social environments for developing romantic relationships. Friendships and peer networks often provide opportunities to meet potential romantic partners. They also serve as learning environments for managing close relationships

and intimacy, facilitating the development of romantic relationships and sexual behaviour as research on adolescents shows (Collins, Welsh, and Furman 2009; Savickaitė et al. 2020; Smetana, Campione-Barr, and Metzger 2006). Cross-gender friendships, in particular, have been found to increase the chances of a romantic relationship debut (Savickaitė et al. 2020). Importantly, research also demonstrates a link between intergroup friendship and intergroup romance: Adolescents with more intergroup friendships were found to be more open to the idea of a romantic relationship with individuals from another cultural or religious group than their own (Carol and Teney 2015). Given that friendships often pave the way for romantic relationships, including premarital sex and, eventually, marriage, intergroup friendships may pose a threat to Muslim adolescents' compliance with endogamy and chastity norms. Consequently, religious norms should not only constrain interreligious romantic relationships but also interreligious friendships.

The specific mechanisms through which external religious norms may contribute to a gendered ingroup bias in Muslim students' friendships, despite abundant opportunities for socialising with non-Muslims in schools, remain unclear. Research on interreligious romantic relationships among ethnic minorities has suggested that gendered religious norms contribute to this pattern by shaping specific aspects of adolescents' social lives differently for Muslim boys and girls. Previous research has shown that religiosity is positively linked with norm internalisation and compliance (Carol and Teney 2015; Cila and Lalonde 2014). As these religious norms particularly target females, religious girls are likely to internalise and adhere to these norms more strongly than religious boys, leading to greater restrictions on their interreligious relationships. Beyond individual religiosity, these norms shape the social environments Muslim adolescents engage with *outside* school, which, in turn, affect their social behaviour *within* the school, including forming interreligious friendships. Specifically, previous research has documented that these religious norms foster social control by ingroup members, such as parents and community members, particularly targeting Muslim girls' social behaviour (e.g., Giuliani et al. 2017; Hennink et al. 1999; van Kerckem, van de Putte, and Stevens 2014). These norms have also been found to encourage selective participation in leisure time activities that involve regular exposure to non-Muslims, limiting Muslim girls' opportunities for contact with non-Muslims more strongly than those of Muslim boys (Giuliani et al. 2017; McGrath and McGarry 2014; Stodolska and Livengood 2006; Walseth and Amara 2017).

Furthermore, research has documented that non-Muslims in Western Europe tend to stigmatise Muslim culture and exhibit more opposition towards Muslim immigration than towards other religious or immigrant groups (Bansak, Hainmueller, and Hangartner 2016; Gusciute, Mühlau, and Layte 2021; Helbling 2014; Ribberink, Achterberg, and Houtman 2017; Strabac and Listhaug 2008). This discriminatory pattern has also been observed among non-Muslim adolescents (Verkuyten and Thijs 2010). If discrimination by non-Muslims is gendered, this may further explain why Muslim girls focus more on ingroup friendships in school than boys. Given these multiple norm-related factors that might be relevant in this context, the objective of Study 3 is to explore the pathways through which gendered religious norms contribute to the emergence of a gender gap in ingroup bias among Muslim adolescents. More broadly, the study examines the interplay between these norms and Muslim youths' social integration in school.

The current chapter delineated three areas of the interplay between cultural and social dimensions of integration, revealing specific knowledge gaps and unresolved questions. However, these gaps can be addressed. This dissertation employs a specific analytical approach to achieve this. It consists of a social network perspective on the social dimension of integration, utilising complete social network data and analytical methods, as well as an ecological perspective, which frames adolescents' peer relations in school as embedded and influenced by social forces beyond the school context, such as culture and social group norms. This analytical approach to understanding and analysing the interplay between cultural aspects and relationship formation can offer new insights into the integration process in schools. In the following section, I will outline how a social network perspective, complemented with a socio-ecological framing of adolescent integration, offers analytical possibilities that can qualify and advance previous research, specifically addressing the gaps and open questions outlined in this chapter and targeted by the three studies of this dissertation.

1.3 Analytical approach

1.3.1 An ecological perspective: Situating peer relations in school within a broader sociocultural framework

Integration processes in schools do not take place in a social vacuum. Although the school context defines the immediate interaction space, relationship formation between students unfolds against the background of a broader social ecology (Bronfenbrenner 1979; McFarland

et al. 2014).⁸ Students are affiliated with external social groups, such as ethnic or religious groups, which have specific norms and cultural practices. These cultural backgrounds can influence the formation and maintenance of intergroup relationships; for example, previous research has suggested that similarities in values and behaviours facilitate, whereas dissimilarities complicate friendships between individuals (e.g., Jugert and Leszczensky 2024; Laursen 2017; Lazarsfeld and Merton 1954; McPherson et al. 2001). Furthermore, as the previous subchapter outlined, sociocultural norms such as religious endogamy norms or culture-based stigmatisations of outgroups may directly impede the formation and maintenance of close outgroup relationships. Next to culture and social group norms, research on social integration has identified several key factors that facilitate or prevent the formation of close intergroup relations (e.g., Jugert and Leszczensky 2024): individual preferences, such as homophily (Lazarsfeld and Merton 1954; McPherson et al. 2001); opportunities for outgroup contact in the immediate interaction context (Blau 1977; Moody 2001); and in regular joint activities such as leisure time activities (shared “foci”, Feld 1981; Wimmer and Lewis 2010), and third parties such as parents and (ethno-religious) communities that may enforce norms on intergroup relations (e.g., Carol 2014; Kalmijn 1998; van Kerckem et al. 2014; Munniksma et al. 2012).

Bronfenbrenner’s ecological approach to human development (1979; Bronfenbrenner and Morris 2006) provides an analytical framework for integrating these diverse explanatory factors of intergroup relationships and for conceptualising how the cultural and social dimensions of integration interplay in the school context. At its core, this ecological approach views individuals, their actions and interactions as situated within and influenced by a broader ecology of nested, interdependent micro, meso- and macro-level social systems

⁸ The ecological perspective is present across several social science disciplines, including developmental psychology, where it is exemplified by Bronfenbrenner's (1979) ecological theory of development, as well as in analytical sociology and network science, to mention the seminal article by McFarland et al. (2014), which proposes and tests an ecological network theory, and other contributions to the growing research program on network ecologies (e.g., Doehne, McFarland, and Moody 2024; Kruse and Kroneberg 2024). I will focus on delineating Bronfenbrenner's ecological model as it provides a comprehensive framework that has evolved over several decades (Rosa and Tudge 2013) and has been applied across disciplines, including immigrant integration (e.g., Titzmann and Lee 2018), intergroup contact and network research (e.g., Jugert and Leszczensky 2024), and criminology (e.g., Kirk 2009)—disciplines which are central to this dissertation. Using this framework as a basis, insights from the network ecology scholarship can be smoothly integrated to make the network perspective more concrete, resulting in the general analytical framework for this dissertation (see Figure 1.1 in Chapter 1.4).

(Bronfenbrenner 1979:22). In this framework, individuals operate within multiple microsystems⁹ – their immediate environments where they form personal relationships and engage in specific behaviours and social roles (Bronfenbrenner 1979:22–25; Rosa and Tudge 2013:246). For adolescents, these microsystems may include the school grade, where their peer relationships develop; the family, where their relationships with parents take shape; or the sports club, where they interact with team members. These microsystems, in turn, may be interconnected and influence each other, forming a "mesosystem" (Bronfenbrenner 1979:25; Bronfenbrenner and Morris 2006:817), such as when the "family" microsystem influences adolescents' "peers" microsystem (Paat 2013; Steinberg, Darling, and Fletcher 1995). Drawing upon previous research evidence, Paat (2013) showed how Bronfenbrenner's ecological model can help to understand how interactions between immigrant families and their children's peer relations can shape adolescents' integration. In this work, the author demonstrated how protective ethnic minority parents may intervene in their child's friendship formation with outgroup peers by monitoring their children's peer relations, disapproving of outgroup friendships, and encouraging activities that primarily provide ingroup contact (Paat 2013:959). This parental behaviour has also been found in empirical studies (e.g., Carol 2014; Carol and Teney 2015; Munnikma et al. 2012; Smith et al. 2014b). Importantly, this ecological model frames individuals, their micro- and mesosystems as operating against the background of a broader macrosystem of cultural beliefs and norms, which includes a society's overarching culture and subcultures of different social groups, such as ethnic, religious, and socioeconomic groups (Bronfenbrenner 1979:26). The macro-level system shapes lower-order systems and processes, that is the microsystems and how these interact with each other (mesosystem).

This ecological perspective is generally fruitful for all three studies in this dissertation. Each study examines a specific aspect of the interplay between culture (macro-level) and peer relations in the school context (micro- and meso-level). That is, how students form and manage their social relationships against the backdrop of their own and others' ethno-religious and

⁹ In Bronfenbrenner's taxonomy, the classification of "micro" describes the innermost structure of an individual's ecological environment, that is, the immediate social setting in which adolescents are directly involved (as compared to more distal contexts like societal culture at the macro-level). This contrasts with the understanding of "micro" entities in analytical sociology, which – if interpreted strictly – refers only to the individual and their characteristics and behaviours (e.g., gender, ethnic origin, wellbeing).

cultural backgrounds and broader social group affiliations, as well as their embeddedness in multiple sociocultural contexts.

The fruitfulness of this ecological lens is well exemplified by Study 3, which investigates why and how religious norms and their gendered manifestations create barriers to Muslim youth's social integration during adolescence. The study asks: How can external religious norms shape Muslim youth's interreligious friendships in school, a microsystem where they have frequent interaction opportunities with non-Muslims? Against the background of an ecological perspective, Muslim religious norms operate not only through an adolescent's religiosity. Beyond that, they involve and shape different microsystems of Muslim adolescents, which are external to the school context but can influence their relationships with non-Muslim schoolmates: previous research has found that norms linked to cultural preservation, group cohesion, and family reputation can increase an individual's motivation to comply (Hennink et al. 1999; Saharso et al. 2023). They may also motivate adolescents' parents and third parties from the Muslim community to encourage compliance, in the case of endogamy and chastity norms, especially for Muslim girls. These microsystems outside school may, therefore, intervene in Muslim youths' social behaviour, including their friendships with non-Muslim peers from school, as the potential sexual or romantic relationships that may develop from them put cultural preservation and reputation at stake. As previous research has shown, this influence can be indirect, through intergenerational transmission and primary socialisation of endogamy and chastity norms, or more direct, by actively monitoring and controlling their children's social interactions and contact with outgroup members (e.g., Carol 2014; Carol and Teney 2015; Munniksmä et al. 2012; Smith et al. 2014b; van Zantvliet, Kalmijn, and Verbakel 2015). Thus, macro-level religious norms influence the micro-system "family", which interacts with the micro-systems "school" and "peers", creating a mesosystem that can shape Muslim adolescents' ingroup bias in friendships with schoolmates from outside. Beyond that, gendered religious norms may also influence other microsystems of Muslim adolescents' social ecology, including their leisure time activities and the extent to which they engage in activities which provide mixing opportunities with outgroup members. Since friendships in school are often initiated and maintained through leisure time activities outside school, Muslim youth themselves or their parents may constrain interreligious friendships in school by limiting these to activities with low opportunities to meet non-Muslim peers.

Importantly, the ecological perspective also highlights how developmental changes can influence these interdependent ecological processes (Bronfenbrenner 1986:724;

Bronfenbrenner and Morris 2006; Rosa and Tudge 2013:249-250,253).¹⁰ The consideration of the influence of developmental processes is central to Study 3's aim to explain the emergence of a gender gap in Muslim ingroup bias from childhood to adolescence. Adolescence is a developmental period characterised by fundamental biological, social and psychological changes associated with puberty (Smetana et al. 2006:258). These changes can alter an individual's social ecology, including their social roles and relationships within different micro-systems and the interplay between these systems (mesosystem). For instance, alongside friendships, dating and romantic relationships become increasingly important in the adolescent's peer microsystem (Collins et al. 2009; Smetana et al. 2006). Also, family relationships may change in response to puberty. Such changes can also affect adolescents' integration processes, as Titzmann and Lee (2018:76) have argued. In the case of Muslim youth, such developmental changes should alter the role that endogamy and chastity norms play in their lives. These norms target intimate and romantic relations and should, therefore, gain importance for Muslim youths' interreligious friendship formation during adolescence rather than childhood.

On top of that, in Islam, the transition to adolescence carries significant religious meaning for Muslim girls, as puberty marks the shift to adult responsibilities and accountability as believing Muslim women and members of the religious community, as documented in previous research (e.g., Abo-Zena 2019; Hennink et al. 1999). As a result, adherence to Muslim practices and norms should not only gain greater significance for the individual. The interaction between religious norms and developmental transitions is also likely to impact the micro-systems of Muslim youths, which are involved in norm compliance. It should increase the relevance of parents' control of their children's social relations as well as the relevance of Muslim youths' outgroup contact opportunities in their leisure time activities, particularly for Muslim girls. Consequently, Muslim girls' ingroup bias in friendships should increase more than that of Muslim boys. In addition, this developmental change may also affect how outgroup members perceive and treat Muslim girls. They might face greater discrimination and rejection by non-Muslims during adolescence than Muslim boys, for example, because of wearing the veil with the onset of puberty, as prior studies document the veil as a factor of discrimination experienced

¹⁰ The consideration of such developmental aspects is, in principle, also possible and undertaken in the network ecology literature, like in the study by McFarland et al. (2014), which considered the role of developmental transition from middle to high school settings on adolescents' relationship formation.

by Muslim females (e.g., Abo-Zena 2019; Chakraborti and Zempi 2012; Choi, Poertner, and Sambanis 2023). In consequence, Muslim girls may increasingly focus on ingroup friendships, which further contributes to the emergence of a gender gap in ingroup bias.

From this ecological perspective, intergroup relationships are formed within the context of a larger system of interdependent and nested social systems. This perspective facilitates a deeper understanding of how the interplay between relational processes and cultural aspects shapes integration in schools. It acknowledges an individual's affiliation to larger social groups, the external norms that these imply, and the different pathways through which these may influence an individual's social behaviour towards outgroups and, more broadly, social integration. This analytical perspective provides a general framework for systematically mapping the different areas of the interplay between the cultural and social dimensions of integration addressed by the individual studies in this dissertation. However, to examine these processes empirically, adopting a social network perspective that includes social network data and analysis methods is essential. This approach helps to illuminate blind spots in previous integration research and to explore mechanisms and aspects within the social dimension of integration that have been inaccessible to earlier studies due to inadequate data and methods.

1.3.2 A social network perspective: More rigorous testing and new analytical possibilities for studying integration in schools

In previous integration research, conventional survey methods have been the primary data source for studying integration and intergroup relations. These surveys ask sampled individuals to report on their outgroup contact and social network, such as whether they have friends of different ethnic origins and whether their friends are connected with each other. This method relies on respondents to identify their social networks and their contacts' attributes. The resulting data have important limitations for studying how individuals navigate ethno-religious diversity and form personal relationships, making them particularly ill-suited for addressing the specific research gaps and questions targeted in this dissertation. To overcome these limitations, this dissertation adopts a social network perspective. This perspective involves using data on the social networks of entire school grades (so-called complete or whole-network data obtained via whole-network surveys) and the use of network analytical methods. In the following, I outline how this approach eliminates specific shortcomings of previous research and offers unique analytical possibilities for studying the interplay between social and cultural dimensions of integration among students in schools, enabling the investigation of novel mechanisms and previously unexplored aspects of this interplay.

1.3.2.1 *Advantages of (whole) social network data over conventional survey data*

Whole social network surveys target *all* members of a social context (e.g., all students in a school grade), collecting information on both their individual attributes (e.g., ethnic origin, gender, and religious affiliation) and their social relations with others in that context (e.g., whom they like or with whom they sometimes fight in the school grade). As a result, a complete picture of who is related to whom and between whom no relation exists in that context can be drawn. The data generated by whole-network surveys have specific advantages over conventional survey data for examining social integration in schools. First, it provides *more accurate and less biased data on inter- and intra-group relationships* than conventional surveys. In the latter, respondents themselves identify their out- and ingroup contact, which can be problematic for several reasons: Individuals often have less precise information about others, leading to inaccurate identification of their contacts' attributes (Perry, Pescosolido, and Borgatti 2018c:290–91), such as ethnic origin or religious affiliation. This shortcoming, in turn, complicates the accurate identification of inter-group and intra-group relations, which requires precise knowledge of the ethnic origin of both interaction partners. In addition, conventional survey questions commonly focus directly on the group membership of contacts, which can provoke socially desirable responses and lead respondents to overstate positive and underreport negative outgroup contact, as previous research has indicated (Wölfer et al. 2017; Wölfer and Hewstone 2017). By contrast, whole network surveys capture social relations separately from individual attributes. It is the researchers who identify intergroup contact *ex post* by combining relational data with respondents' self-reported group memberships during data preparation and analysis stages. This approach allows more objective and less biased identification of positive and negative inter- and intra-group relations (Wölfer and Hewstone 2017:614–15). The capacity to accurately identify positive and negative relations within and between groups is essential for all three studies in this dissertation: Studies 1 and 2 require the ability to distinguish inter-ethnic from intra-ethnic relations among students. Study 3, in turn, relies on the ability to identify whether Muslim youths' friends are Muslims or non-Muslims. Additionally, Study 1 examines the role of ethnic origin not only in positive relations such as friendships but also in negative relations, including dislike and physical violence between students.

Second, whole-network surveys offer a further key advantage over conventional surveys by capturing the *opportunities for ingroup and outgroup contact* within a school grade, as they typically target all members of a defined context. Unlike conventional surveys, which only

record existing relationships, whole-network data provide information on all potential interaction partners available – revealing not only who is related but also between whom no relationship has formed in the school grade. This characteristic of whole network data is crucial for determining students' tendency to form ingroup rather than outgroup relationships, which depends not only on individual preferences but also crucially on the relative availability of ingroup peers in the school grade (e.g., Moody 2001; Smith et al. 2016; Wimmer and Lewis 2010). For this reason, whole-network data are essential for Study 1, which investigates ethnic homophily (the tendency to befriend co-ethnics rather than ethnic outgroup members), and Study 3, which examines ingroup bias among Muslims (the tendency to predominantly befriend Muslim peers). Drawing on whole-network data, both studies can assess these tendencies while controlling for opportunity structures, such as the share of Muslims in the school grade.

Third, whole-network surveys offer another crucial advantage over conventional surveys as they provide *detailed information on the structure of relationships*. Since whole network data capture both the presence and absence of relations among a given set of individuals, they enable an objective and comprehensive assessment of the network structure, that is, *how* schoolmates are connected. This capacity is particularly valuable for assessing the structure of intergroup contact, as conventional survey data generally lack information on relational structures. This has limited the study of inter-group contact to broad measures, such as having any outgroup friends or the number of outgroup friendships, in previous research, ignoring the structure of inter-group contact (e.g., Burgess and Platt 2021; Martinović 2013; Titzmann et al. 2015). While it is, in principle, possible to gather information on the structure of social networks in conventional surveys by asking respondents to report the connections between their friends¹¹, this approach is prone to inaccuracies, as people generally have difficulty evaluating the extent of contact among their contacts (e.g., Perry, Pescosolido, and Borgatti 2018d:29–30, 2018b:121–25; Perry et al. 2018c:290–91). Also, previous research on cognitive social structures has discovered that individuals often overestimate the extent to which their friends are also friends with each other (Brands 2013; Brashears and Quintane 2015). Even more problematic, prior research has found that assessing a friend's contact with outgroup members

¹¹ Ego-centric network survey instruments, for example, can be included in conventional surveys. These ask respondents (i.e., egos) to first list their social contacts (using a name generator question). Then, to provide information about the attributes of their contacts and how these are connected (name interpreter question), for example, by asking for every pair of contacts mentioned by the respondent, whether these two contacts are friends (e.g., Perry, Pescosolido, and Borgatti 2018d:26–27).

is particularly challenging for individuals (Wölfer, Faber, and Hewstone 2015; Wölfer and Hewstone 2017). However, accurately capturing the structure and ethnic composition of social networks is vital for Study 2 of this dissertation, which examines brokerage in adolescents' friendship networks. Brokerage describes a specific network structure in which an individual is friends with two others who are not friends with each other. The study further distinguishes inter-ethnic brokerage, where these two friends differ in their ethnic backgrounds, from intra-ethnic brokerage, where these friends share the same ethnic origin. Unlike conventional survey data, whole-network data make it possible to adopt such a differentiated structural perspective on inter-ethnic contact and to explore its implications, making novel insights for integration research possible.

Fourth, in comparison to conventional survey data, whole-network surveys provide insights into *social networks at multiple levels*. As the complete social network of a school grade is built from the singular relationships between schoolmates, smaller network structures are nested within larger ones. The overall network of a school grade can be partitioned into the personal social networks of individual students – their immediate network comprised by their direct friends, their friends' interconnections and attributes (Perry et al. 2018d, 2018c). Beyond network information, whole-network surveys also collect non-relational information, such as individual attributes (ethnic origin, gender) and outcomes (mental wellbeing). This comprehensive data provided by whole network surveys allows great flexibility in terms of the level of analysis and range of possible research questions that can be addressed. Networks and their characteristics can serve as independent or dependent variables at multiple levels, such as the individual level (e.g., personal network characteristics) or the school grade level (e.g., school grade network characteristics). This multi-level relational data, together with non-relational information, creates unique analytical opportunities to investigate the interplay between social and cultural integration. For instance, non-network outcomes can be analysed as functions of personal network characteristics and network-based explanatory mechanisms. This feature is essential for the research endeavour of Study 2, in which brokerage structures and their varying ethnic composition in a student's personal friendship network serve as predictors of individual mental wellbeing. Micro-level integration processes can be examined to inquire into how the interplay between ethnicity and network structure creates different socio-psychological conditions for individuals. At the same time, the characteristics of personal networks can also be analysed as a function of non-network mechanisms and factors. This analytical possibility is fundamental in Study 3, which explores whether the religious

composition of Muslim students' personal friendship networks develops differently for boys and girls with increasing age and how non-network factors within a student's sociocultural ecology, such as parental control and leisure time activities, contribute to this development. Taken together, the possibility of incorporating influences from students' sociocultural contexts beyond the school environment and considering how these shape their experiences and peer relations, allows for a comprehensive analysis of the interplay between social and cultural integration in schools. The complete network data can be processed into individual-level variables, allowing the use of conventional statistical analysis methods, such as linear regression techniques.

In addition to these analytical possibilities at the individual-level, whole-network data provide the possibility to consider the *overall* school grade network's characteristics as dependent and independent variables. However, to fully leverage the information provided by complete social network data, network analytical methods are required. These create unique additional analytical possibilities and enable more rigorous empirical investigations of relationship formation and the interplay between social and cultural dimensions of integration.

1.3.2.2 Advantages of network analysis methods

Exponential random graph models (ERGMs; see Robins 2011) are, for example, network analytical models that treat the global school grade network as a dependent variable. They can disentangle the explanatory mechanisms that drive relationship formation and bring about the overall school grade network. This combination of data and methods provides analytical advantages that are decisive in Study 1, which examines the role of ethnic origin in shaping students' relationships, such as ethnic homophily in friendships. Various mechanisms may drive the formation of intra- versus inter-ethnic relationships, and ERGMs are well-suited to isolate the relative contributions of these mechanisms (e.g., Wimmer and Lewis 2010). One key advantage of ERGMs is their ability to account for the opportunity structures to form inter- and intra-ethnic relations, that is, the availability of in- and outgroup students in the school grade, which has been shown to heavily determine the chances of forming ingroup versus outgroup relations (Blau 1977; van Tubergen and Smith 2018; Wimmer and Lewis 2010). ERGMs can determine the relevance of ethnic origin for relationship formation in schools, net of these meeting opportunities. Another major strength of ERGMs lies in their capacity to explicitly model a key feature of social networks: the interdependency of social relations. Relationship formation is interdependent, meaning that an individual's relationship choice depends on the relational choices of others. For instance, due to the general human desire for

symmetry in social relations, individuals tend to reciprocate relations. While these “network endogenous” (e.g., Goodreau, Kitts, and Morris 2009; Wimmer and Lewis 2010) relationship-generating mechanisms are, in principle, independent of ethnicity, they may indirectly amplify ethnicity-related mechanisms such as ethnic homophily.¹² Ignoring such general relational mechanisms could result in overestimating ethnic homophily, as argued and demonstrated in previous research (e.g., Kalter and Kruse 2015; Wimmer and Lewis 2010). That said, standard statistical analyses typically assume that relations are independent of each other, ignoring this fundamental characteristic of human relationships and network formation. ERGMs, by contrast, are capable of modelling this statistical interdependence of observations that is inherent to network data. The ability of these network analytical models to isolate the contribution of ethnic origin beyond meeting opportunities and network endogenous mechanisms allows more rigorous empirical testing of assumptions about the role of ethnicity in peer relations than achieved in previous research, particularly studies that rely on conventional survey data and methods. These analytical capacities are central in Study 1, which examines how ethnic origin influences the likelihood of a positive (friendship) or negative relationship (dislike and violence) between students.

A further capacity of ERGMs is that they enable researchers to consider how different types of relationships are associated. Some relationships, such as friendships and spending leisure time together, may facilitate each other, while others may inhibit each other. For example, when two students dislike each other, friendship between them is unlikely. Given that whole network surveys capture multiple relationship types, ERGMs allow considering these associations as additional explanatory mechanisms, which is essential for Study 1, as it explores how friendship is connected to dislike and violence relationships between students and how this

¹² Humans prefer balanced social relationships and tend to avoid inconsistencies in their social relations, as these can lead to social and psychological strain and discomfort (Heider 1946). Therefore, individuals tend to reciprocate friendships (reciprocity mechanism) and to be friends with their friends' other friends (triadic closure). These mechanisms capture the interdependencies of social relations, such that when A is friends with B, B is also likely to be friends with A because of the already existing friendship between A and B. Such "network endogenous" mechanisms can amplify other relationship-generating mechanisms, such as the preference for same-ethnic others (e.g., Goodreau, Kitts, and Morris 2009; Kalter and Kruse 2015; Kossinets and Watts 2009; Wimmer and Lewis 2010). For example, if A and B share the same ethnic origin, the first friendship between A and B may form because of an individual's preference for friends of the same ethnic origin. However, the second friendship from B to A may be due to a general tendency to reciprocate, increasing the ethnic segregation in the social context, but not because of individual preference. Advanced network analytical models such as ERGMs can disentangle these mechanisms.

interplay influences the role of ethnic origin in relationship formation. This approach enables Study 1 to conduct a more nuanced analysis of social integration than has been common in previous research.

Beyond that, meta-network analysis and regression techniques (e.g., An 2015; Snijders and Baerveldt 2003) allow researchers to consider school grade network characteristics as higher-order contexts that shape student interactions. This analytical capacity makes it possible to look into variation in relationship formation tendencies across schools, such as variation of the school grade-specific ERGM estimates for ethnic homophily across schools. This possibility is essential for Study 1, which – in line with the network ecologies scholarship (e.g., Doehne, McFarland, and Moody 2024; McFarland et al. 2014; Smith et al. 2016) – considers the degree of ethnic homophily in school grade friendship networks as a predictor of tendencies toward intra-ethnic versus inter-ethnic dislike and violence in school grades. Using meta-analytical techniques, contextual co-variations across multiple school grade networks can be investigated to determine whether school contexts which exhibit stronger ethnic homophily in friendships tend to exhibit higher frictions and tensions between ethnic groups.

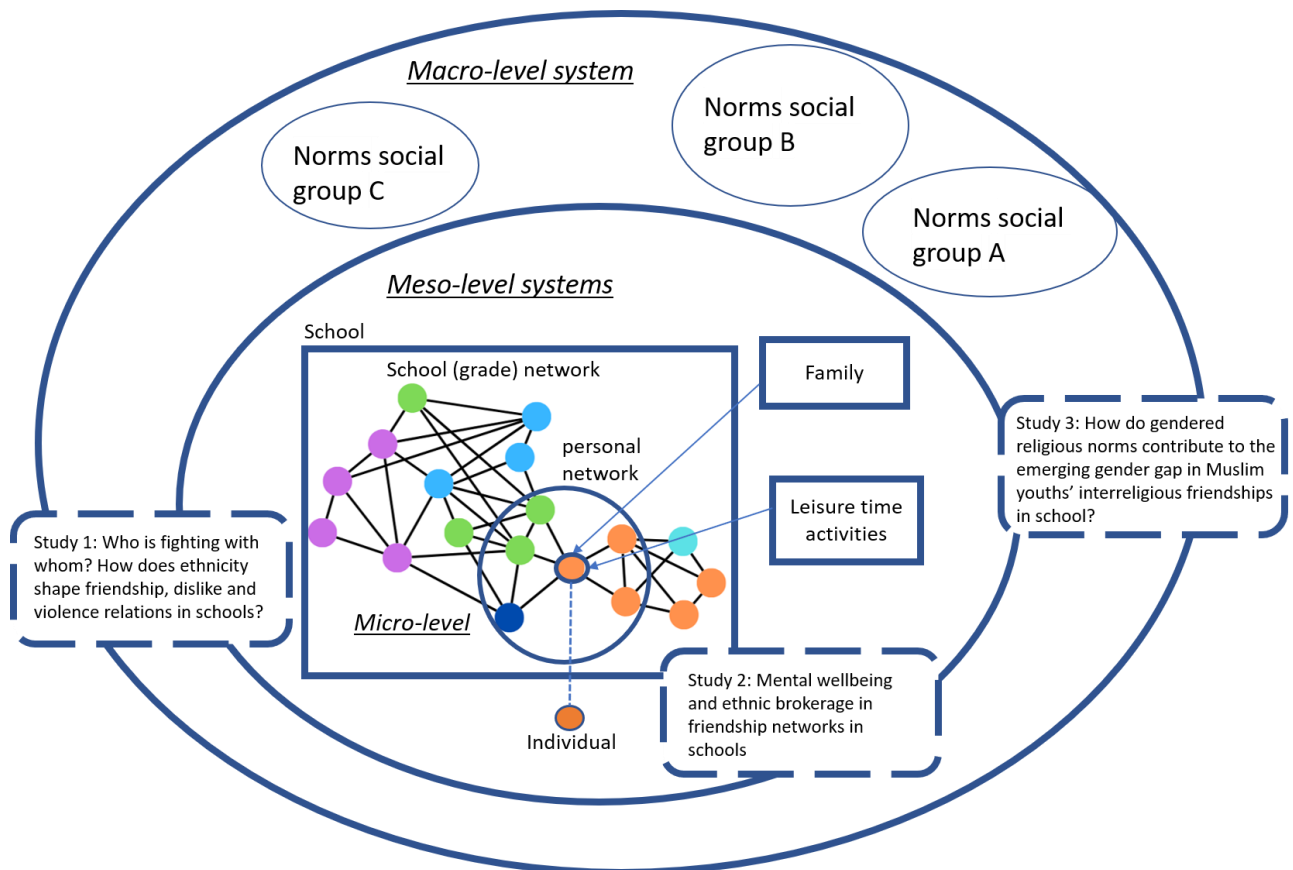
In summary, using social network data and analysis methods offers crucial analytical advantages over conventional survey approaches for this dissertation's research aims. The social network perspective enables more rigorous empirical testing. It opens up new analytical possibilities to examine the interplay between social and cultural dimensions of integration in schools at different levels. Combining insights from social network science with the analytical advantages of complete social network data and network analysis methods also helps overcome key limitations and blind spots in previous integration research.

This network perspective is central to the specific aims of all three studies and their investigation of different facets of the interplay between social and cultural dimensions of integration: The ability to accurately identify micro-level network structures and their ethnic composition is essential in Study 2, which examines different configurations of ethnic brokerage structures within individuals' immediate friendship networks. Study 3 depends on a precise assessment of ingroup bias in friendships among Muslim youth, net of opportunities for ingroup contact. Study 1 requires complete, grade-level social network data from multiple schools and advanced network analytical methods to rigorously evaluate the role of ethnicity in different positive and negative relationship types while accounting for other relevant relationship-generating

mechanisms. Meta-network analyses further allow exploring how the degree of ethnic homophily predicts inter- and intra-ethnic dislike and violence tendencies across schools.

1.4 General dissertation framework

Figure 1.1 General dissertation framework combining social network and ecological perspectives for studying ethnic peer relations in school.



Note. Fictitious school grade network where each node represents a student, each tie represents a relationship (e.g., friendship or dislike), and node colours indicate different individual attributes (e.g., students' distinct ethnic origins). The dashed rectangles indicate the location of the three studies of this dissertation within this multi-level framework.

Figure 1.1. illustrates this dissertation's general framework to inquire into the interplay between social integration and cultural aspects among adolescents in the school context, combining a social network perspective with an ecological perspective. All studies in this dissertation focus on social integration in the school context. Against the backdrop of ethno-religious diversity and compulsory schooling in Germany, schools are a key social context where adolescents have the opportunity to build relationships with peers of different ethno-religious backgrounds. To investigate the interplay between social integration and cultural aspects, this

dissertation considers the broader sociocultural context of students' relationships beyond school. Against the background of an ecological perspective, schools are no isolated microcosms of peer relations. Rather, social integration between students is also shaped by other sociocultural contexts in which they are directly involved, such as their family, their peer group or leisure-time activities. These immediate contexts can interact, together forming a meso-level system that influences adolescents' intergroup relationships within the school context. An ecological perspective also recognises that students and the relations they form result in local configurations at the personal network level and also higher-order networks, like at the school grade level. The characteristics of these lower- and higher-order networks themselves are social contexts that may shape students' peer relations and integration outcomes.¹³ However, broader social entities located within the macro-level system, such as the norms of ethnic and religious groups, also influence social integration in schools by affecting lower-level systems and processes within an adolescent's social ecology. Against this background, this dissertation demonstrates how relationship formation in school is intertwined with students' external social realities and group affiliations.

By combining a social network perspective with an ecological perspective, this dissertation can address distinct research questions and explore different aspects of ethnic peer relations in school. Each study examines a specific aspect of the interplay between social and cultural dimensions of integration which materialises at different intersections of lower- and higher-order levels (micro/meso/macro): Study 1 focuses on the role of ethnic origin in positive and negative relations among the same set of students in the school context, recognising the multidimensionality of peer relations. In addition, by considering the overall school grades' network characteristics as a higher-order social context that shapes student interactions, this study probes previous assumptions that contexts characterised by a higher degree of ethnic homophily in friendships exhibit higher levels of inter-ethnic rather than intra-ethnic dislike and physical violence. Study 2 zooms in on micro-level structures of friendships, specifically

¹³ While Bronfenbrenner's ecological model highlights that adolescents can be simultaneously embedded in multiple sociocultural contexts (e.g., family, peers, school) and that these different contexts can mutually influence each other and thus collectively shape adolescents' behaviour and experiences (mesosystem), the network ecology approach brings networks to the foreground (see also Chapter 1.3.2). This approach emphasises both higher-level networks and their features (e.g., the degree of ethnic homophily in school grade friendship networks) and local network configurations (e.g., ethnic brokerage in personal friendship networks) as forces that influence adolescents' social experiences and interactions (see Doehne et al. 2024).

on ethnic brokerage structures in personal networks where an individual is friends with others who belong to different ethnic groups but are not also friends with each other. It thereby contributes to closing knowledge gaps in previous research on the psychological dimensions of integration, particularly regarding the navigation of diverse norms and behavioural expectations in inter-ethnic contact. Study 3 considers how Muslim religious norms can constrain interreligious friendships of Muslim youth within the school context through their influence on out-of-school social contexts, such as parental control and leisure time activities. Thereby, it can qualify assumptions in previous research on whether and through what sociocultural channels religious norms produce a stronger ingroup bias in friendships among Muslim girls compared to Muslim boys and why it emerges in adolescence.

This analytical approach enhances our understanding of the interplay between cultural aspects and relationship formation, identifying additional influencing factors and conditionalities on the subprocesses of integration. On the following pages, I will summarise each of the three studies (see also Table 1.1 for an overview).

1.5 Summary of studies and overview

1.5.1 Summary of studies

Study 1, “Who is fighting with whom? How ethnic origin shapes friendship, dislike, and physical violence relations in German secondary schools” (Wittek, Kroneberg, and Lämmermann 2020) is fully presented in Chapter 2. This study investigated the linkages between positive and negative social relations within the school environment, focusing on the role of ethnicity therein. To do so, it examined the role of ethnic origin in shaping friendship, dislike, and violence networks while considering how dislike and physical violence are related to friendship and spending spare time together among students. Finally, the study explored how the strength of ethnic homophily in friendship relates to tendencies towards intra- vs. inter-ethnic violence and dislike, respectively, across school grades.

Data came from a large-scale network survey on over 2500 seventh-graders from 39 secondary schools in the Ruhr area in North Rhine-Westphalia, Germany (Friendship and Violence in Adolescence (FaVA)). The data was collected during autumn/winter 2013, targeting all students attending the seventh school grade in each school. The survey included all secondary school forms except special needs and upper secondary schools (German “Gymnasium”). Students’ overall participation rate was 79% (for further details, see Beier, Schulz, and Kroneberg 2014). In the final analysis sample, 59% of the students had a migration background.

This study employed exponential random graph models (ERGMs) (see Lusher, Koskinen, and Robins 2013; Robins 2011) to determine the influence of ethnic origin on friendship, dislike and violence networks of each school grade while accounting for endogenous network mechanisms (e.g., reciprocity) and the opportunity structure for relationship formation (e.g., relative ethnic group sizes and whether students live in the same neighbourhood). Furthermore, multiple parameters were included in these models to capture the interplay between the different positive and negative relationship types among students. Meta-analytical techniques (An 2015; Snijders and Baerveldt 2003), which combined the school (grade)-specific ERGM estimates, were used to identify general tendencies for inter- vs. intra-ethnic ties in dislike, violence, and friendship networks across schools. Finally, following approaches by McFarland et al. (2014) and Smith et al. (2016), the study used fixed-effects meta-regressions to explore the co-variation of ethnic homophily in friendships and the tendency towards intra- vs. inter-ethnic dislike and violence relations across school grades.

In line with the study's expectations about the interplay between positive and negative relationship types among students, the network analyses showed that physical violence (a relational behaviour) and dislike (a relational cognition) relate in a contrary fashion with friendship and social closeness. Two students were more likely to dislike one another the greater their social distance, i.e. the further apart students were in the school grade's friendship network. Physically violent interaction, by contrast, was more likely to occur the closer two students were in the friendship network. Also, spending leisure time together outside school made physical fighting between two students more likely. The results were also consistent with the study's hypotheses on the role of ethnic origin in shaping friendship, dislike and violence relations. The results revealed a general tendency towards ethnic homophily in friendship networks – friendships tended to be more frequent among co-ethnics, net of other mechanisms of relationship formation. This result aligns with previous research on the role of ethnic origin in educational settings (e.g., Baerveldt et al. 2004; Kalter and Kruse 2015; Smith et al. 2016, 2014a). For dislike relations, the results revealed a tendency towards ethnic heterophobia, meaning that students were more likely to dislike ethnic outgroup members than same-ethnic peers, net of other mechanisms of relationship formation. This evidence is consistent with the results obtained by Boda and Néray (2015) in Hungarian secondary schools. However, physically violent interactions in turn tended to be more likely between students of the same ethnic origin than across ethnic groups. This finding was partly accounted for by the higher likelihood of violent interactions among students who are close in the friendship network and

who spend time together outside of school, as analyses that considered the interplay between positive and negative relationship types illustrated. In addition, the contextual analyses across schools showed that in schools with stronger ethnic homophily in the friendship network, ethnic heterophobia – the tendency among students to dislike ethnic outgroup members – was more pronounced, as expected. This finding aligns with the notion in previous research that ethnic homophily in positive relationships is associated with negative inter-ethnic sentiments (e.g., Smith et al. 2016). However, in line with the study’s expectations, this association did not apply to physical violence. By contrast, in schools where students exhibited stronger ethnic homophily in friendships, also hitting or kicking tended to take place within rather than across ethnic groups. This finding calls into question the assumption delineated in previous peer victimisation research that links ethnic segregation with higher victimisation by members of ethnic outgroups (e.g., Kawabata and Crick 2011; Vervoort et al. 2010; Walsh et al. 2016).

Study 2, “Mental wellbeing and ethnic brokerage in friendship networks of adolescents in German secondary schools” (Lämmermann 2025) is presented in full in Chapter 3. This study examined whether brokerage between friends – having friends who are not friends with each other – is linked to lower mental wellbeing for adolescents, with a particular focus on the role of ethnicity. It investigated whether this negative relationship is stronger for brokerage between friends of different ethnic backgrounds (inter-ethnic brokerage) than for brokerage between friends of the same ethnic background (intra-ethnic brokerage). Additionally, to evaluate the role of the broker’s own ethnicity, the study evaluated whether the negative association between inter-ethnic brokerage and mental wellbeing is more pronounced when the broker has the same ethnic origin as one of the friends (biased inter-ethnic brokerage) compared to when the broker has no shared ethnic background with any of the friends (unbiased inter-ethnic brokerage). Finally, to test a suggestion from previous research (Mollenhorst et al. 2015), the study also explored whether the association between ethnic brokerage and mental wellbeing differs between ethnic minority and ethnic majority brokers.

The analyses drew on data from more than 2700 seventh-graders from 39 schools in North Rhine-Westphalia, Germany, from a large-scale network study (Social Integration and Boundary Making in Adolescence (SOCIALBOND)). The data was collected during the autumn/winter period in 2018/2019, targeting all students attending the seventh school grade in each school. The survey included all secondary school forms except for special needs schools. Overall, 76% of students participated in the study. In the final analysis sample,

students were, on average, 12.87 (SD = 0.59) years old, about 53% were boys, and 56% belonged to an ethnic minority group.

To identify micro-level brokerage structures and to assess each student's involvement as a broker, the overall friendship network of a school grade was first decomposed into smaller, personal networks, identifying each student's immediate friendship network. Next, brokerage structures within each student's friendship network were identified, that is, when a student connected two friends who were not friends with each other. This structural information was then combined with data on the student's and the respective friends' ethnic origins, which allowed the classification of brokerage structures as either intra-ethnic or inter-ethnic. In terms of analysis methods, the study employed linear regression models with cluster-robust standard errors at the school grade level (Cameron and Miller 2015) to examine whether and how ethnic brokerage is associated with lower mental wellbeing. To ascertain whether the association between inter-ethnic brokerage and mental wellbeing varies between ethnic majority and minority groups, the study conducted separate analyses for each group. Additional analyses were performed on the full sample to assess the statistical significance of the differences using interaction effects between minority status and inter-ethnic brokerage variables.

Consistent with the expectations of the study and previous research (Krackhardt 1999; Mollenhorst et al. 2015), the empirical analyses revealed that brokerage between friends was related to lower mental wellbeing among students and that ethnic origin played an important role for this relationship: Brokerage between friends of different ethnic origin (inter-ethnic brokerage) was significantly related to lower mental wellbeing whereas brokerage between friends of the same ethnic origin (intra-ethnic brokerage) showed a weaker and non-significant relationship with lower mental wellbeing. Considering the broker's own ethnic background for inter-ethnic brokerage, there was no stronger negative association with mental wellbeing for biased inter-ethnic brokerage than for unbiased inter-ethnic brokerage, contrary to theoretical expectations. Furthermore, the additional analyses examining differential effects for ethnic majority and ethnic minority students revealed no significant group differences in the association between inter-ethnic brokerage and mental wellbeing. This finding contrasts with earlier research by Mollenhorst et al. (2015:910), who suggested greater negative consequences of inter-ethnic brokerage for ethnic minority individuals.

Study 3, "How Gendered Religious Norms Contribute to the Emerging Gender Gap in Muslim Youths' Interreligious Friendships" (Kretschmer, Lämmermann, and Leszczensky

2024) is presented in full in Chapter 4. Against the background that recent research has demonstrated that during adolescence, Muslim girls increasingly have ingroup friendships while Muslim boys remain more open to interreligious friendships (Kretschmer and Leszczensky 2022, 2023), this study examined whether and how religious endogamy and chastity norms contribute to this gendered developmental pattern in Muslim youth's interreligious friendships. It identified three factors in Muslim youth's lives related to these norms – individual religiosity, parental control, and leisure time activities – and explored two mechanisms through which these norm-related factors may contribute to the emergence of a gender gap: through their gender-specific development over time (e.g., Muslim girls may increasingly limit leisure time activities with regular outgroup contact compared to boys) and through their gender-specific effects in adolescence (e.g., although Muslim parents may control the behaviour of both their sons and daughters, their tolerance of interreligious contact may be lower for their daughters). In addition, Study 3 considered the potential influence of discrimination by non-Muslims, as different experiences of discrimination may further contribute to a gendered pattern of ingroup bias in Muslim adolescents' friendships.

Study 3 used longitudinal network data from the Friendship and Identity in School (FIS) survey (Leszczensky et al. 2022), covering six waves with about nine-month time lags and 2701 students from ten secondary schools in North Rhine-Westphalia, Germany. The school sample comprised lower, intermediate, or comprehensive secondary schools. In the first wave, conducted in spring 2013, all students who attended the fifth, sixth and seventh grades were targeted, with students aged 11–14. By the sixth wave, the initial seventh graders were 17–18 years old. The overall participation rate ranged from 76.3% to 88.4% across waves (Leszczensky et al. 2022). The final analysis sample comprised 737 Muslim students with 2239 observations over time from age 11 to 17; about 47% were boys.

This study employed random-effects group-specific growth curve models (GCMs; Brüderl, Kratz, and Bauer 2019; Halaby 2003) first to investigate and establish the starting point of the analyses, that is, whether ingroup bias develops differently with age between Muslim girls and Muslim boys and second, to explore whether and how the identified factors contribute to this emerging gender gap. The emerging gender gap was assessed by interacting age with gender in the GCMs. Furthermore, factor-specific analyses were conducted using two additional GCMs per hypothesised norm-related factor to assess its contribution through its gender-specific trajectories (including the factor's overall effect) and gender-specific effects (including the interaction between factor and gender). Generalized estimating equation models (GEE;

Yan, Aseltine, and Harel 2013) were employed to evaluate how much the factors individually and collectively explained the initial gender gap. All analyses included grade dummies to account for time-stable differences between school grades and those between educational tracks.

In accordance with the study's expectations and previous research (Kretschmer and Leszczensky 2022, 2023), the analyses revealed an emerging gender gap in ingroup bias among Muslims between the ages of 11 and 17. Although Muslim girls and boys displayed a comparable ingroup bias at age 11, until the age of 17, the increase in ingroup bias for Muslim girls was twice that of Muslim boys.¹⁴ Furthermore, the analyses demonstrated that the three norm-related factors – religiosity, parental control, and leisure time activities (previously demonstrated to constrain Muslim girls' interreligious romantic relationships, e.g., Carol and Teney 2015; Hennink et al. 1999) – contributed to this emerging gender gap in friendship ingroup bias, but via different pathways. Higher religiosity was associated with stronger ingroup bias for both genders. At the same time, the analyses showed that religiosity tended to increase with age among girls and decrease among boys. Religiosity thus contributed to the emergence of the gender gap, as it *developed* differently for boys and girls during adolescence. In comparison, parental control contributed to the gender gap as its *effect* differed between genders: it increased similarly for both genders during adolescence, but higher parental control was significantly related to higher ingroup bias only among Muslim girls. Leisure time activities added to the emergence of the gender gap as the analyses showed that Muslim girls' participation in clubs declined during adolescence, which was associated with higher ingroup bias for Muslim girls in contrast to boys. Collectively, these norm-related factors – religiosity, parental control, and leisure time activities – accounted for approximately one-third of the emerging gap in ingroup bias between Muslim boys and girls. The study also explored the role of discrimination by non-Muslims in adolescence, but the analyses demonstrated that gendered perceptions of discrimination and rejection did not contribute to the emerging gender gap among Muslim youth.

¹⁴ This gendered pattern only emerged among Muslim youth – additional analyses showed no emerging gender gap in ingroup bias in the non-Muslim sample (see Appendices Chapter 4 (Study 3), Appendix E).

1.5.2 Contribution to studies

Study 1 titled “Who is fighting with whom? How ethnic origin shapes friendship, dislike, and physical violence relations in German secondary schools” (Wittek et al. 2020) is co-authored by Mark Wittek, Clemens Kroneberg and me as the third author. Mark Wittek, Clemens Kroneberg, and I conceived the study. While Mark Wittek and Clemens Kroneberg were primarily responsible for drafting the introduction, theory and previous research section, I contributed an overview of previous research on the interplay of positive and negative social relations in school settings. Mark Wittek and Clemens Kroneberg conceived of the analytical strategy. Mark Wittek prepared the data for analysis and conducted the analyses; he also drafted the results section. I drafted the data and measures section, the methods section, and parts of the model specification section. All three of us edited the full manuscript before submission. As a member of the FUGJ research team, I was involved in all stages of the data collection and its design and contributed information on the project and data for this manuscript. We jointly prepared and revised the manuscript for submission and publication in *Social Networks*.

Study 2, titled "Mental wellbeing and ethnic brokerage in friendship networks of adolescents in German secondary schools" (Lämmermann 2025), is single-authored by me. I prepared and revised the manuscript for submission and publication in the *Journal of Ethnic and Migration Studies*. Clemens Kroneberg supervised the project throughout.

Study 3 titled “How Gendered Religious Norms Contribute to the Emerging Gender Gap in Muslim Youths’ Interreligious Friendships” (Kretschmer et al. 2024) is co-authored by David Kretschmer, Lars Leszczensky, and myself. David Kretschmer and I share first authorship of this study. David Kretschmer, Lars Leszczensky, and I conceived the study jointly. David Kretschmer conducted the literature review and drafted the introduction, theory, and previous research sections, while I conducted the empirical analyses and drafted the data, methods, measures, and results sections. Together, David Kretschmer and I drafted the discussion and conclusion sections. We prepared the manuscript collaboratively and contributed to all parts of the paper. Lars Leszczensky supervised the manuscript preparation. We jointly revised the manuscript for submission and publication in the *International Journal of Intercultural Relations*.

1.5.3 Tabular overview of studies

Table 1.1 Overview of studies and summary of results

	Study 1	Study 2	Study 3
Title	Who is fighting with whom? How ethnic origin shapes friendship, dislike, and physical violence relations in German secondary schools	Mental wellbeing and ethnic brokerage in friendship networks of adolescents in German secondary schools	How gendered religious norms contribute to the emerging gender gap in Muslim youths' interreligious friendships
Research questions	<ul style="list-style-type: none"> • How are dislike and physical violence embedded in friendship networks? • What is the role of ethnic origin in friendship, dislike and violence relations? • How does the strength of ethnic homophily in friendships relate to intra- vs. inter-ethnic dislike and violence across schools? 	<ul style="list-style-type: none"> • Is brokerage in general negatively related to mental wellbeing in friendship networks of adolescents? • Is this negative association stronger for brokerage between friends with different ethnic backgrounds (inter-ethnic brokerage) than between friends with the same ethnic background (intra-ethnic brokerage)? • Is the negative relation between inter-ethnic brokerage and mental wellbeing stronger when the broker shares ethnic group membership with one friend (biased inter-ethnic brokerage) than when the broker does not share ethnic group membership with any of the brokered friends (unbiased inter-ethnic brokerage)? • Are there differential effects for minority and majority brokers? 	<ul style="list-style-type: none"> • Does a gap in religious ingroup bias emerge between Muslim boys and girls in adolescence? • Are gendered religious norms targeted at interreligious romantic relationships also responsible for the gender gap in Muslim youths' interreligious friendships, which emerges in adolescence? • How do individual religiosity, parental control, and leisure time activities shape the friendship-making of Muslim boys and girls? • Do these norm-related factors influence gendered interreligious friendship-making because they develop differently or because they have different effects among Muslim boys and girls? • Do non-Muslim youth contribute to the emerging gender gap among Muslims, because Muslim boys and girls have different experiences of discrimination and rejection by non-Muslims in adolescence?
Dependent variable	<ul style="list-style-type: none"> • Friendship, violence and dislike networks at the school grade level 	<ul style="list-style-type: none"> • Individual mental wellbeing 	<ul style="list-style-type: none"> • Individual Muslim ingroup bias in friendships

(Table continued on next page)

	Study 1	Study 2	Study 3
Core independent variables	<ul style="list-style-type: none"> • Ethnic origin; multiple parameters to capture the interplay between friendships, spending spare time, violence and dislike: <ul style="list-style-type: none"> ○ entrainment effects to study the co-occurrence of relations (e.g., how likely is a violence relation between two students who share a friendship relation) ○ parameters to assess the role of social closeness in the friendship network for the occurrence of negative relations (based on shortest path length measures) 	<ul style="list-style-type: none"> • Different measures to capture ethnic brokerage structures in a student's friendship network: <ul style="list-style-type: none"> ○ number of unique pairs of friends who are not friends with each other and who have different (inter-ethnic brokerage) or the same ethnic origin (intra-ethnic brokerage). ○ inter-ethnic pairs further distinguished by whether the student shared ethnic origin with one friend (biased inter-ethnic brokerage) or neither friend (unbiased inter-ethnic brokerage). 	<ul style="list-style-type: none"> • Individual religiosity; parental control of friendships; leisure time activities that can provide opportunities for outgroup contact; • Perceived religious discrimination and public rejection of Islam
Data	<ul style="list-style-type: none"> • Friendship and violence in adolescence (FaVA), wave 1 (autumn/winter 2013) 	<ul style="list-style-type: none"> • Social integration and boundary making in adolescence (SOCIALBOND), wave 1 (autumn/winter 2018/2019) 	<ul style="list-style-type: none"> • Friendship and identity in school (FIS, Leszczensky et al. 2022), waves 1-6 (spring 2013-spring 2017)
Analytical method	<ul style="list-style-type: none"> • School(grade)-specific exponential random graph models (ERGMs); • Multivariate fixed-effects meta-analyses of friendship; dislike and violence networks on the school(grade) level; • Fixed-effects meta-regressions to study variation in network mechanisms across school grades (i.e. schools) 	<ul style="list-style-type: none"> • Linear regression models with cluster-robust standard errors at the school grade level; • Subsample analyses and interaction effects to investigate differences between ethnic minority and majority students 	<ul style="list-style-type: none"> • Random-effects growth curve models (GCMs) with group-specific growth curves by interacting age with gender to evaluate the emergence of gender gap in ingroup bias. • Separate analyses (GCMs) of each norm-related factor's contribution through gender-specific trajectories (including the factor's overall effect) and gender-specific effects (including the interaction between factor and gender) • Generalized estimating equation models (GEE) to evaluate how much factors individually and collectively explained of the initial gender gap (i.e., coefficient changes in the interaction effect age*gender) • All analyses include school grade dummies.

(Table continued on next page)

	Study 1	Study 2	Study 3
Findings	<ul style="list-style-type: none"> • Ethnic homophily in friendship networks and ethnic heterophobia in dislike networks; physical violence is more likely between students of the same rather than different ethnic origins. • Higher likelihood of violent interaction among students who were close in the friendship network and who spend leisure time together. • Schools with stronger ethnic homophily in friendships showed stronger ethnic heterophobia in dislike but a stronger tendency for intra-ethnic compared to inter-ethnic violence relations. 	<ul style="list-style-type: none"> • Brokerage was negatively associated with mental wellbeing • The negative association was stronger for inter-ethnic brokerage than intra-ethnic brokerage. • The negative association was not stronger for biased inter-ethnic brokerage than for unbiased inter-ethnic brokerage. • No difference between ethnic minority and ethnic majority students. 	<ul style="list-style-type: none"> • Emerging gender gap in ingroup bias among Muslims between the ages of 11 and 17. Until the age of 17, girls' increase was twice that of boys. • Religiosity, parental control, and leisure time activities contributed to it through gender-specific trajectories or gender-specific effects. • Collectively, these factors explained one-third of the gender gap. • Gendered experiences of religious discrimination and rejection did not contribute to the emerging gender gap.
Co-Authors	<ul style="list-style-type: none"> • Mark Wittek and Clemens Kroneberg, with me as third author 	<ul style="list-style-type: none"> • Single-authored 	<ul style="list-style-type: none"> • David Kretschmer and Lars Leszczensky, with David Kretschmer and me sharing first authorship
Current Status	<p>Published</p> <p>Wittek, Mark, Clemens Kroneberg, and Kathrin Lämmermann. 2020. 'Who Is Fighting with Whom? How Ethnic Origin Shapes Friendship, Dislike, and Physical Violence Relations in German Secondary Schools'. <i>Social Networks</i> 60:34–47. doi:10.1016/j.socnet.2019.04.004.</p>	<p>Published</p> <p>Lämmermann, Kathrin. 2025. 'Mental Wellbeing and Ethnic Brokerage in Friendship Networks of Adolescents in German Secondary Schools'. <i>Journal of Ethnic and Migration Studies</i> 51(3):915951. doi:10.1080/1369183X.2023.2290989.</p>	<p>Published</p> <p>Kretschmer, David, Kathrin Lämmermann, and Lars Leszczensky. 2024. 'How Gendered Religious Norms Contribute to the Emerging Gender Gap in Muslim Youths' Interreligious Friendships'. <i>International Journal of Intercultural Relations</i> 98:101919. doi:10.1016/j.ijintrel.2023.101919.</p>

2 Who is fighting with whom? How ethnic origin shapes friendship, dislike, and physical violence relations in German secondary schools (Study 1)¹⁵

2.1 Abstract

This study examines the role of ethnic background for friendship, dislike, and violence networks in secondary school. We analyze data on multiple networks from a large-scale study of more than 2500 seventh-graders in Germany. In addition to ethnic homophily in friendship networks, our results reveal a tendency among students to dislike ethnic outgroup members (ethnic heterophobia). However, students are more likely to engage in violence towards same-ethnic peers than outgroup members. This is partly due to the greater prevalence of violence among students who are close in the friendship network and students who spend time together outside of school. Moreover, schools marked by stronger ethnic homophily in friendships tend to display higher levels of ethnic heterophobia but exhibit higher levels of intra-ethnic rather than inter-ethnic violence.

Keywords: Ethnic homophily; Violence; School networks; Multiplex networks; Exponential random graph models; Bullying

¹⁵ This chapter presents Study 1 in its published form, with only the citation style, formatting, and placement of tables and figures adjusted where necessary: Wittek, Mark, Clemens Kroneberg, and Kathrin Lämmermann. 2020. ‘Who Is Fighting with Whom? How Ethnic Origin Shapes Friendship, Dislike, and Physical Violence Relations in German Secondary Schools’. *Social Networks* 60:34–47. doi:[10.1016/j.socnet.2019.04.004](https://doi.org/10.1016/j.socnet.2019.04.004).

2.2 Introduction

During the last decades, Western Europe has experienced increasing levels of ethnic diversity, which has become a contested issue in political and public discourse (Albahari 2015; Carrera et al. 2015; Castles, Haas, and Miller 2013). A key question for societies, policymakers, and scholars alike is how to ensure that societies will not become disintegrated through segregation along ethnic lines and inter-ethnic conflict. Against this background, it is essential to gain a deeper understanding of the mechanisms that underlie positive or negative relations within and between ethnic groups. We contribute to this task by examining ethnic segregation in social networks of friendship, dislike, and violence in the school setting.

Schools are institutions with the potential to promote a societal climate of mutual understanding, tolerance, and respect among ethnic groups and foster the social integration of ethnic minorities (Aboud et al. 2012). The literature on social networks in schools has long recognized the significance of ethnicity and race for tie formation. Analyzing complete networks among schoolchildren, studies have repeatedly found evidence for ethnic homophily – the tendency to form ties with one’s co-ethnics rather than outgroup members, above and beyond other known principles of tie formation (McPherson et al. 2001; Moody 2001; Wimmer and Lewis 2010). These studies have focused almost exclusively on friendships or other positive relations (Baerveldt et al. 2004; Kruse et al. 2016; Moody 2001; Mouw and Entwisle 2006; Munniksmas et al. 2016; Smith et al. 2016, 2014a; Wimmer and Lewis 2010).

In contrast, far less is known about ethnic segregation in negative social ties among schoolchildren. The few studies that use data on complete social networks have examined one particular negative tie type in isolation, focusing on the role of ethnic background for bullying (Kisfalusi et al. 2018; Tolsma et al. 2013), being mean to a classmate (Wölfer et al. 2017) or a combined measure of dislike and hate (Boda and Néray 2015). Based on a sample of Hungarian secondary schools, Boda and Néray (2015) reported a tendency toward ethnic heterophobia between Roma and non-Roma students in terms of dislike and hate. Using data from the same study, a recent analysis of bullying relations reported a more complex pattern: Not only non-Roma students but also Roma students are more likely to report that they bully peers they perceive as Roma compared to peers they perceive as non-Roma (Kisfalusi et al. 2018). Similarly, Tolsma et al. (2013) observed no clear tendency toward inter-ethnic bullying in a study of Dutch primary schools: Contrary to their theoretical expectations, inter-ethnic bullying was just as common as bullying within one’s own ethnic group.

These mixed findings might originate in differences across types of social ties (dislike vs. bullying), age groups, ethnic groups, countries, or methods. To advance our understanding of negative ties and the role of ethnic origin therein, it is therefore crucial to simultaneously investigate the co-occurrence of positive and negative ties among the same set of actors (Harrigan and Yap 2017; Huitsing et al. 2012; for so-called entrainment effects, see conceptually Lusher et al. 2013; Lusher and Robins 2013). In particular, the conditions for inter-ethnic hostility – whether in terms of dislike or overt behavior such as bullying – warrant further attention.

Against this background, our study extends the literature on ethnic segregation in the social networks of schoolchildren in three important ways. First, we develop a more comprehensive perspective on ethnic segregation of peer relations in the school context. While previous research has mostly focused only on friendships or one particular type of negative tie, we examine the co-occurrence of friendship ties with two types of negative ties – dislike and physical violence – on the same set of actors.

Second, we advance the theoretical understanding of negative ties by directing attention to the differences between dislike as a relational cognition and physical violence as a relational behavior. As the nature and determinants of these two types of negative ties are fundamentally different, they are also differentially associated with students' ethnic background and friendship relations.

Third, we derive implications of our arguments for contextual variation across schools. In particular, we examine how the strength of ethnic homophily in friendships maps on to tendencies to form inter-ethnic rather than intra-ethnic dislike and violence ties. Previous work assumes a “dark side” of ethnic segregation in friendship networks as a possible symptom or cause of threat perceptions and hostile inter-group relations (Boda and Néray 2015; Smith et al. 2016). Our study qualifies this conflict assumption: while dislike as a negative sentiment is indeed more likely to occur across group boundaries, physical violence as a negative behavior is more likely to be a within-group phenomenon, especially in segregated environments.

Our analyses use new data on more than 2500 schoolchildren in 39 schools in Germany. The sample is ideally suited for our objectives due to the large sample size and relatively large grade-level networks along multiple dimensions. To study these multiple networks, we apply exponential random graph models (Lusher et al. 2013) in combination with multivariate meta-

analysis and meta-regression techniques (An 2015). This allows us to answer the following research questions:

- (1) For secondary school children, how are dislike and physical violence embedded in friendship networks?
- (2) What is the role of ethnic origin for friendship, dislike and violence relations?
- (3) How does the strength of ethnic homophily in friendships relate to intra- vs. inter-ethnic dislike and violence across schools?

Our findings reveal the distinct characters of dislike and violence as negative ties and show that stronger ethnic homophily in friendship networks tends to amplify the greater relative prevalence of *inter*-ethnic dislike and *intra*-ethnic violence. The study demonstrates the potential of a multi-dimensional view of ethnic segregation in the social networks of schoolchildren and serves to qualify overly alarmist portrayals of ethnic segregation of friendship networks as being indicative of overt intergroup conflict.

2.3 Theory and previous research

In this section, we first discuss dislike and violence as two different types of negative ties and their relations with friendships in the school setting. We then derive implications for the role of ethnic background in networks of positive and negative ties and discuss the common view that schools with ethnically segregated friendship networks might provide fertile grounds for inter-ethnic dislike and violence.

2.3.1 Dislike and violence: Different types of negative ties in the school setting

Dislike and violence are important types of negative ties that can have serious consequences for rejected peers (Parkhurst and Asher 1992), victims (Due et al. 2005; Hawker and Boulton 2000), and offenders (Kaltiala-Heino et al. 2000) and may provide the building blocks for social disintegration in schools. In this study, violence is defined narrowly as a behavior that causes physical harm towards others, such as hitting or kicking someone (Kaye and Erdley 2011). In comparison, dislike is a negative affective sentiment towards another person. Following Borgatti et al. (2013: 13), we can classify dislike as a relational cognition which expresses a negative affective evaluation, while violence is a behavior – either a singular relational event or more regular negative interactions between certain individuals that can even give rise to relational roles (as in bully-victim relations, see Huitsing et al. 2014; Olweus 1996).

Causal feedback processes are likely to link both types of negative ties: Victimization may lead to dislike between individuals, while dislike might at times provide the basis for acts of physical

aggression. To the extent that this reciprocal causation operates in the school context, the following hypothesis should hold:

H1. Dislike and violence co-occur more frequently than would be expected by chance.

However, it would be wrong to perceive of violence exclusively as a manifestation or cause of strong feelings of dislike. Upon closer scrutiny, dislike and violence are markedly different. This becomes clear once we take into account the causes and consequences of these types of negative ties and their social embeddedness in friendship networks.

As a negative relational cognition, dislike should be rather opposed to positive relationships such as friendship. Although peers can also have ambivalent relationships marked by positive as well as negative sentiments (see Methot, Melwani, and Rothman 2017), we expect friendship and dislike to co-occur only rarely. This already follows conceptually from the understanding of friendships as positive social relationships based on reciprocal affection (Hays 1988; see also Bukowski, Newcomb, and Hartup 1998:1). It is also in line with balance theory (Heider 1946), as individuals should act to dissolve situations of cognitive dissonance in which they feel dislike towards one of their friends. Within the literature on friendship and dislike, several recent studies found friends to align in their feelings or perceptions of dislike towards other students (Berger and Dijkstra 2013; Fujimoto et al. 2017; Pál et al. 2016; Rambaran et al. 2015). Moreover, dislike as a negative sentiment generally leads individuals to avoid the disliked others (Harrigan and Yap 2017). Taken together, the reduction of cognitive dissonance and avoidance of disliked others should make it unlikely that dislike occurs frequently in close friendship circles. Indeed, dislike should become increasingly likely the more distant schoolmates are in the friendship network. At the same time, there is a countervailing effect, as dislike will be unlikely unless there is a minimum amount of exposure and contact. These arguments lead to the following hypothesis:

H2. Dislike is rarely present among friends and becomes more likely the more distant students are in the friendship network, until distance makes contact unlikely.

In comparison, violence follows markedly different mechanisms. As a behavior, violence tends to involve greater risks than disliking someone (see Windzio and Bicer 2013). Engaging in acts of violence towards schoolmates means to break the official rules of schools, if not the law (Wikström and Treiber 2009). In addition, violence can lead to retaliation or loss of status, but also to a gain in social standing in the peer group – depending on the outcome of the physical confrontation and its evaluation by friends and other peers (Faris and Felmlee 2014; Veenstra

et al. 2010). Its greater potential costs should make violence much rarer than dislike. Even more importantly, the likelihood of inter-personal violence is strongly affected by frequency of contact and exposure to unsupervised settings.

Socially close children, such as friends or members of the same friendship group, usually spend more time with each other (e.g., in school breaks or in their leisure time) than with other students, and this greater exposure comes with a greater probability of provocations and other strain-inducing events or frictions. Moreover, as some of this contact will take place outside of school, it might involve unstructured and unsupervised time with peers that is known to be conducive to violence and delinquency (Clarke and Felson 1993; Osgood et al. 1996). Hence, applying this insight from routine activity theory, we expect opportunities and motivations for inter-personal violence to be more frequent among friends and the risk of formal sanctions to be lower, especially when they meet outside of school.

While it might seem paradoxical from a balance-theoretic perspective that friends fight with each other, motivation to do so may arise from various sources. Previous studies have argued that adolescents' goal to secure or improve social status often motivates them to target socially close individuals (e.g., Felmlee and Faris 2016; Gould 2003; Sijtsema et al. 2009; see also Gravel et al. 2018). Moreover, due to the prior investments, positive feelings and rewards that bind friends together, these positive relationships tend to be retained even when physical aggression erupts situationally. Hence, the avoidance mechanism that leads dislike and friendship to drift apart in schoolchildren's social relations does not operate in the same way for friendship and violence. On the contrary, the fact that violence is a function of exposure, time spent in unsupervised settings, and adolescents' competition for status means that violence should become increasingly *unlikely* the more distant schoolmates are in the friendship network. Again, however, this effect will attenuate once social distance becomes so large that students are not likely to interact at all:

H3. Violence is more frequent among friends and less likely the more distant students are in the friendship network, until distance makes contact unlikely.

Hence, although dislike and violence as negative ties are sometimes directed towards the same individuals, they relate very differently to students' friendship networks. This is also true with regard to spending time outside of school: While students are unlikely to spend more time than necessary with others they dislike, contact in settings with reduced supervision makes violence more likely.

H4. Spending time together outside of school is associated with an increased prevalence of violence but negatively associated with dislike.

Previous research already sheds some light on the conjecture that the vast majority of everyday acts of aggression takes place *within* the social circles constituted by positive ties. The most direct support comes from a recent study that found cyber aggression among eighth- to twelfth grade students to occur far more frequently between current or former friends and dating partners (Felmlee and Faris 2016). Moreover, there have been studies of smaller scale that reported physical aggression to occur between young friends (Crick and Nelson 2002; Mishna, Wiener, and Pepler 2008).

2.3.2 Ethnic segregation in positive and negative ties among schoolchildren

Our theoretical discussion carries important implications for the role of ethnic origin for positive and negative ties in the school setting. A large body of research has focused on friendship networks and suggests a lack of meeting opportunities and preferences for same-ethnic others as two broad classes of causes that underlie ethnic segregation. Meeting opportunities are largely a function of relative group sizes in the school but also of residential ethnic segregation in the surrounding communities (Kruse et al. 2016; Mouw and Entwisle 2006; Schlueter 2012) and the allocation of students to different classrooms or tracks (Leszczensky and Pink 2015). Lacking a direct measure of same-ethnic preferences, ethnic homophily is commonly defined as the degree of ethnic segregation in networks that remains after controlling for the opportunity structure and other important mechanisms such as reciprocity or triadic closure (Smith et al. 2016; Wimmer and Lewis 2010). Most studies find at least some degree of ethnic homophily in friendship networks (Baerveldt et al. 2004; Kruse et al. 2016; Leszczensky and Pink 2015; Moody 2001; Mouw and Entwisle 2006; Smith et al. 2016, 2014a).

In comparison, studies on the role of ethnic origin for negative ties in the school setting are few and far between (Boda and Néray 2015; Kisfalusi et al. 2018; Tolsma et al. 2013; Wölfer et al. 2017). Theoretically, Boda and Néray (2015) use social identity theory to argue for a greater prevalence of dislike relations across rather than within ethnic groups. Social identity theory assumes humans to strive for a sense of self-worth derived from group membership (Tajfel and Turner 1979). One strategy to establish positive self-esteem connected to an in-group is to seek a clear distinction from and devaluation of the outgroup. This mechanism should provoke not only negative feelings towards the outgroup in general, but also make dislike ties to outgroup

members more likely than to members of the ingroup (Boda and Néray 2015:59). Similarly, conflict theory can be used to derive this tendency towards ethnic heterophobia (Blalock 1967; Bobo and Hutchings 1996; Horowitz 1985). This theory assumes members of different ethnic groups to feel threatened by each other when the groups compete for scarce resources, such as social status. Such threat perceptions have been argued to make students prefer same-ethnic over cross-ethnic friends (Smith et al. 2016:1229–35). In the same way, these threat perceptions might lead to more dislike relations across group boundaries than within ethnic groups.

Support comes from the study by Boda and Néray (2015), who examined friendships and negative ties between Roma and non-Roma students in Hungarian secondary schools. Their results showed that majority students tend to dislike peers whom they perceive as minorities rather than perceived majority members. Moreover, the salience of Roma ethnicity in these Hungarian schools allowed the authors to measure and gain insights on the significance of self-declared and perceived ethnicity: Minority students were likely to befriend perceived minority classmates who also declared themselves as Roma but tended to dislike them if they declared themselves as non-Roma.

While this study used a combined measure of negative ties based on dislike and hate (Boda and Néray 2015:60–61), we will distinguish between dislike as a relational cognition and violence as a relational behavior. As the nature and determinants of these two types of negative ties are fundamentally different, this should also affect their associations with ethnic background. Most importantly, our foregoing theoretical discussion cautions against the analytical short circuit from inter-ethnic dislike to inter-group violence. Tellingly, the recent analysis of bullying relations by Kisfalusi et al. (2018) that used data from the same study as Boda and Néray (2015) reports a more complex pattern: Not only non-Roma students but also Roma students are more likely to report that they bully peers they perceive as Roma compared to peers they perceive as non-Roma. Similarly, in an analysis of Dutch primary schools, Tolsma et al. (2013) found inter-ethnic bullying to be just as common as bullying within one's own ethnic group. As the authors conclude, these results do not support the theoretical arguments that ethnic prejudice or ethnicity as a signal of someone's otherness translates into inter-ethnic bullying (Tolsma et al. 2013:57).

Our foregoing discussion yields a markedly different theoretical expectation as it implies a greater prevalence of violence within rather than between ethnic groups. Negative sentiments usually lead to avoidance rather than generating active hostility (Harrigan and Yap 2017).

Given the greater likelihood of violence within the social circles constituted by positive ties and the common tendency towards ethnic segregation of friendships, schoolchildren should be more likely to attack same-ethnic peers than outgroup members. To summarize, we arrive at the following hypotheses on the relevance of ethnic background for friendship, dislike and violence:

H5. Friendship networks tend to exhibit ethnic homophily.

H6. Dislike nominations tend towards ethnic heterophobia.

H7. Violence is more frequent between students of the same ethnic origin than across ethnic groups.

As this last hypothesis is based on the argument that everyday violence takes place primarily within the social circles constituted by positive ties, we can derive another testable implication:

H8. The greater prevalence of violence within ethnic groups as opposed to across ethnic groups is due to the greater prevalence of violence among students who are close in the friendship network and students who spend time together outside of school.

2.3.3 School-level implications: how ethnic homophily in friendships relates to intergroup dislike and violence

Even if a general tendency towards inter-ethnic violence seems unlikely, ethnic origin might be a highly salient “conflictual” or “polarizing” attribute in certain contexts (Harrigan and Yap 2017:139). In such situations, inter-ethnic dislike might become strong enough to overcome the tendency towards avoidance and instead generate active hostility. This idea is featured prominently in previous research on schools. Although most social network studies have focused on friendships, a recurring motivating assumption has been that ethnic homophily in friendship networks is problematic, as it may be a symptom or a cause of threat perceptions and hostile inter-group relations (Boda and Néray 2015; Smith et al. 2016). More explicitly, work on peer victimization has argued that particular ethnic compositions or ethnic segregation of friendships lead to higher peer victimization across ethnic groups (Agirdag et al. 2011; Durkin et al. 2012; Kawabata and Crick 2011; Thijs and Verkuyten 2014; Walsh et al. 2016). For example, Walsh and colleagues reason that “higher percentages of immigrants in school are related to more within ethnic group friendships or ‘ethnic homophily’ (Titzmann and Silbereisen 2009), which might be associated with fighting and tension occurring on an intergroup basis.” (Walsh et al. 2016:11). Theoretically, the underlying argument is that a

preference for same-ethnic over cross-ethnic friends (i.e., ethnic homophily) might be indicative of threat perceptions (see also Smith et al. 2016:1229–35), ethnic prejudice, or outgroup denigration – which might provide a fertile ground for inter-ethnic dislike and violence.

However, upon closer scrutiny, research on peer victimization has not produced conclusive evidence on the hypothesized relationship between ethnic homophily in friendships and inter-ethnic violence. Most studies on peer victimization lack social network data that would allow them to ascertain the identity and ethnic group membership of the perpetrators (Agirdag et al. 2011; Durkin et al. 2012; Kawabata and Crick 2011; Thijs and Verkuyten 2014; Walsh et al. 2016). Hence, higher levels of victimization in ethnically segregated schools could also be due to a greater prevalence of violence *within* ethnic groups.

Again, our theoretical arguments on the differences between dislike and violence lead us to question the assumption that ethnic homophily in friendship networks will yield a greater inclination to fight between, rather than within ethnic groups. Schools where students have a pronounced preference for same-ethnic friends might indeed also exhibit more inter-ethnic than intra-ethnic dislike ties. But to the extent that such ethnic homophily leads to more exposure and contact among co-ethnics, everyday acts of physical violence should also be more frequent within rather than between ethnic groups. We therefore arrive at the following school-level hypotheses:

H9. Stronger ethnic homophily in friendship networks is associated with more inter-ethnic than intra-ethnic dislike.

H10. Stronger ethnic homophily in friendship networks is associated with more intra-ethnic than inter-ethnic violence.

2.4 Data and measures

2.4.1 Data

We use data from a large-scale network study among 7th graders in the Ruhr area in Germany. In winter 2013, all schools from five adjacent cities were asked to participate in the survey, with the exception of special needs schools and upper secondary schools (German “Gymnasium”). This metropolitan area and selection of schools yield a sample of high ethnic diversity as well as a relatively high-risk sample in terms of delinquency. The Ruhr area represents the largest urban area in Germany, is characterized by the downfall of the coal

mining industry and relatively high levels of unemployment, and is home to a large share of the population with a migration background.

A total of 39 out of 44 schools participated, 122 school classes were surveyed, and the average number of students per grade was 66.62 (SD = 38.07). Students' overall participation rate was 79%, which yields a sample size of 2635 (for further details, see Beier et al. 2014). After data cleaning, the analysis sample was reduced to 2598 cases. Students were 13 years old on average (SD = 0.62); 53% of the students were boys and 59% of the students had a migration background.

The survey was administered in the form of audio-enhanced, computer-assisted self-interviews, where students could additionally listen to questions and answer categories using headphones in order to reduce problems arising from language difficulties and illiteracy. The survey was conducted in classrooms during two school lessons, where trained interviewers instructed the students beforehand and supervised the survey process. Participation was voluntary and required active parental consent.

2.4.2 Measures

2.4.2.1 *Ethnic background*

We define ethnic origin based on parents' and grandparents' country of birth. If only one parent was born abroad, her or his country of birth was assigned. If both parents were born outside of Germany, the mother's country of birth was assigned (following Dollmann, Jacob, and Kalter 2014). If both parents were born in Germany but at least one grandparent was born abroad, we used the country of birth of the grandparents to assign ethnic background. Students with a migration background therefore either immigrated themselves (1st generation) or are the children of immigrants (2nd and 3rd generation). In order to avoid too sparsely populated ethnic categories and to allow for reliable statistical analysis, we distinguish between five large categories: German (40%), Turkish (29%), East (Eastern Europe and former Soviet Union: 13%), other European (North-, West-, South, and Southeast-Europe: 10%), and East Africa (6%).

2.4.2.2 *Sex, school class, and neighborhood similarity*

We control for sex due to its well-known importance for tie formation in adolescence. To capture differential opportunities to form ties to particular students, we include information on whether students belong to the same school class. For the same reason, we use students' self-reported information on the city and neighborhood they live in.

In the sociometric part of the survey, we asked students for information on different types of relationships they have with others in their grade. Each student was given a list containing all members of the school's 7th grade, sorted by classroom and alphabetically by their first name. On the list, each student's name was assigned a unique identification number beforehand. Students were asked to use this list to answer the network questions by indicating the respective student's assigned number. From this sociometric information, we constructed uniplex, grade-level networks with directed ties for friendship, dislike, violence, and spending spare time relations.

2.4.2.3 Friendship networks

Friendship relations were measured by asking students to indicate their five best friends ("Who are your best friends in your grade?"). Friendship nominations did not have to be mutual in order to count as a friendship tie between two students in our analysis. This is in line with previous research and helps to avoid underestimating existing friendship ties, since nominations were restricted to students' five best friends only (Boda and Néray 2015; McFarland et al. 2014; Smith et al. 2016).

2.4.2.4 Dislike networks

To measure dislike relations, students were asked, "Which of your schoolmates do you not like at all?" They could nominate up to ten fellow students from their grade.

2.4.2.5 Violence networks

We constructed violence networks by combining information on victimization ("Which schoolmates sometimes hit or kick you?") and information on offending ("Which schoolmates do you sometimes hit or kick?"). For both questions, students could indicate up to five schoolmates. A directed violence tie from actor i to actor j was considered present, either when actor i indicated to have hit or kicked actor j , or when actor j stated to have been hit or kicked by actor i . This measurement strategy follows the example of Felmlee and Faris (2016:7) and helps to account for underreporting due to social desirability, which is a common issue in measuring negative ties (see Robins 2015:98–99).

2.4.2.6 Spending spare time networks

In our analysis of violence relations, we also consider students' nominations in response to the question, "Which of your schoolmates do you also meet up with in your spare time?" They could nominate up to ten fellow students from their grade.

Table A1 in the Appendix provides descriptive statistics on these networks.

2.5 Methods and models

2.5.1 Exponential random graph models (ERGMs)

We model the grade-level networks of each school based on exponential random graph models (ERGMs).¹⁶ ERGMs take the global structure of a given network as the dependent variable and model it on the basis of local structural patterns (e.g., the number of reciprocated ties present). In order to infer whether a specific local structure is an important building block for the observed network's overall structure, ERGMs compare the frequency of that specific local structure in the empirical network to its average prevalence in a distribution of simulated networks. The parameter estimates derived from this estimation process thus reflect whether a specific tie-formation mechanism exists more frequently in the observed network than expected at random, given all other local structures specified in the model (see Lusher et al. 2013; Robins 2011).

In addition to network-endogenous mechanisms (e.g., reciprocity, triadic closure), ERGMs can take into account structural patterns involving actor attributes (e.g., ethnic origin), as well as the opportunity structure to form particular ties (e.g., due to relative group sizes). ERGMs therefore allow us to evaluate the importance of ethnic group membership for students' social interactions, net of network-endogenous mechanisms and opportunity structure.

2.5.2 Meta-analysis and meta-regression

We use meta-analytic techniques to combine parameter estimates from these school-specific ERGMs. We conduct multivariate fixed-effects meta-analyses in order to assess general tendencies for inter- vs. intra-ethnic ties in dislike, violence and friendship networks across our sample of schools. Like the previously proposed univariate meta-analysis, it averages coefficients of network models weighted by their standard errors (Snijders and Baerveldt 2003). In addition, the multivariate meta-analysis accounts for the interdependence of estimated parameters within each network based on their variance-covariance matrix (An 2015:48–49).

Furthermore, we employ fixed-effects meta-regressions to examine contextual predictors for the estimated ERGM parameters (similar to McFarland et al. 2014; Smith et al. 2016). In the

¹⁶ All analyses were carried out in R. We used the *ergm* package to conduct the ERGM analysis (Hunter, Handcock, et al. 2008; Hunter, Goodreau, and Handcock 2008). The *mvmeta* package was used to summarize the ERGM estimates and perform the meta-regressions (Gasparrini, Armstrong, and Kenward 2012; for an application of the package see An 2015).

final step of our analysis, we regress parameter estimates for the presence of inter- vs. intra-ethnic ties in dislike and violence on ethnic homophily in friendship networks. This allows us to consider co-variation of ERGM parameters across schools while retaining the ability of multivariate meta-analysis to account for within-network dependencies of parameters. Both multivariate fixed-effects meta-analyses and meta-regression are estimated by the generalized least square approach (see An 2015).

2.5.3 Model specifications

Our ERGM specifications were guided by previously proposed specifications to model negative ties (Boda and Néray 2015; Harrigan and Yap 2017; Huitsing et al. 2012, 2014). In an explorative modeling strategy (see Wimmer and Lewis 2010:625), we estimated a range of different specifications under various settings for the estimation process. In this iterative procedure, we aimed to achieve a balance between the number of networks that converge under a certain specification and the goodness of fit.

2.5.3.1 Structural effects

In order to control for the general tendency of adolescents to nominate schoolmates, we include the edges term in all network models. It counts all ties present in a network and therefore represents the density of the network. All models also include the *mutual* term that captures students' general tendency to reciprocate nominations of others. To account for different activity and popularity levels between actors we included geometrically weighted in- and out-degree effects for all tie types (see, e.g., Kruse et al. 2016).

While these structural effects were entered into all models, we included additional terms to the model setup of particular network types to account for their specific characteristics. In the models of friendship relations, we added the “geometrically weighted edgewise shared partner” (*GWESP*) term. The *GWESP* term captures transitivity, i.e., the tendency of actors to become friends with friends (Hunter 2007; for applications see, e.g., Smith et al. 2016; Wimmer and Lewis 2010). The likelihood of having a tie increases with each additional edgewise shared partner, but the magnitude of this increase declines with each additional one. This decreasing return of additionally shared friends is represented by the *GWESP alpha* term, which we fix to one.

Models of dislike as well as violence networks include *non-sender* and *non-receiver* terms that count the number of students who were only receiving or only sending negative ties. This takes into account the sparseness of negative ties (for a similar modeling strategy, see Boda and

Néray 2015:62). Finally, the model fit in the ERGMs for dislike relations improved by including a geometrically weighted version of the incoming non-edgewise shared partner (*GWNE SP-ISP*) and the transitive non-edgewise shared partner (*GWNE SP-OTP*) parameters. The former term models the absence of a dislike relationship between students who dislike the same students. The *GWNE SP-OTP* term counts triads in which *i* dislikes *k* and *k* dislikes *j* but there is no dislike relation between *i* and *j*.

2.5.3.2 *Effects of node-level characteristics*

We model the tendency for *ethnic homophily* in friendship networks and the corresponding tendency for intra- vs. inter-ethnic dislike and violence ties. To this end, we include a term which is based on a statistic that counts all same-ethnic ties. All cross-ethnic ties serve as the reference category. In addition, all ERGMs control for the preference to interact with partners of the *same sex* and the greater tendency of two students to interact if they are in the *same class*. Furthermore, we consider *neighborhood similarity* as an additional source of exposure.

2.5.3.3 *Entrainment effects*

In order to model interdependencies between different tie types, entrainment effects can be included in ERGMs. Entrainment describes the tendency for ties of one type to predict ties of another type (Harrigan and Yap 2017:128; Robins and Pattison 2006). To investigate the expected association between spending spare time together and violence, we include a *spare time entrainment effect* in our model of violence networks. This tendency for the two tie types – spending spare time ties and violence ties – to co-occur is measured by a statistic which counts directed ties of one type that co-occur with nominations of another type between two actors.¹⁷

Moreover, all ERGMs for dislike include violence entrainment effects, and vice versa. These effects are not only necessary to test our first hypothesis but also considerably improved model fit, allowing a greater number of networks to enter the analysis sample. Robustness analyses (available from the authors upon request) showed that the main findings are robust when excluding these entrainment effects (i.e., analyzing violence networks without controlling for dislike ties, and vice versa).

¹⁷ We specified an entrainment effect in the *ergm* package (Hunter, Handcock, et al. 2008; Hunter, Goodreau, et al. 2008) by adding an *edg cov()* term which entails the adjacency matrix of the “entraining” network.

2.5.3.4 Closeness in the friendship network

To test our theoretical expectations about the role of social closeness for the occurrence of negative ties (H2, H3), we construct a matrix entailing the shortest path between two students in the friendship network. The matrix captures the notion of “close social circles” in the friendship network as it is analogous to a distance matrix in physical space (e.g, Luke 2015:176). For instance, a pair of students sharing a friend but having no friendship themselves have a shortest path length of two since they are only connected via their mutual friend.¹⁸

By including this shortest path matrix in our ERGMs of negative ties, we estimate a parameter for the occurrence of a negative tie between a pair of students separated by an additional path in the friendship network. In addition, we include a squared version of the shortest path matrix, which entails the squared shortest paths between all students in a grade. Similar to a quadratic term in the regression framework, this squared shortest path matrix can account for a curved relationship between social closeness and negative ties, as postulated in H2 and H3. For example, if each additional path that separates students in the friendship network makes dislike between them more likely, this effect should “level off” after a certain path distance makes contact unlikely (similar to the geometrical weighting of degree effects or transitive structures).¹⁹

2.6 Results

2.6.1 Descriptive results

In Table 2.1, we report the average frequencies of and dyadic overlap between different tie types. The right-hand column shows that violence networks are relatively sparse, which resembles previous findings on negative ties (Boda and Néray 2015; Huitsing et al. 2012). The average number of friendship dyads per school (~165) is about three times bigger than the

¹⁸ We use the Dijkstra algorithm to obtain the shortest path matrices for all grades (see, e.g., West 2001), which is implemented in the *igraph* package (version 1.1.2; Csardi and Nepusz 2006). The directionality of the friendship network was not taken into account for the computation of shortest paths. To avoid problems in the estimation process, students in different components of the friendship networks were assigned a shortest path length of 10 to one another, since this path length was rarely observed empirically. The same cutoff value was chosen for the shortest distance between isolates and non-isolates in the friendship network.

¹⁹ Note that it was not possible to estimate a simple entrainment effect of friendship on dislike since friendship almost always implies the absence of dislike. Using shortest path matrices avoids this problem of perfect prediction. Hence, this analytic strategy helps to examine the relationships between tie types that are highly collinear on the dyad level.

average number of violence dyads (~58). The frequency of spending spare time together (~173) is similar to the one of friendships, while dislike ties are even more frequent (~210).

Table 2.1 Co-occurrence of different combinations of tie types in dyads

		Tie type B				Dyads per tie type
		Friendship	Spare Time	Violence	Dislike	
Tie type A	Friendship		0.624 (0.092)	0.058 (0.032)	0.005 (0.009)	165.49 (106.78)
	Spare Time	0.639 (0.058)		0.063 (0.036)	0.011 (0.025)	173.43 (122.34)
	Violence	0.202 (0.113)	0.207 (0.114)		0.275 (0.121)	57.59 (36.18)
	Dislike	0.005 (0.008)	0.008 (0.014)	0.086 (0.050)		210.10 (136.50)

Note. Numbers indicate the share of all type A dyads which are also type B dyads. We report the average of these pairwise overlaps across all 39 schools. The last column reports the mean number of dyads per tie type across schools. Standard deviations are in parentheses for the mean number of dyads and for the share of tie type co-occurrence.

As a descriptive measure for the average pairwise co-occurrence of tie types, we calculated the share of all dyads of tie type A that are also linked via tie type B. In an average school, 8.6% of all dyads related by dislike also entail a violence tie, and 27.5% of all violence dyads involve a dislike nomination. Furthermore, friendship and dislike nominations are almost mutually exclusive: On average only 0.5% of all friendship dyads simultaneously display a dislike nomination and vice versa. Spending spare time and dislike ties also co-occur rarely: On average only 1.1% of all spending spare time dyads involve dislike nominations, and only 0.8% of all dislike dyads involve reports of spending spare time together outside of school. These findings are in line with H1, H2 and H4: Whereas dislike and violence tend to co-occur in dyads, dislike ties are rarely present between two students who are connected by a friendship or spare time nomination.

To put the network correlates of violence ties into perspective, it has to be noted that a substantial proportion of students is not involved in violence at all: On average, 37% of the students in a school grade were neither involved as victims nor as offenders (see Table A1 in the Appendix). This explains why the prevalence of violence in other tie types is rather low: Only around 6% of all friendship and spending spare time dyads are marked by incidences of violence and the prevalence of violence is not much higher among students who dislike each

other (8.6%). Conversely, however, if violence occurs in a dyad, 20% of these dyads share a friendship tie, 21% share a spending spare time tie and 27.5% of all violence dyads involve dislike. Hence, to a considerable extent, violence is embedded in other types of peer relations. And while the vast majority of friends do not sometimes hit or kick each other, every fifth violence tie occurs between friends. The same holds for spending spare time dyads. This descriptive result already points towards a substantial overlap between violence and friendship as well as violence and spending time together outside of school (see H3 and H4).

2.6.2 ERGM results: Meta-analyses of friendship, dislike and violence networks

We now turn to the results of the exponential random graph models. For each tie type, our initial analysis sample comprised all 39 grade-level networks. None of the networks had to be excluded in advance due to high data quality. Between 91 and 100% of all participating students provided usable information in the network survey. Moreover, grade-level networks varied from at least 15 to 156 students. The median size was 59 students, with 75% of all networks including more than 33 students and 25% including more than 98 students.

We only included the ERGM results in the meta-analyses that indicated a good model fit. If the t-ratio for convergence was greater than 0.1 for one of the model's parameters, the model fit was considered unsatisfactory (Robins, Pattison, and Wang 2009), and all of the model's estimates were disregarded in the meta-analysis.²⁰ Additionally, we excluded models if one or more of their estimated parameters had a standard error greater than 5 (Smith et al. 2016:1259) or a magnitude outside a [-10; 10] range (Kruse et al. 2016:136). Based on these model fit criteria, a varying number of networks enter the meta-analyses depending on the network type and model specification. Furthermore, we assessed the goodness of fit (GOF) by simulating networks from the obtained ERGM results and comparing their outdegree, edgewise-shared partner and geodesic distance statistics with the ones observed in the respective network (Goodreau et al. 2008). All ERGM results reported in the results section show a mean percentage of at least 90% of GOF ratios below 2 across schools, which can be considered satisfactory (Robins and Lusher 2012).

²⁰ To ease convergence, we fixed the maximum outdegree to 5 for all tie types, which proved to provide best convergence and GOF compared to other settings. If the model showed degeneracy issues, we restarted the estimation process up to 10 times. Moreover, we provided the estimation process with the logarithmic tie vs. no-tie ratio as the initial value for the edges parameter.

2.6.2.1 Meta-analysis of friendship networks

Table 2.2 presents the results of the multivariate meta-analyses of friendship networks. We observed a tendency for reciprocity as well as a tendency for the occurrence of transitive ties, as indicated by the significant GWESP parameter. The latter tendency decreases with each additional k-shared partner of ego and alter. Friendship networks exhibited no sex differences in activity or popularity.

In line with previous research, several node-level characteristics prove important for friendships: Students are more likely to be friends when they share the same ethnic origin, the same sex, the same neighborhood, or belong to the same class in the grade (see already Kruse et al. 2016; Leszczensky and Pink 2015; Moody 2001; Mouw and Entwisle 2006; Smith et al. 2016). This can be interpreted as evidence for sex homophily and ethnic homophily and for greater opportunities to form friendships that come with greater exposure in the classroom and neighborhood.

Table 2.2 Multivariate meta-analysis of friendship networks

	M1	
	beta	s.e.
Edges	-5.78***	0.06
Mutual	2.37***	0.05
GWODEG	1.21***	0.12
GWIDEG	0.47***	0.07
GWESP	0.81***	0.01
Same class	1.15***	0.03
Same neighborhood	0.26***	0.03
Activity female	0.03	0.05
Popularity female	-0.06	0.08
Same sex	0.94***	0.03
Same ethnic	0.30***	0.02
AIC	611.80	
N	32	

Note. *beta* denotes the averaged ERGM coefficient weighted by the variance-covariance matrix of all parameters estimated per model specification with a multivariate fixed-effects meta-analysis (An 2015); *s.e.* reports the standard error associated with this averaged ERGM coefficient. †*p* < 0.10; **p* < 0.05; ***p* < 0.01; ****p* < 0.001 (two-sided).

2.6.2.2 *Meta-analyses of dislike and violence networks: Basic findings*

Table 2.3 and Table 2.4 show the results of the multivariate meta-analyses of dislike and violence networks. For both negative tie types, we first report results from a specification without the shortest path effects that capture closeness in the friendship network (M1). We then add the shortest path effects to examine how the significance of other effects – in particular the tendency towards intra- vs. inter-ethnic ties – changes once we control for closeness in the friendship network (M2). The meta-analysis of violence networks simultaneously adds the entrainment effect of spending time together outside of school.

We first describe effects that control for basic structural tendencies and remain largely constant across these model specifications. As was true for friendship networks, both dislike and violence networks exhibit a significant tendency for reciprocity. The non-receiver and non-sender terms that we included to take into account the sparseness of negative ties are particularly relevant for dislike networks. In Table 2.3, these parameters are negative and significant, which indicates that students tend to receive and send dislike nominations at the same time rather than only sending or only receiving nominations. For violence networks (see Table 2.4) only the non-receivers effect is marginally significant ($p < .10$). Its positive sign means that there tend to be more students who only send but do not receive violence ties (i.e., offenders who are not also victims) than would be expected by chance.

Table 2.3 Multivariate meta-analysis of dislike networks

	M1		M2	
	beta	s.e.	beta	s.e.
Edges	-0.24*	0.11	-1.45***	0.14
Non-receivers	-0.76***	0.12	-0.73***	0.12
Non-senders	-1.07***	0.18	-1.10***	0.18
Mutual	1.35***	0.05	1.27***	0.05
GWODEG	-5.57***	0.23	-5.53***	0.23
GWIDEG	-1.90***	0.10	-1.86***	0.10
GW incoming non-edgewise shared partners	-0.19***	0.01	-0.20***	0.01
GW transitive non-edgewise shared partners	-0.08***	0.004	-0.07***	0.005
Same class	1.54***	0.04	1.77***	0.04
Same neighborhood	-0.12**	0.05	-0.07	0.05
Activity female	0.14***	0.03	0.14***	0.03
Popularity female	-0.23***	0.04	-0.23***	0.04
Same sex	0.03	0.03	0.19***	0.03
Same ethnic	-0.11***	0.03	-0.10**	0.03
Violence entrainment	1.00***	0.06	1.11***	0.07
Shortest path			0.38***	0.03
Shortest path squared			-0.03***	0.002
AIC	806.55		728.62	
N	29		29	

Note. *beta* denotes the averaged ERGM coefficient weighted by the variance-covariance matrix of all parameters estimated per model specification with a multivariate fixed-effects meta-analysis (An 2015); *s.e.* reports the standard error associated with this averaged ERGM coefficient. †*p* < 0.10; **p* < 0.05; ***p* < 0.01; ****p* < 0.001 (two-sided).

Table 2.4 Multivariate meta-analysis of violence networks

	M1		M2	
	beta	s.e.	beta	s.e.
Edges	-2.54***	0.12	-1.03***	0.15
Non-receivers	0.27 [†]	0.15	0.25 [†]	0.15
Non-senders	-0.19	0.19	-0.12	0.19
Mutual	2.41***	0.08	2.32***	0.08
GWODEG	-2.05***	0.25	-1.89***	0.26
GWIDEG	-1.84***	0.16	-1.84***	0.16
Same class	1.57***	0.06	1.25***	0.06
Same neighborhood	-0.08	0.05	-0.08	0.05
Activity female	-0.41***	0.04	-0.41***	0.04
Popularity female	0.21**	0.07	0.27***	0.07
Same sex	0.07	0.04	-0.30***	0.05
Same ethnic	0.16***	0.04	0.08*	0.04
Dislike entrainment	0.98***	0.05	1.29***	0.06
Shortest path			-0.62***	0.04
Shortest path squared			0.05***	0.004
Spare time entrainment			0.34***	0.06
AIC	1012.63		845.99	
N	21		21	

Note. *beta* denotes the averaged ERGM coefficient weighted by the variance-covariance matrix of all parameters estimated per model specification with a multivariate fixed-effects meta-analysis (An 2015); *s.e.* reports the standard error associated with this averaged ERGM coefficient. [†]*p* < 0.10; **p* < 0.05; ***p* < 0.01; ****p* < 0.001 (two-sided).

Turning to node-level characteristics, we observe a greater likelihood of dislike and violence between students who belong to the same class (as was also true for friendships). Living in the same neighborhood makes dislike less likely (Table 2.3, M1). This does not hold for the violence networks, where the same neighborhood parameter shows a negative sign but remains insignificant in all model specifications (Table 2.4).

Sex is relevant for both negative tie types but exhibits remarkably different patterns. Comparing the activity and popularity effects between Table 2.3 and Table 2.4, we see that female students tend to send more dislike ties but fewer violence ties than male students. In

contrast, female students receive fewer dislike nominations but more violence nominations than male students. In the model specification that does not control for closeness in the friendship network (M1 in Table 2.3 and Table 2.4), we observe no systematic tendency to nominate students of the same sex or the opposite sex in negative ties.

Ethnic origin has significant but, again, contrasting effects. As evident in Table 2.3, the dislike networks display ethnic heterophobia. This supports H6 and is congruent with the results reported by Boda and Néray (2015) based on secondary schools in Hungary. In contrast, however, violence networks are characterized by a significant tendency for intra-ethnic ties compared to ties across group divides (Table 2.4, M1). This is in line with H7.

2.6.2.3 *Entrainment and shortest path effects*

We now discuss the entrainment effects of other tie types as well as effects capturing the shortest path distance in the friendship network on negative ties. These effects allow a more rigorous multivariate evaluation of H1 to H4.

All model specifications for dislike include violence entrainment effects and vice versa. Table 2.3 shows a significant positive entrainment effect of violence on dislike in both model specifications. Table 2.4 includes the corresponding effects of dislike on violence. This provides multivariate support for the hypothesis that dislike and violence co-occur more frequently than expected by chance (H1).

In Table 2.3 (Model 2), the shortest path effects reveal that dislike ties are also significantly associated with closeness in the friendship network. In line with H2, the longer the shortest path separating two students in the friendship network, the more likely a dislike nomination. This association is less pronounced for each additional shortest path length. Finally, note that spending spare time together and dislike relations were mutually exclusive to a degree that made it impossible to estimate an entrainment effect of spare time ties on dislike ties due to degeneracy issues. We regard this as further evidence for H4.

Model 2 in Table 2.4 reveals a significant association between violence ties and closeness in the friendship network. Contrary to dislike relations, violence ties between students become increasingly *unlikely* the longer the shortest path separating them in the friendship network is. This is in line with our expectation that violence is more likely to take place within close as opposed to distant social circles (H3). Again, this effect is marginally decreasing (i.e., “levels off”) with each additional shortest path length. Moreover, the significant and positive entrainment effect for spending spare time nominations indicates that students who spend time

together outside of school are more likely to sometimes hit or kick each other than students who only meet in school.

2.6.2.4 Changes in same-sex and same-ethnic effects on negative ties when controlling for closeness in friendships

Comparing Models 1 and 2 in Table 2.3 and Table 2.4, we can examine how other parameters in the models for negative ties change once we control for the closeness of students in the friendship network. Recall that we observed no systematic tendency toward more negative ties between same-sex students or students of opposite sex in the basic model specifications (Model 1 in Table 2.3 and Table 2.4). However, once we controlled for closeness in the friendship network, we observed a significant tendency to send dislike nominations to same-sex peers rather than to students of the opposite sex (Table 2.3, M2). Hence, taking into account students' greater likelihood to have same-sex friends, students of the same sex are actually more likely to dislike each other. Again, results are markedly different for violence. Here, we observe systematically more violence ties between the sexes after including the shortest path effects. Thus, taking into account the higher likelihood of violence in close social circles reveals a tendency to hit and kick students of the opposite sex.

Even more important for our analytic interests, there are also changes in the same-ethnic parameter estimates for violence networks. Once we control for the closeness in friendship networks and spending spare time outside of school, the same-ethnic estimate for violence ties drops substantially in size and significance from 0.16 ($p < 0.001$) to 0.08 ($p < 0.05$).²¹ These results provide some evidence for our hypothesis that the greater relative prevalence of violence within ethnic groups can be partially explained by the greater prevalence of violence among students who are close in the friendship network and among students who spend time together outside of school (H8).

²¹ Interpreting changes in the size of parameters across nested ERGM specifications is not unproblematic (see, e.g., Kruse et al. 2016:136; Mood 2010). It is therefore important to note that the coefficients of all basic structural effects remain practically constant and that also the p-value of the same-ethnic parameter drops considerably after including the shortest path terms and the spare time entrainment effect on violence. In further robustness analyses, adding these measures of social closeness even leaves the same-ethnic term significant only at the 10% level. These analyses control for the size of schools in a meta-regression in order to account for network size as a potential source of heterogeneity. These models produce very similar results (available from the authors upon request).

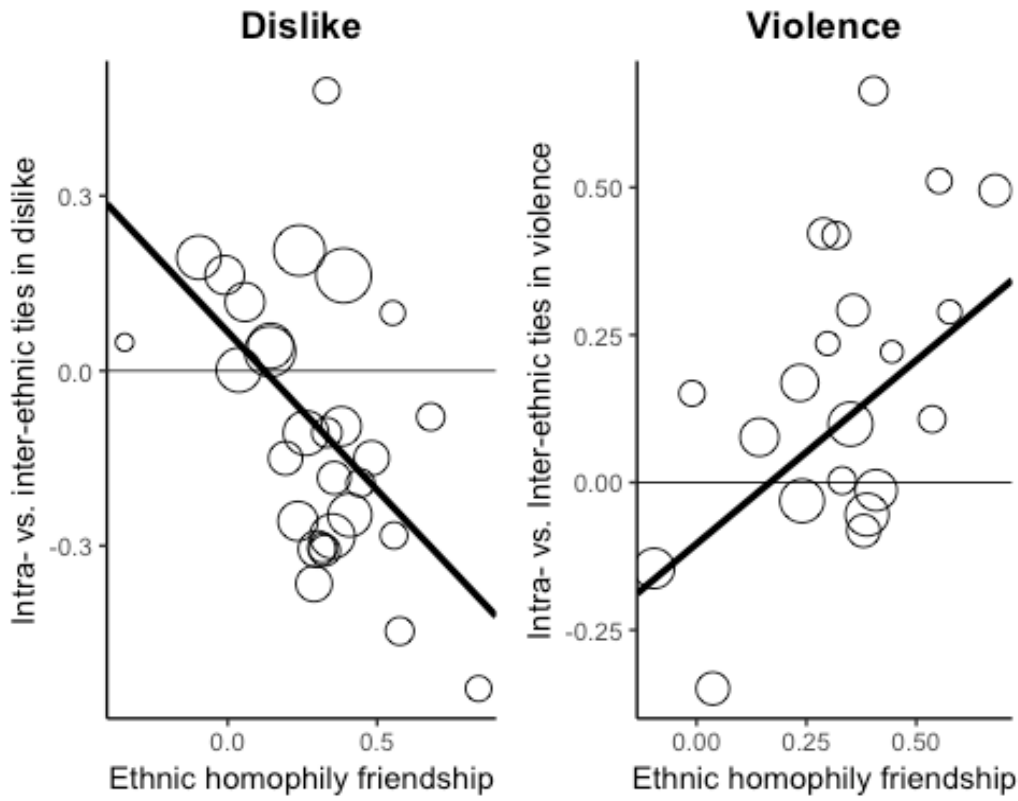
2.6.2.5 *Meta-regressions: Ethnic segregation in friendship and negative ties across schools*

The results discussed in the previous section are based on meta-analyses that average structural tendencies across all schools and may hide important between-school differences. Tables A2, A3, and A4 in the Appendix present measures for between-school differences in the multivariate meta-analysis of friendship, dislike and violence networks. Overall, there is clear indication of significant between-school variation. This is also true for the estimates of the same-ethnic terms which vary significantly across schools for friendship and dislike networks and marginally so for violence networks ($p < .10$).

In the final step of our analysis, we turn to this between-school variability and examine how the strength of ethnic homophily in friendships maps onto tendencies for inter- vs. intra-ethnic dislike and violence ties. To this end, Figure 2.1 visualizes the contextual co-variation of ethnic homophily in friendships and the occurrence of intra- vs. inter-ethnic ties in dislike and violence across schools. The x-axis denotes ethnic homophily in friendship networks (based on the specification in Table 2.2, M1). On the y-axis, we report the degree of intra vs. inter-ethnic nominations in negative ties (based on the specifications in Table 2.3, M1, for dislike and Table 2.4, M1, for violence networks). Each dot in the figure represents one particular school. The location of each dot reflects the coefficients obtained from the school-specific ERGM. The sizes of the dots correspond to the inverse squared standard error of the same-ethnic coefficient in the dependent network (dislike, violence). Hence, bigger dots indicate more statistical precision of this estimate, which corresponds to a greater weighting of the estimate in the meta-regression (similar to Smith et al. 2016:1246). The regression lines added to both plots are based on multivariate meta-regressions, which add ethnic homophily in friendship networks as a predictor to the meta-analyses of dislike and violence networks reported in Table 2.3 and Table 2.4.

The left-hand graph of Figure 2.1 shows that schools with stronger ethnic homophily in friendships tend to exhibit more inter-ethnic than intra- ethnic dislike. The slope of the regression line is -0.54 (s.e. = 0.16). Hence, we find support for H9. The right-hand graph reveals that in schools where ethnic homophily in friendship networks is strong, violence ties also tend to be more likely within than across ethnic groups (slope = 0.62 , s.e. = 0.22). This result supports H10 and contradicts the view that ethnic segregation of friendship networks is associated with fights occurring more often between than within ethnic groups.

Figure 2.1 Covariation of ethnic homophily in friendships with intra- vs. inter-ethnic ties in dislike and violence



2.7 Discussion und conclusion

The aim of this study was to investigate the links between positive and negative social ties in the school setting and specifically the role of ethnic background in friendship, dislike, and violence networks. We used data on more than 2500 schoolchildren in 39 schools from a regional study in Germany and applied exponential random graph models and meta-analytic techniques to study the different tie types among students on the grade level.

2.7.1 Friendship and different types of negative ties

To understand the links between friendship and negative ties more broadly, we focused not only on the relational cognition of dislike but also on physical violence as a behavior. Our analysis of violence relations – students hitting or kicking each other – showed that this type of negative tie behaves very differently compared to dislike ties. In particular, we found opposite patterns in the embeddedness of dislike and violence relations in friendships. The more distant two students are in the friendship network, the more likely they are to dislike each other. In contrast, inter-personal violence becomes more likely, the closer two students are in

the friendship network. The same pattern can be observed with respect to spending spare time with each other. Theoretically, these findings suggest that violence as a behavior is strongly shaped by exposure, which comes with a greater probability of provocations and other strains as well as lower risk of formal sanctions, especially during unstructured and unsupervised contact outside of school (Clarke and Felson 1993; Osgood et al. 1996). In comparison, dislike is rare in closer friendship circles due to avoidance (Harrigan and Yap 2017) or a tendency to reduce cognitive dissonance in feelings towards one's persistent friends (Cartwright and Harary 1956; Heider 1946).

2.7.2 The role of ethnic origin for different tie types

Building on these general theoretical arguments, we developed a more comprehensive perspective on ethnic homophily in the school context. Most previous research in this area has been exclusively concerned with ethnic homophily in friendship networks (Baerveldt et al. 2004; Kruse et al. 2016; Leszczensky and Pink 2015; Moody 2001; Mouw and Entwisle 2006; Smith et al. 2016, 2014a). The prevailing theories in this literature assume a “dark side” of ethnic segregation in friendship networks: It may be a symptom (or a cause) of ethnic prejudice, threat perceptions, or outgroup denigration and might provide a fertile ground for inter-ethnic violence. Based on a multi-dimensional analysis of ethnic segregation in the social networks of schoolchildren, we arrive at a more differentiated picture.

In addition to the well-known tendency for ethnic homophily in friendship networks, our results reveal a tendency towards ethnic heterophobia, i.e., disliking outgroup members rather than ingroup members. This is in line with the results obtained in Hungarian secondary schools by Boda and Néray (2015). This tendency, however, does not extend to violence relations: We found students to be more likely to engage in violence towards same-ethnic peers than towards outgroup members. Our analysis suggests that this is partly due to the greater prevalence of violence among students who are close in the friendship network and students who spend time together outside of school. Our theoretical arguments on the links between social closeness, exposure, and violence might contribute to understanding the partly unexpected results of previous studies. Rather than finding clear tendencies toward inter-ethnic bullying, the two existing social network studies found bullying within one's own ethnic group to be rather common (Kisfalusi et al. 2018; Tolsma et al. 2013).

2.7.3 The relevance of ethnic origin across schools

A further contribution of our study is to add to a small but growing literature which seeks to explain contextual variation in structural tendencies related to race and ethnicity across networks (McFarland et al. 2014; Moody 2001; Smith et al. 2016). First of all, we can report that the significance of ethnic origin varies across contexts for all investigated tie types. In line with the notion that ethnic homophily in positive ties may be a symptom or a cause of negative inter-ethnic sentiments, we found that ethnic heterophobia in dislike is more pronounced in schools that exhibit stronger ethnic homophily in friendship networks. However, we found the opposite pattern for violence networks: The overall tendency to hit or kick students from the same ethnic group is amplified in schools with stronger ethnic homophily in friendships. Our analysis therefore leads us to the conclusion that stronger ethnic homophily in friendship networks tends to amplify the greater relative prevalence of *inter*-ethnic dislike and *intra*-ethnic violence.

This result challenges work on peer victimization that has argued for a link between ethnic segregation and higher victimization by members of ethnic outgroups (Agirdag et al. 2011; Durkin et al. 2012; Kawabata and Crick 2011; Thijs and Verkuyten 2014; Walsh et al. 2016). Notably, most of these studies lack social network data that would allow them to ascertain the ethnic group membership of the perpetrators. Our results suggest that most of the greater peer victimization observed in ethnically segregated schools might actually take place *within* ethnic groups.

2.7.4 Limitations and future research

There are a number of limitations to our study that future research might be able to overcome. First, our analysis of violence ties was based on students' reports on sometimes hitting and kicking other students or sometimes being hit and kicked by other students. Although the sparseness of violence networks may limit the potential for more differentiated analyses, future research could try to distinguish between different forms and degrees of seriousness of violent interactions. One interesting question is whether our findings also apply to relational or verbal aggression. As they carry lower risks of formal and social sanctions than physical violence, we expect these forms of aggression to occupy a position in between dislike and physical violence.

A second limitation concerns the cross-sectional and correlational nature of our analyses. Longitudinal analyses would not only provide a stronger basis for causal inferences but also offer to examine important additional questions. In particular, future research should examine

the co-evolution of friendship and violence ties and the role of students' ethnicity for such dynamics. For example, violence could affect the dissolution of friendship ties differently, depending on whether it involves students of the same or different ethnic origin. Furthermore, longitudinal analyses of multiplex networks would allow one to go beyond the rather basic entrainment and shortest path effects examined in this study.²² As shown in recent studies, such analyses offer a detailed understanding of the interplay of different types of social relations, as they allow one to take into account various forms of structural interdependence (Berger and Dijkstra 2013; Daniel et al. 2016; Fujimoto et al. 2017; Huitsing et al. 2014; Rambaran et al. 2015). We believe that much is to be gained by further integrating the study of structural tendencies in multiplex networks with the literature on inter-group relations and segregation in social networks.

In conclusion, we would like to stress that our findings pertain only to the microcosms of schools in an ethnically diverse metropolitan area of Germany during a period of stability and peace. With respect to such contexts, our findings cast doubt on popular images of disintegrated schools in which ethnically segregated friendship networks go hand in hand with physical aggression across ethnic group divides. However, we know from case studies of ethnic conflicts that ethnic segregation makes local outbreaks of inter-ethnic violence more likely when ethnic conflicts erupt in the wider society (e.g., Varshney 2001). And even if we restrict our attention to ethnically diverse schools under normal circumstances, we cannot rule out the possibility that violence between students of different ethnicity may be qualitatively different from within-group violence. In particular, the former might be coded as "ethnic" by students, and consensus over such a meaning can in turn have important social consequences, such as more intense antipathies, retaliation, and ethnic closure in friendships (Brubaker 2004:93). To investigate this possibility, future research could complement socio-metric information on offender-victim ties with data on students' perceptions about the prevalence of ethnic conflicts in their classrooms, grades, or schools.

²² To be sure, even our cross-sectional analyses could in principle be extended by examining the overlap between more than two networks. For example, one could analyze only spending spare time nominations which do not entail a friendship nomination and investigate whether they play a different role for negative ties compared to spending spare time nominations involving a friendship tie

2.8 Acknowledgements

We would like to thank Hanno Kruse, Mario Small, Tom Snijders, two anonymous reviewers, and the editors for valuable comments on this work. Earlier versions were presented at the Social Science Research Colloquium, TU Kaiserslautern, in January 2018; at the XXXVIII Sunbelt Conference, Utrecht University, in June 2018; at the Research Colloquium Analytical Sociology, LMU Munich, in July 2018, and at the Networks, Culture, and Action workshop at the University of Cologne, in November 2018. We thank the various participants for their helpful feedback.

2.9 Funding

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.

3 Mental wellbeing and ethnic brokerage in friendship networks of adolescents in German secondary schools (Study 2)²³

3.1 Abstract

Inter-ethnic brokerage between friends, i.e. having friends with different ethnic backgrounds who are not friends with each other, is essential to social integration processes in multi-ethnic societies. This study examines the relation between inter-ethnic brokerage in adolescent friendship networks and individual mental wellbeing in the school context. Using data on friendship networks from a large-scale study of more than 2,700 seventh-graders in German secondary schools, I analyse the interplay between triadic brokerage structures and ethnicity, combining network analytical methods with linear regression techniques. The results show that brokerage in general is associated with lower mental wellbeing. This negative association is stronger for brokerage between friends with different ethnic backgrounds than for brokerage between friends with the same ethnic background. Furthermore, the negative association is not stronger for inter-ethnic brokerage, where the broker has the same ethnic background as one friend, than for inter-ethnic brokerage, where all actors belong to distinct ethnic groups. The results indicate no differences between ethnic majority and minority students. Though inter-ethnic brokerage is vital to bridge ethnic divides, this study highlights the psychological challenges inter-ethnic brokers may face. It emphasises the relevance of investigating brokerage in inter-ethnic friendships and going beyond dyadic perspectives on inter-ethnic contact.

Keywords: ethnicity; brokerage; friendship; mental wellbeing; adolescents

²³ This chapter presents Study 2 in its published form, with only the citation style, formatting, and placement of tables and figures adjusted where necessary: Lämmermann, Kathrin. 2025. 'Mental Wellbeing and Ethnic Brokerage in Friendship Networks of Adolescents in German Secondary Schools'. *Journal of Ethnic and Migration Studies* 51(3):915951. doi:[10.1080/1369183X.2023.2290989](https://doi.org/10.1080/1369183X.2023.2290989).

3.2 Introduction

Ethnic diversity in Western European societies has increased significantly in the last decades (Castles 2000). Yet, researchers have repeatedly shown that emotionally strong and positive relations, such as friendships, are segregated along ethnic group membership (e.g., Martinovic, van Tubergen, and Maas 2009). On the societal as well as individual level, bridging these social divides is of central interest, as positive inter-ethnic contact reduces prejudice (Allport 1954; Pettigrew and Tropp 2006), increases access to relevant resources (e.g. Kanas et al. 2012) and has individual psychosocial benefits (e.g. Graham et al. 2014). A key social mechanism underlying such integration processes is inter-ethnic brokerage of friendships, where an individual is friends with others who are not also friends with each other and belong to different ethnic groups.

However, next to its positive aspects and great potential to promote contact between different ethnic groups (Love and Levy 2019), brokerage is assumed to have a ‘dark side’, which has largely been disregarded in previous research (Stovel and Shaw 2012): individuals in brokerage positions are exposed to specific psychological strain, especially when brokerage occurs between emotionally close contacts (Heider 1946) who belong to different social groups with diverging norm and value systems (Goode 1960; Krackhardt 1999; Merton 1968; Pescosolido and Rubin 2000). This reasoning is supported by a recent study by Mollenhorst et al. (2015), which shows that inter- ethnic brokerage is related to lower psychological wellbeing in a sample of young adult Swedes.

The present study examines whether inter-ethnic brokerage in friendship networks is negatively related to mental wellbeing among adolescents in German secondary schools. It thereby contributes to previous research in three important ways. First, by focusing on triadic brokerage structures and analysing the relations between a group of three friends, it generates further insights into the psychological aspects of inter-ethnic contact. Previous studies focus on dyadic, less complex forms of contact, such as friendship between two individuals (e.g. Smith et al. 2016, 2014a; Windzio and Bicer 2013) or use rather broad measures, such as the number of different-ethnic friends (e.g. Martinović 2013). I also go beyond the existing work on triadic inter-ethnic brokerage (Mollenhorst et al. 2015) by additionally considering the broker’s own ethnic background. I argue that a one-sided affiliation of the broker with a friend through shared ethnic origin may intensify the psychological strain of inter-ethnic brokerage. Second, this study uses comprehensive data containing sociometric information on complete friendship networks at the school grade level and personal characteristics of more than 2,700 seventh-

graders. This data allows for the identification of inter-ethnic brokerage structures in friendship networks compared to earlier studies on inter-ethnic contact that often lack explicit social network data (e.g. Martinović 2013). It furthermore allows a more accurate assessment in comparison to previous research (e.g. Mollenhorst et al. 2015) that uses social network data based on respondents' self-reports about their contacts' relationships between each other or their contacts' ethnic background (Wölfer et al. 2015:48). Finally, the study explores a new empirical setting by studying adolescent friendship networks in German secondary schools. Close relationships and belonging to a cohesive group with a shared norm system are essential resources for adolescent development (e.g. Crosnoe 2000; Ueno 2005). Thus, while previous brokerage research mainly focuses on adults, inter- ethnic brokerage in friendship networks should have special relevance to the mental wellbeing of adolescents. The German school context provides ideal conditions to investigate inter-ethnic brokerage as it is ethnically diverse (Lochner and Jähnert 2020) but school-based friendship networks are ethnically segregated (e.g. Smith et al. 2014a). By broadening the range of empirical settings, my study contributes to qualifying the generalisability of the negative association between inter-ethnic brokerage and mental wellbeing previously found by Mollenhorst et al. (2015).

Against this background, I will (1) examine whether brokerage in general is negatively related to mental wellbeing in friendship networks of adolescents. I will (2) investigate whether this negative association is stronger for brokerage between friends with different ethnic backgrounds (inter-ethnic brokerage) than between friends with the same ethnic background (intra-ethnic brokerage). Moreover, I will (3) investigate the role of the broker's own ethnic origin and examine whether the negative relation between inter-ethnic brokerage and mental wellbeing is stronger when the broker shares ethnic group membership with one friend (biased inter-ethnic brokerage) than when the broker does not share ethnic group membership with any of the brokered friends (unbiased inter-ethnic brokerage). Finally, I will (4) investigate whether there are differential effects for minority and majority brokers, as Mollenhorst et al. (2015) found a significant negative association between inter-ethnic brokerage and mental wellbeing for ethnic minority but not for majority individuals.

In line with earlier findings, my results suggest that there is a negative association between mental wellbeing and brokerage in friendship networks in German secondary schools. More importantly, this negative association is stronger for brokerage between friends of different ethnic origin than for brokerage between friends of the same ethnic origin, which is also in line with earlier findings. Furthermore, the negative association between inter-ethnic brokerage and

mental wellbeing is not stronger for biased inter-ethnic brokerage, with the broker sharing ethnic group membership with one friend, than for unbiased inter-ethnic brokerage, with the broker and each of the brokered friends belonging to distinct ethnic groups. Contrary to Mollenhorst et al. (2015), I find no significant differences between minority and majority individuals.

3.3 Theory and previous research

3.3.1 Brokerage and mental wellbeing in strong relation networks

Across the literature, the brokerage position is considered beneficial for individuals. Bridging otherwise unconnected actors is seen as a structural advantage that facilitates access to and control over non-redundant information, resources or power (Burt 2005; for a review on brokerage see Stovel and Shaw 2012).

Besides these potential benefits, however, the brokerage position has a ‘dark side’ with risks and liabilities for the individual broker (Stovel and Shaw 2012). In strong positive relations such as friendships, the downsides of brokerage originate from the emotional boundedness to others and the fact that these are not friends with each other. According to balance theory, such structural gaps between close contacts (i.e. an individual’s friends are not friends with each other or dislike each other) induce cognitive dissonance, feelings of disturbance and stress because humans prefer affectively balanced relations among their close contacts (Heider 1946). Consequently, brokerage in friendship networks should be highly unlikely because individuals strive for the closure of relational gaps (Granovetter 1973). However, recent empirical evidence shows that disconnections between one’s close contacts are more common than predicted by traditional structural theory (Mollenhorst et al. 2015; Small 2017:155).

Literature on the social psychological mechanisms linking social relationships to mental health (Thoits 2011) provides further insights into the detrimental effects of brokerage between friends for individual brokers. Social relationships can generally be beneficial and enhance mental wellbeing through the positive psychological aspects they bring about. For example, social relationships can generate a sense of belonging and companionship (Rook and Underwood 2000; Thoits 2011), but a deficiency of companionship by contrast describes loneliness which is linked to depression and anxiety (for a review see Hawkey and Cacioppo 2010; Thoits 2011:149). Furthermore, social relationships provide social support which benefits psychological wellbeing directly and indirectly as it can provide effective coping (e.g.

Taylor and Stanton 2007) and maintain the individual's self-esteem and sense of belonging which both sustain mental wellbeing (Thoits 2011:155).

For individuals in brokerage positions, however, their disconnected friendships may be an uncertain source of a sense of belonging, companionship or effective social support. The brokerage position in friendship networks is unlikely to generate these psychological benefits of social relationships, which in turn should lower the mental well-being of brokers. This adverse facet is likely to be more pronounced for brokers who connect friends from different social groups, creating additional strain and stress potential, as I explain below.

3.3.2 Brokerage between diverse social groups and ethnic brokerage

Brokerage, as any other relational structure, is always located within a broader social context. Consequently, individuals in brokerage positions not only are structural bridges between disconnected individuals but also 'gateways' between social groups (Love and Levy 2019). According to Gould and Fernandez (1989:91), the consideration of socially relevant group affiliations is necessary for the analysis of brokerage because its meaning and functionality differ depending on whether brokers connect actors within or between social groups.

Being in the middle between unconnected and distinct groups can become quite hazardous, especially when one is closely related to each of them (Krackhardt 1999). Social groups have specific value and norm systems to which their members must conform in order to stay part of the group. Brokers between members of different social groups are consequently the immediate link between diverse, at times even incompatible, behavioural expectations. The extent to which group norms deviate from each other determines the subset of possible behaviours for the broker that would be compatible with each group (Krackhardt 1999:189).

Generally, a social role (e.g. being a friend), the corresponding role relationships (e.g. friendship) and the responsibilities and behavioural expectations they imply can have positive effects on mental wellbeing (Thoits 2011). They can provide normative and behavioural guidance, and promote a sense of meaning in life which in turn has positive impacts on psychological wellbeing. Furthermore, the degree to which individuals perform their role successfully influences self-esteem which in turn is associated with lower symptoms of anxiety, depression, and distress and relates positively to life satisfaction and happiness (cf. Thoits 2011:148).

Brokers between friends of different social groups, however, have limited possibilities to fully satisfy the expectations of each friend as compliance with one side may limit compliance with

another (Goode 1960; Krackhardt 1999). Instead of normative and behavioural guidance, brokers may experience cross-pressures within friendships, being caught between discrepant behavioural expectations and conflicting loyalties (Krackhardt 1999; Stovel and Shaw 2012). Navigating the multiple demands of friends may furthermore exceed the broker's individual resources, time and energy. All of this may be overdemanding for the individual broker and result in role strain (Goode 1960) which is an important social stressor linked to mental health (Pearlin 1999). Next to the psychological stress through internal pressures, the broker's limited ability to meet the different expectations can also lead to external conflicts with and among friends, which is an extra source of stress affecting psychological wellbeing negatively (Rook 1990). In such a situation, role performance is unlikely to be perceived as successful by the broker, undermining the broker's self-esteem. Thus, brokerage between distinct social groups can lead to psychological stress through internal and external pressures (Merton 1968; Pescosolido and Rubin 2000). Additionally, it is unlikely to provide normative and behavioural guidance and can be detrimental to self-esteem, which further contributes to a reduction in mental wellbeing.

Mollenhorst et al. (2015:898) argue that ethnic groups are an example of social groups that confine group-specific, coherent value systems and behavioural expectations for their members. In their view, if two of one's friends who belong to different ethnic groups are not also friends with each other, this is particularly meaningful because it may be indicative of salient and substantial discrepancies between norms and behaviours of these ethnic groups (Mollenhorst et al. 2015:912). Whether brokerage takes place between friends with the same or distinct ethnic backgrounds will therefore be consequential for the broker's psychological wellbeing, as it changes the level of cross-pressure associated with the brokerage position. Using social network data based on respondents' self-reports about their friends' relations and ethnic background, Mollenhorst et al. (2015) found inter-ethnic brokerage to be negatively related with psychological wellbeing, in a sample of native Swedes and first- and second-generation immigrants from former Yugoslavia and Iran (N = 2,942; age = 19). However, the effect was significant only for Swedes with migration background and not for native Swedes.

Like most previous brokerage research, Mollenhorst et al. (2015) focussed on adult individuals. In adulthood, social relations are often diversified across multiple and separate contexts, such as the workplace, neighbourhood or sports clubs, which allows for interaction with different friends at varying times and places. Friends can be allocated across non-overlapping settings.

Under such conditions, brokerage between dissimilar friends should be less stressful (Small 2017:153).

Against this background, the situation of adolescent inter-ethnic brokers deviates systematically from that of adults because adolescents' time and interactions are mainly confined to a single space: the school context.

3.3.3 Ethnic brokerage in adolescent friendship networks in the school context

The school is a shared interaction space in which adolescents spend most of their time, in which they frequently interact with each other and find their close friends. These conditions imply special stress potential of inter-ethnic brokerage within this context.

First, sharing one interaction space, like the school context, provides ideal conditions for triadic closure, i.e. that two of one's close contacts are also connected to each other (Mollenhorst, Völker, and Flap 2011; Small 2017:155). Having disconnected friends despite such a strong and universal tendency for closure should make brokerage an especially dissonant experience. Correspondingly, earlier studies found an association between brokerage in friendship networks and lower mental wellbeing in the school context. For instance, in a sample of U.S. high school students ($n = 11,160$; grades 11 and 12), Copeland et al. (2019) found that bridging in friendship networks predicted higher self-harming behaviour. Similarly, in Carboni and Gilman's (2012) sample of 733 senior high school students, brokerage was related to higher social stress and lower life satisfaction among female adolescents than among male adolescents. Analysing friendship data of 13,465 adolescents in the U.S., Bearman and Moody (2004) found that for girls, suicidal thoughts increased significantly when their friendships were intransitive, i.e. when an individual was not also friends with the friends of the individual's friends, signifying disconnections within friendship circles. Borowski et al. (2017) investigated the influence of social network position and social status on psychological outcomes of 440 adolescents. The authors found brokerage to be significantly related to lower psychological outcomes in adolescents whose status was controversial – i.e. who were both liked and disliked by some peers – than youth with average status. However, Lee, Wu, and Huang (2013) study on brokerage in adolescents' friendship networks in junior high schools in Taiwan ($N = 2,844$) showed no significant correlation between structural holes – a concept capturing the absence of connections between social groups – and depression.

Second, the school context as a shared interaction space makes the management of diverging norm systems for the broker especially difficult. According to Krackhardt (1999:207), the

extent to which brokerage between social groups is associated with psychological distress depends not only on discrepancies between value systems. He argues that it is also influenced by the observability of the broker's behaviour and non-compliance with expectations. Consequently, inter-ethnic brokerage can become especially troublesome, as behaviour in this context is easily monitorable and non-conformity to ethnic group norms and behavioural expectations is difficult to conceal.

Based on these theoretical reasonings, I derive the following hypotheses for brokerage in friendship networks in the school context:

Hypothesis 1: Brokerage between friends is negatively associated with mental wellbeing.

Hypothesis 2: The negative association between brokerage and mental wellbeing is stronger for brokerage between friends with different ethnic backgrounds (inter-ethnic brokerage) than for brokerage between friends with the same ethnic background (intra-ethnic brokerage).

While it is decisive whether the broker connects individuals of the same or of different ethnic groups, previous research also points to the potential role of the broker's own ethnic group membership and whether one of the brokered friends is an ingroup member of the broker (Gould and Fernandez 1989; Krackhardt 1999). Relatedly, Stovel and Shaw (2012:142) classify brokerage structures as biased to the extent that 'the broker is relationally, socially, or informationally closer to one party than the other'. Building on this theoretical argument, I argue that in the case of inter-ethnic brokerage, such a bias is indicated by a shared ethnic group membership between the broker and one of the brokered friends. This shared ethnic group membership imposes additional difficulties and challenges on the inter-ethnic broker, creating particular stress potential and adverse effects on mental wellbeing: First, an individual's sense of belonging depends on the acceptance and inclusion by others, the group members, and is not automatically granted (Thoits 2011:149). Therefore, the broker should feel particularly pressured to conform to the norms and expectations of the same ethnic friend because affirmative intra-group interactions and compliance to group norms are necessary to stay part of the group and are also conducive to self-worth (Deaux and Martin 2003). Second, this unequally strong pressure to conform to the same ethnic friend may be strongly at odds with the broker's need to reconcile the expectations of the other friend and to show equal loyalty and commitment (Stovel and Shaw 2012). Biased inter-ethnic brokerage should make it therefore particularly difficult for the broker to sustain a sense of belonging, achieve a

satisfactory role performance and derive self-esteem from it. On top of that, an actual or supposed biased alliance with one friend due to shared ethnic group membership may nourish conflicts with and among friends, intensifying adverse effects on mental wellbeing.

In comparison, in unbiased inter-ethnic brokerage situations where all actors have different ethnic backgrounds, the broker may still experience stress because of diverse role obligations. Yet, no additional conformity pressures due to shared ethnic group membership should be evident. In fact, the diversity and equal distribution of group belongings may create a non-biased situation, in which pressures to satisfy multiple role obligations and the necessity to prove a ‘neutral’ commitment to each friend are reduced for the broker. Thus, unbiased inter-ethnic brokerage should generate less stress and cross-pressures, and put a sense of belonging, role performance and thereby self-esteem less at risk.

Against this background, biased inter-ethnic brokerage should be more detrimental to mental wellbeing than unbiased inter-ethnic brokerage.

Accordingly, when the broker’s own ethnic group membership is additionally considered, the following hypothesis can be derived about inter-ethnic brokerage:

Hypothesis 3: The negative association between inter-ethnic brokerage and mental wellbeing is stronger for inter-ethnic brokerage between a same-ethnic friend and a friend with a different ethnic background (biased inter-ethnic brokerage) than for inter-ethnic brokerage in which all individuals differ in their ethnic background (unbiased inter-ethnic brokerage).

3.4 Data and method

I use data from the first wave of a large-scale network study among school children (Social Integration and Boundary Making in Adolescence (SOCIALBOND)).²⁴ The data was collected during 2018/2019 in North-Rhine Westphalia, Germany, targeting students attending the 7th school grade. In total, data from 39 schools are available, including all public secondary school forms except special needs schools. The selection of schools was based on convenience sampling, aimed at a fairly equal distribution of participating schools across the different secondary school forms within the same geographical region. In each school, the complete 7th grade was targeted, i.e. students of all classes belonging to the school’s 7th grade. The data of

²⁴ The study received ethical approval from the ethics committee of the University of Cologne.

the first wave comprises in total 153 school classes in 39 7th school grades of 39 schools. In total, 3,003 seventh-graders participated in the first wave, whereby participation was voluntary and required active parental consent (overall participation rate: 76%).²⁵ The survey was conducted in classrooms during school lessons, using computer-assisted self-interviews. The survey process was supervised by trained interviewers who instructed the students beforehand.

For data cleaning, I exclude cases for which the social network information cannot be clearly identified, reducing the sample to 2,996 cases with valid information. Furthermore, I use listwise deletion to account for missing values on relevant attribute data, resulting in 239 deleted cases and a final analysis sample of 2,757 cases. In this final analysis sample, students are on average 12.87 (SD = 0.59) years old, about 53 per cent of students are boys. Furthermore, 56 per cent belong to an ethnic minority group, whereby I consider students with non-German ethnic origin as ethnic minority and students with German ethnic origin as ethnic majority individuals.

I define a student's *ethnic origin* following Dollmann et al. (2014). If one of the student's parents is born outside of Germany, I assign the foreign-born parent's country of birth as the student's ethnic origin. If both parents are born outside of Germany, I classify the student according to the mother's country of birth. If both parents as well as the student are born in Germany, the ethnic origin of the student is defined as 'German'. This way, individuals of non-German ethnic origin either have parents who immigrated (second generation) or immigrated themselves (first generation).²⁶ In this very fine-grained operationalisation approach, I consider each country of origin as a separate ethnic group, which results in 112 distinct ethnic groups in

²⁵ The average number of students visiting a 7th grade ($n = 39$) was 101.3 (SD = 41,7; range = 44–242), whereby in twelve school grades, the participation rate was below 70%. In these particular grades, the individual network characteristics derived from school grade friendship networks can be influenced by this extent of missingness, which should be noted as limitation. A robustness check shows that all substantive conclusions regarding the hypotheses remain the same when these school grades are excluded from the analysis sample (see Appendix A, Tables A1-A3).

²⁶ Following Dollmann et al. (2014) in those few cases ($N = 16$) where parents were born in Germany, but the student was born outside of Germany, the student's country of birth is assigned as country of origin. In cases in which information on both parents' country of birth is missing, I use additional background information in the data (cf. Dollmann et al. 2014): students with parents or grandparents born abroad were additionally asked to indicate their family's country of origin. I use this information to code students' ethnic origin correspondingly. In cases in which data on parents' country of birth is missing but the student was born in Germany, the category 'German' is assigned if the student also indicated that their grandparents were born in Germany or that they didn't know their grandparents' country of birth.

the analysis sample. The largest ethnic minority groups are students with an ethnic origin from Turkey (11.64%), Poland (5.33%), Russia (4.06%), Morocco (2.79%) and Italy (2.14%). A complete list of the 112 groups, including the corresponding number and percentage of students from the sample in each group, is provided in Appendix B, Table B1.²⁷

The country of birth of parents and students seems the most appropriate indicator to define the ethnic origin of students. It is a rather exogenous, objective and stable way to identify children of immigrants and their ethnic origin (cf. Dollmann et al. 2014:24). By contrast, other indicators such as self-reported ethnic identity are subjective and rather fluid, especially in adolescence (Umaña-Taylor et al. 2014) and may be a consequence as well as a predecessor of inter-ethnic brokerage. For instance, students who are children of immigrants to Germany may currently self-categorize as German, making it impossible to identify them as students with a migration history in the family, as well as their respective country of origin. In such cases, ethnic brokerage and the related strain due to distinct ethnic origins would not be identifiable based on self-reported ethnic identity. Importantly, norms and behavioural expectations attributable to the family's country of origin, which may be internalised and unconscious, can be effective in adolescents' lives and interactions – irrespective of the student's self-reported ethnic identity. Furthermore, the objective assessment via the country of birth is widely used and allows for comparison with other data sources and previous studies (e.g. Mollenhorst et al. 2015), which is crucial for classifying the results obtained in this study.

3.4.1 Dependent variable

To measure the dependent variable *mental wellbeing*, I compute a mean score based on six items. The questions were (1) 'How often in the last four weeks have you been a very nervous person?', (2) 'How often in the last four weeks have you felt calm and peaceful?', (3) 'How often in the last four weeks have you felt downhearted and blue?', (4) 'How often in the last four weeks have you been a happy person?', (5) 'How often in the last four weeks have you felt so down in the dumps that nothing could cheer you up?' and (6) 'How often in the last four weeks have you felt lonely?'. Students could indicate the frequency of those feelings on a six-

²⁷ As the definition of ethnic groups influences their size and therefore an individual's possible number of inter- and intra-ethnic open triads, I follow Smith et al. (2016:1239,1266) and conduct sensitivity analyses using a broader measure of ethnic origin (see Appendix C). The results are in line with the main analyses.

point scale ranging from ‘all of the time’ to ‘none of the time’.²⁸ I recoded the items such that higher scores indicate greater mental wellbeing (Cronbach’s $\alpha = 0.79$).

This measure captures a range of mental health aspects related to psychological mechanisms influenced by inter-ethnic brokerage (e.g. symptoms of anxiety, depression, loneliness, and happiness). As examining singular aspects (e.g. life satisfaction or depression) might underestimate the total costs of inter-ethnic brokerage (Aneshensel 1999:214–15) and because different groups may be affected differently (e.g. girls experiencing depressive feelings and boys feeling less happy as inter-ethnic brokers) (Pearlin 1999:175), this measure is particularly useful and comprehensive. It furthermore allows for comparison with Mollenhorst et al.’s previous study (2015), as it closely resembles their composite measure of psychological wellbeing.

3.4.2 Independent variables

3.4.2.1 Brokerage

In order to assess each student’s role as broker, I use sociometric information on grade-level friendship networks. In the survey, each student was asked to name up to ten of their best friends in the school grade. To that end, each student was given a list containing all members of their school’s seventh grade, sorted by classrooms. Every name on the list had previously been assigned a unique identification number. Students were instructed to use this list to indicate the respective friend’s identification number, resulting in complete friendship network data at the school grade level.

I operationalise brokerage by the respondent’s *number of open triads* in his or her immediate friendship network, i.e. the number of unique pairs of the respondent’s direct friends who are not friends with each other. To create this individual-level aggregate measure of brokerage, I proceed as follows: In a first step, I extract information on each student’s immediate friendship network from the complete school grade friendship network. I define a student’s immediate friendship network by the individuals the student nominated as best friends, irrespective of whether these friendships are reciprocated. Notably, the derived data contains information not

²⁸ This item battery is based on the Mental Health Inventory – 5 (items 1 to 5) which is a sub-scale of the RAND 36-Item Health Survey 1.0 Version (Berwick et al. 1991; Hays, Sherbourne, and Mazel 1993). An additionally conducted factor analysis shows that item 6 (feeling lonely) relates closely to the same construct as the MHI-5 items, supporting the approach to combine these six items to measure mental wellbeing.

only on whom the student nominated as best friend but also on friendships between these friends, as indicated by the friends themselves. In a second step, I identify the number of unique pairs of friends who did not indicate to be friends with each other to determine the number of open triads in the student's friendship network. Thus, a student's maximum possible number of open triads is the number of unique pairs of friends in the student's network.

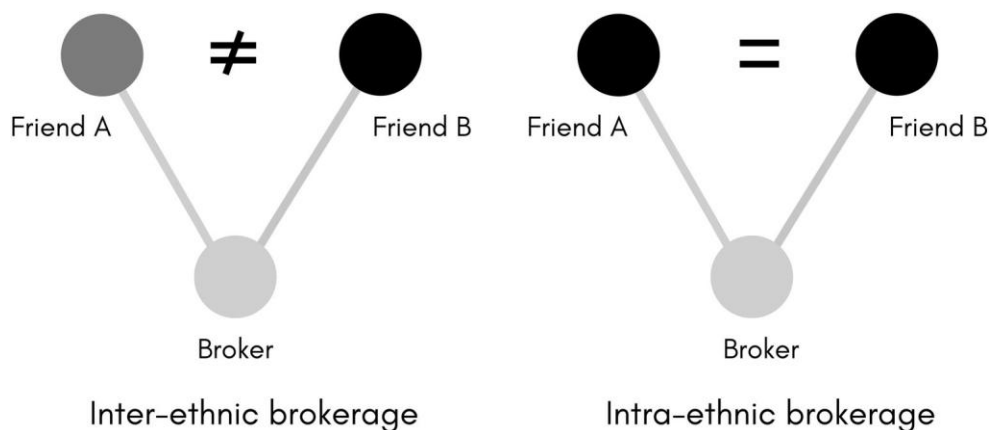
3.4.2.2 Ethnic brokerage

To identify ethnic brokerage, I build on previous work by Gould and Fernandez (1989) and Mollenhorst et al. (2015) and combine each open triad in an individual's friendship network with information on the ethnic origin of individuals.

3.4.2.3 Inter- and intra-ethnic brokerage.

In order to differentiate between inter- and intra-ethnic brokerage, I consider the ethnic origin of each of the broker's friends, irrespective of the broker's own ethnic origin. I classify an open triad as inter-ethnic when friend A and friend B have distinct ethnic origins²⁹ and intra-ethnic when friend A and friend B have the same ethnic origin (Figure 3.1). In line with my operationalisation of brokerage, I measure inter-ethnic brokerage by the *number of inter-ethnic open triads* in an individual's friendship network. Correspondingly, I measure intra-ethnic brokerage by the *number of intra-ethnic open triads* in an individual's friendship network.

Figure 3.1 Inter- and intra-ethnic brokerage

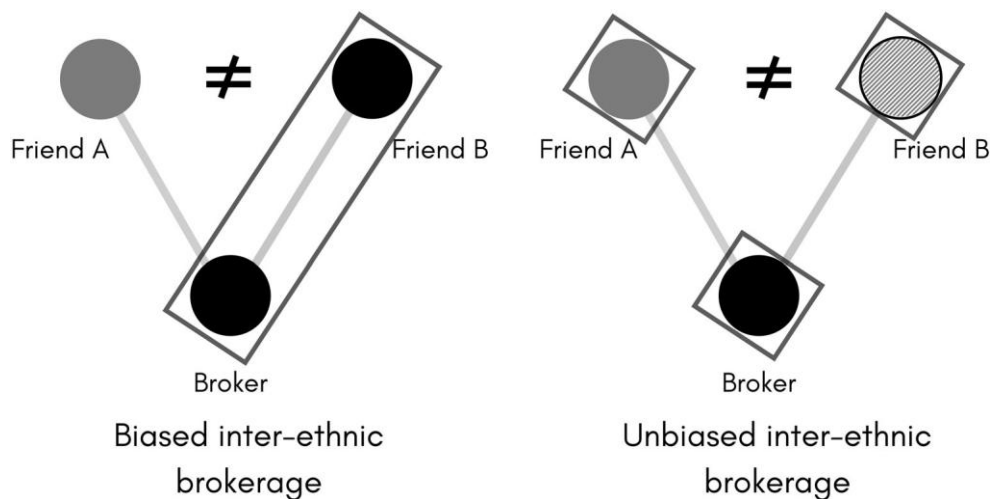


²⁹ By solely focusing on deviation in ethnic origins, I do not consider the extent to which ethnic groups may differ in their norms, which is generally not easy to identify. Factors such as generational status might play a role as well. For instance, it is hard to tell whether brokerage between a German majority student and a French student who is a first-generation migrant is associated with more or less normative dissensus than brokerage between a German majority student and a Turkish student who is a second-generation migrant.

3.4.2.4 Biased and unbiased inter-ethnic brokerage.

I additionally consider the broker's own ethnic origin which allows me to differentiate between biased and unbiased inter-ethnic brokerage. I classify each inter-ethnic open triad as either biased when the broker shares ethnic group membership with one friend or unbiased when the broker does not share ethnic group membership with any of the friends and all individuals differ in their ethnic background (Figure 3.2). Relatedly, I operationalise biased inter-ethnic brokerage by the *number of biased inter-ethnic open triads* and unbiased inter-ethnic brokerage by the *number of unbiased inter-ethnic open triads* in an individual's friendship network.

Figure 3.2 Biased and unbiased inter-ethnic brokerage



3.4.3 Control variables

Number of friends: A higher number of friends is related to better mental health (e.g. Ho 2016). It also determines the extent of brokerage opportunities an individual can have in the first place. I assess this control variable by the number of individuals the respondent nominated as best friends.

Number of friends with different ethnic origin: I control for the number of friends with a different ethnic background than the respondent, because the ethnic composition of a respondent's group of friends will influence the opportunities for inter-ethnic brokerage. Additionally, it has been related to mental wellbeing in previous research (Bagci et al. 2017; Graham et al. 2014).

The following characteristics may be indirect confounders through their influence on the number of friends and friends with different ethnic origin. Furthermore, they have been directly associated with mental wellbeing in earlier studies:

Gender: Mental wellbeing differs by gender, with adolescent girls tending to have more mental health problems and lower subjective wellbeing than adolescent boys (e.g. Yoon et al. 2023). Furthermore, female adolescents tend to value few, intimate relationships more than male adolescents (Rose and Rudolph 2006) and are more likely to strive for densely connected friendship networks in mixed-gender classrooms than boys (Ko, Buskens, and Wu 2015), suggesting gendered tendencies to brokerage between friends.

Generational status: Second-generation minority youth tend to have lower mental wellbeing than first-generation minority youth due to greater exposure to acculturation-specific hassles with ingroup and outgroup peers (e.g. Abouguendia and Noels 2001). However, empirical evidence is inconsistent (e.g. Montazer and Wheaton 2011). In my study, the measure of generational status traces the point of arrival in the host country until the parental generation. It differentiates between students who immigrated themselves (first generation) and German-born students whose parents were born abroad (second generation).³⁰ I furthermore treat adolescents with one parent born abroad and the other born in Germany as a special case of second-generation individuals (second-generation inter-ethnic), because adolescents of mixed heritage are more likely to hold bridging positions between ethnic groups in their friendship networks (e.g. Love and Levy 2019:419; Quillian and Redd 2009). Also, while empirical studies on the mental wellbeing of mixed-ethnic compared to first- and second-generation individuals are scarce, they suggest lower mental wellbeing for mixed-ethnic individuals (e.g. Montazer and Wheaton 2011).

Educational background: I use the school type of the respondents' school as an approximation and distinguish individuals from upper secondary (Gymnasium), comprehensive (Gesamtschule), intermediate secondary (Realschule) and lower secondary schools (Hauptschule).

³⁰ Following Dollmann, Jacob, and Kalter (2014:17), students who are born in Germany and have one parent born abroad with missing information on the other parent's country of birth are assigned to the category 'second generation'. Correspondingly, students born in Germany with one German-born parent and information on the other parent missing are assigned to the category 'native'.

Total number of students in school grade: Students in larger grades will have a greater number of schoolmates whom they do not know personally. This might reduce the emotional attachment to the school grade and in turn, increase depressive symptoms (e.g. Anderman 2002; Ueno 2005). Furthermore, the total number of students in the school grade determines the number of peers an individual could befriend and therefore indirectly the possible number of brokerage structures.

Share of majority students in school grade: The ethnic composition of the school grade is likewise a precondition for opportunities to form inter-ethnic friendships and, thus, inter-ethnic brokerage structures. Furthermore, previous research indicates that a higher share of students with a migration background as well as higher ethnic diversity in the student body is associated with increased ethnic homophily – net of the opportunity structure (e.g. Smith et al. 2016) – which also influences the prevalence of inter- ethnic brokerage structures in a student’s friendship network. Also, previous research indicates that the ethnic composition of the student’s interaction context is related to individual mental wellbeing (for a recent review see DuPont-Reyes and Villatoro 2019).

3.4.4 Methods

I use linear regression models with cluster-robust standard errors at school grade level to predict mental wellbeing (Cameron and Miller 2015).³¹

As the study by Mollenhorst et al. (2015) suggests that the association between inter-ethnic brokerage and mental wellbeing differs for ethnic majority and minority individuals, I run subsample analyses for both groups to provide further testing of this previous finding.

Data preparation is performed in R, version 3.6.1. The statistical analyses are conducted in STATA, version 14.

3.5 Descriptives

Table 3.1 presents descriptive statistics on the dependent and independent variables for the full sample and separately for majority and minority students. About 27 per cent of minority students are of the first generation, 45 per cent of the second generation with two foreign-born

³¹ As robustness check, I conduct school grade-fixed effects analyses with school grade dummies to control for potential confounding by unobserved characteristics of schools, obtaining similar results (Appendix D, Table D1 and Table D2).

parents and 28 per cent of the second generation with one German-born and one foreign-born parent. On average, majority students have higher mental wellbeing than minority students.

Students nominated about six friends in their grade ($M = 6.21$, $SD = 2.56$). Minority adolescents have more inter-ethnic friendships than majority adolescents: minority adolescents have on average 5.56 ($SD = 2.56$) friends with a different ethnic background than their own, and majority group members 2.68 ($SD = 1.93$). Students have roughly nine open triads in their friendship network ($M = 9.19$, $SD = 8.39$).³² The average number of inter-ethnic open triads is higher in minority students' friendship networks ($M = 7.41$, $SD = 6.87$) than in majority students' friendship networks ($M = 5.88$, $SD = 6.29$). In the full sample, the average number of unbiased inter-ethnic open triads in students' friendship networks is higher than biased inter-ethnic open triads. However, Table 3.1 shows differences for majority and minority students: The dominant inter-ethnic brokerage structure in minority students' friendship networks is that of maximal ethnic diversity (unbiased inter-ethnic brokerage) ($M = 5.91$, $SD = 6.08$). By contrast, the dominant inter-ethnic brokerage structure in majority students' friendship networks is biased inter-ethnic brokerage, in which one of the brokered friends is likewise a majority member ($M = 4.21$, $SD = 4.52$). Table E1 in Appendix E shows furthermore the correlations between demographic characteristics and relevant study variables.

³² While the mean number of 9.19 open triads may seem rather high, it should be noted that being able to nominate up to 10 friends in the school grade means that there is a maximum of 45 potential open triads ($N(N-1)/2$, where N is the number of nominated friends cf. Perry et al. (2018a:175) a student can broker. For example, in the case where a student indicated 10 best friends, nine open triads in this student's network could already result from only one of these friends not being friends with any of the student's other friends.

Table 3.1 Descriptive statistics: total number of missings on a variable (with the percentage in parentheses). Mean, standard deviation, minimum and maximum values for the full sample, majority and minority student sample

	<u>Full sample</u>					<u>Majority students</u>				<u>Minority students</u>			
	Missing (%)	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Mental wellbeing	156 (5.21%)	3.52	(0.88)	0	5	3.59	(0.82)	1	5	3.47	(0.92)	0	5
<i>Person characteristics:</i>													
Gender: girl	12 (0.40%)	0.47	(0.50)	0	1	0.47	(0.50)	0	1	0.48	(0.50)	0	1
<i>Educational background</i>													
Gymnasium	0	0.43	(0.50)	0	1	0.52	(0.50)	0	1	0.35	(0.48)	0	1
Realschule	0	0.23	(0.42)	0	1	0.19	(0.40)	0	1	0.26	(0.44)	0	1
Hauptschule	0	0.10	(0.31)	0	1	0.05	(0.23)	0	1	0.15	(0.35)	0	1
Gesamtschule	0	0.24	(0.43)	0	1	0.23	(0.42)	0	1	0.24	(0.43)	0	1
<i>Generational status</i>													
Native	49 (1.64%)	0.44	(0.50)	0	1								
1 st gen.	49 (1.64%)	0.15	(0.36)	0	1					0.27	(0.44)	0	1
2 nd gen.	49 (1.64%)	0.25	(0.43)	0	1					0.45	(0.50)	0	1
2 nd gen. inter-ethnic	49 (1.64%)	0.16	(0.36)	0	1					0.28	(0.45)	0	1
<i>Friendship network characteristics:</i>													
Number of friends	0	6.21	(2.56)	0	10	6.20	(2.57)	0	10	6.22	(2.55)	0	10
Number of friends with diff. ethnic origin	46 (1.54%)	4.28	(2.71)	0	10	2.68	(1.93)	0	10	5.56	(2.56)	0	10
<i>Brokerage:</i>													
Number of open triads	0	9.19	(8.39)	0	40	9.18	(8.60)	0	40	9.19	(8.22)	0	38
<i>Intra- and inter-ethnic brokerage:</i>													
Number of intra-ethnic open triads	37 (1.23%)	2.46	(3.76)	0	31	3.29	(4.43)	0	31	1.79	(2.97)	0	28
Number of inter-ethnic open triads	37 (1.23%)	6.73	(6.66)	0	34	5.88	(6.29)	0	33	7.41	(6.87)	0	34

(Table continued on next page)

Table 3.1 Continued

	Missing (%)	<u>Full sample</u>				<u>Majority students</u>				<u>Minority students</u>			
		Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
<i>Biased/unbiased inter-ethnic brokerage:</i>													
Number of biased inter-ethnic open triads	41 (1.37%)	2.70	(4.02)	0	22	4.21	(4.52)	0	22	1.49	(3.08)	0	20
Number of unbiased inter-ethnic open triads	41 (1.37%)	4.03	(5.35)	0	34	1.67	(2.89)	0	31	5.91	(6.08)	0	34
<i>School grade characteristics:</i>													
Total number of students	0	91.95	(31.04)	21	158	97.79	(31.01)	21	158	87.27	(30.27)	21	158
% majority students	0	0.43	(0.19)	0	1	0.52	(0.17)	0	1	0.36	(0.19)	0	1
Observations		2,757				1,226				1,531			

3.6 Results

Table 3.2 presents the results from linear regression models with cluster-robust standard errors at the grade level and mental wellbeing as dependent variable.

Supporting Hypothesis 1, according to which brokerage between friends is negatively associated with mental wellbeing, the association between an individual's number of open triads and mental wellbeing is negative and statistically significant ($b = -0.018$, $p < 0.001$) (Model 1). Expressed in standard deviations (SD), mental wellbeing is on average -0.168 SD lower when brokerage increases by one SD, holding all other variables in the model constant (Model 1, Table F1, Appendix F).

Model 2 tests Hypothesis 2, which assumes that the negative association between brokerage and mental wellbeing is stronger for brokerage between friends with different ethnic backgrounds (inter-ethnic brokerage) than for brokerage between friends with the same ethnic background (intra-ethnic brokerage). Corroborating this hypothesis, the number of inter-ethnic open triads in an individual's friendship network shows a negative and statistically significant association with mental wellbeing ($b = -0.022$, $p < 0.001$). Expressed in standard deviations (SD), mental wellbeing is on average -0.164 SD lower when inter-ethnic brokerage increases by one SD, holding all other variables constant (Model 2, Table F1, Appendix F). By contrast, the association between an individual's number of intra-ethnic open triads and mental wellbeing is negative but small and statistically insignificant ($b = -0.008$, $p = 0.135$). In further support of Hypothesis 2, the difference between the effect of inter-ethnic brokerage and that of intra-ethnic brokerage is significant (adjusted Wald-test ($F_{1,38} = 4.98$, $p = 0.032$)).

Model 3 divides inter-ethnic brokerage structures into biased and unbiased configurations to test Hypothesis 3, according to which the negative association between inter-ethnic brokerage and mental wellbeing is stronger for inter-ethnic brokerage between a same-ethnic friend and a friend with a different ethnic background (biased inter-ethnic brokerage) than for inter-ethnic brokerage in which all individuals differ in their ethnic background (unbiased inter-ethnic brokerage). Model 3 shows a negative relation between the number of biased inter-ethnic open triads and mental wellbeing ($b = -0.020$). The association is statistically significant ($p < 0.001$). Expressed in standard deviations (SD), mental wellbeing is on average -0.093 SD lower when biased inter-ethnic brokerage increases by one SD, holding all other variables constant (Model 3, Table F1, Appendix F). Similarly, a negative and statistically significant relationship is evident for the number of unbiased inter-ethnic open triads and mental wellbeing ($b = -0.023$,

$p < 0.001$). The difference in effect sizes between biased and unbiased inter-ethnic brokerage is small and not statistically significant (adjusted Wald-test ($F_{1,38} = 0.24$, $p = 0.629$)). With regard to unbiased inter-ethnic brokerage, mental wellbeing is on average -0.139 SD lower when unbiased inter-ethnic brokerage increases by one SD, holding all other variables constant (Model 3, Table F1, Appendix F). Consequently, Hypothesis 3 is not supported.

Table 3.2 Results of linear regression analysis with mental wellbeing as dependent variable (cluster-robust standard errors at school grade level); $N=2757$

	Model 1		Model 2		Model 3	
	β	p-values	β	p-values	β	p-values
<i>Person characteristics:</i>						
Gender (ref.: boy)	-0.410***	(0.000)	-0.408***	(0.000)	-0.408***	(0.000)
Educational background (ref.: Hauptschule)						
Gymnasium	0.008	(0.891)	0.013	(0.824)	0.013	(0.826)
Realschule	-0.029	(0.662)	-0.026	(0.693)	-0.026	(0.702)
Gesamtschule	-0.091	(0.209)	-0.086	(0.226)	-0.087	(0.224)
Generational status (ref.: native)						
1 st gen.	-0.100	(0.127)	-0.120 ⁺	(0.076)	-0.119 ⁺	(0.081)
2 nd gen.	-0.008	(0.882)	-0.026	(0.646)	-0.026	(0.652)
2 nd gen. inter-ethnic	0.019	(0.757)	-0.002	(0.972)	-0.002	(0.974)
<i>Friendship network characteristics:</i>						
Number of friends	0.081***	(0.000)	0.075***	(0.000)	0.073***	(0.000)
Number of friends with diff. ethnic origin	-0.025*	(0.028)	-0.014	(0.231)	-0.011	(0.353)
<i>Brokerage:</i>						
Number of open triads	-0.018***	(0.000)				
<i>Intra- and inter-ethnic brokerage:</i>						
Number of intra-ethnic open triads			-0.008	(0.135)	-0.008	(0.138)
Number of inter-ethnic open triads			-0.022***	(0.000)		
<i>Biased/unbiased inter-ethnic brokerage:</i>						
Number of biased inter-ethnic open triads					-0.020***	(0.000)
Number of unbiased inter-ethnic open triads					-0.023***	(0.000)
<i>School grade characteristics:</i>						
Total number of students	0.001	(0.285)	0.001	(0.279)	0.001	(0.273)
% majority students	0.005	(0.965)	-0.057	(0.625)	-0.054	(0.642)
Constant	3.459***	(0.000)	3.491***	(0.000)	3.488***	(0.000)
R^2	0.077		0.079		0.079	
N	2,757		2,757		2,757	

Note: p-values in parentheses; ⁺ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

I also conduct separate analyses to probe for differences between majority and minority students, which are reported in Table 3.3: the number of open triads in an individual's friendship network is negatively associated with mental wellbeing and statistically significant for majority students ($b = -0.020$, $p < 0.001$, Model 1a) and minority students ($b = -0.014$, $p < 0.05$, Model 1b).

In contrast to Mollenhorst et al. (2015), the results of Model 2a and 2b (Table 3.3) show a negative and statistically significant association between the number of inter-ethnic open triads and mental wellbeing for both majority ($b = -0.027$, $p < 0.001$) and minority students ($b = -0.019$, $p < 0.001$). The relation between the number of intra-ethnic open triads and mental wellbeing is very small and not statistically significant for both majority ($b = -0.007$, $p = 0.408$, Model 2a) and minority students ($b = 0.002$, $p = 0.844$, Model 2b).

Models 3a and 3b show the more differentiated examination of inter-ethnic brokerage, distinguishing between biased and unbiased inter-ethnic brokerage: the number of biased inter-ethnic open triads is negatively and significantly related with mental wellbeing for both majority ($b = -0.027$, $p < 0.001$, Model 3a) and minority students ($b = -0.018$, $p < 0.05$, Model 3b). Likewise, the number of unbiased inter-ethnic open triads is negatively and significantly related to mental wellbeing for majority students ($b = -0.028$, $p < 0.05$) as well as for minority students ($b = -0.019$, $p < 0.001$).

Thus, the separate analyses show that for both majority and minority students, the association between inter-ethnic brokerage and mental wellbeing is negative and statistically significant. Yet, the effect sizes of inter-ethnic brokerage and its subtypes, biased and unbiased inter-ethnic brokerage, tend to be greater for majority compared to minority students in these separate analyses.

To determine whether these differences in effect sizes are statistically significant, I conducted additional analyses calculating interaction effects between minority status and inter-ethnic brokerage variables using the full sample (Table G1, Appendix G). In these analyses, no significant interaction effects are evident, neither for inter-ethnic brokerage and minority status (Table G1, Model 1), nor for its more differentiated forms, biased and unbiased inter-ethnic brokerage and minority status (Table G1, Model 2 and 3).

In summary, no significant differences between majority students and minority students in terms of the association between inter-ethnic brokerage and mental wellbeing are evident.

Table 3.3 Results of linear regression analysis with mental wellbeing as dependent variable (cluster-robust standard errors at school grade level);N_{Majority students}=1226, N_{Minority Students}=1531

	Model 1a:		Model 1b:		Model 2a:		Model 2b:		Model 3a:		Model 3b:	
	Majority students		Minority students		Majority students		Minority students		Majority students		Minority students	
	β	p-values	β	p-values	β	p-values	β	p-values	β	p-values	β	p-values
<i>Person characteristics:</i>												
Gender (ref.: boy)	-0.352***	(0.000)	-0.466***	(0.000)	-0.348***	(0.000)	-0.465***	(0.000)	-0.348***	(0.000)	-0.465***	(0.000)
Educational background (ref.: Hauptschule)												
Gymnasium	-0.035	(0.716)	-0.001	(0.994)	-0.015	(0.886)	0.005	(0.953)	-0.015	(0.886)	0.005	(0.951)
Realschule	-0.047	(0.667)	-0.047	(0.546)	-0.038	(0.734)	-0.042	(0.580)	-0.038	(0.739)	-0.042	(0.584)
Gesamtschule	-0.217*	(0.046)	-0.039	(0.728)	-0.201 ⁺	(0.074)	-0.031	(0.774)	-0.201 ⁺	(0.073)	-0.031	(0.775)
Generational status (ref.: 2 nd gen. inter-ethnic)												
1 st gen.			-0.116	(0.102)			-0.114	(0.107)			-0.113	(0.108)
2 nd gen.			-0.026	(0.677)			-0.022	(0.718)			-0.022	(0.717)
<i>Friendship network characteristics:</i>												
Number of friends	0.083***	(0.000)	0.081***	(0.001)	0.068**	(0.003)	0.081***	(0.000)	0.068**	(0.003)	0.079***	(0.001)
Number of friends with diff. ethnic origin	-0.015	(0.438)	-0.036 ⁺	(0.073)	0.017	(0.544)	-0.034 ⁺	(0.086)	0.018	(0.528)	-0.031	(0.148)
<i>Brokerage:</i>												
Number of open triads	-0.020***	(0.000)	-0.014***	(0.001)								
<i>Intra- and inter-ethnic brokerage:</i>												
Number of intra-ethnic open triads					-0.007	(0.408)	0.002	(0.844)	-0.007	(0.409)	0.001	(0.848)
Number of inter-ethnic open triads					-0.027***	(0.000)	-0.019***	(0.000)				
<i>Biased/unbiased inter-ethnic brokerage:</i>												
Number of biased inter-ethnic open triads									-0.027***	(0.000)	-0.018*	(0.040)
Number of unbiased inter-ethnic open triads									-0.028*	(0.013)	-0.019***	(0.000)

(Table continued on next page)

Table 3.3 Continued

	Model 1a:		Model 1b:		Model 2a:		Model 2b:		Model 3a:		Model 3b:	
	Majority students		Minority students		Majority students		Minority students		Majority students		Minority students	
	β	p-values	β	p-values	β	p-values	β	p-values	β	p-values	β	p-values
<i>School grade characteristics:</i>												
Total number of students	0.001	(0.380)	0.001	(0.392)	0.000	(0.477)	0.001	(0.365)	0.000	(0.482)	0.001	(0.364)
% majority students	0.032	(0.876)	0.005	(0.973)	0.065	(0.759)	-0.098	(0.484)	0.064	(0.767)	-0.098	(0.479)
Constant	3.468***	(0.000)	3.495***	(0.000)	3.447***	(0.000)	3.519***	(0.000)	3.447***	(0.000)	3.519***	(0.000)
R ²	0.073		0.079		0.075		0.082		0.075		0.082	
N	1,226		1,531		1,226		1,531		1,226		1,531	

Note: p-values in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

3.7 Discussion and conclusions

Individuals who bridge ethnic divides through personal relationships are an integral part of integration processes in multi-ethnic societies. Using new data on friendship structures of more than 2,700 German secondary schoolchildren, this study examined how inter-ethnic brokerage in friendship networks relates to mental wellbeing and whether this relationship differs for ethnic minority and majority individuals.

In line with the study's expectations, the empirical analysis showed, first, that brokerage in general was related to lower mental wellbeing in students. Second, when ethnic origin was additionally considered, this negative relationship was stronger for brokerage between friends of different ethnic origin (inter-ethnic brokerage) than for brokerage between friends of the same ethnic origin (intra-ethnic brokerage).

Contrary to the theoretical expectations, the negative association between inter-ethnic brokerage and mental wellbeing was not stronger for biased inter-ethnic brokerage than for unbiased inter-ethnic brokerage. One reason for this could be that inter-ethnic brokers have specific characteristics which make them less susceptible to conformity pressures towards ingroup members. For example, minority adolescents with a mixed-ethnic background are more likely to occupy inter-ethnic brokerage positions (Echols and Graham 2020; Love and Levy 2019:419; Quillian and Redd 2009). If mixed-ethnic individuals are also less responsive to ingroup pressures than mono-ethnic individuals, biased or unbiased inter-ethnic brokerage should not have a different effect on mental wellbeing. Furthermore, given that biased inter-ethnic brokerage is more prevalent among majority individuals in the sample, another reason could be that biased inter-ethnic brokerage works differently for brokers who are members of the ethnic majority. For these, sharing ethnic (majority) group membership with one friend may not produce the same intensified cross-pressures as for minority brokers, because their sense of belonging and role performance is rather taken for granted and less contested, both internally by brokers themselves and externally by others. However, the subsample analyses do not indicate such a different mechanism for majority individuals, as their results showed no stronger negative association for biased inter-ethnic brokerage compared to unbiased brokerage for both, majority and minority students. Thus, the non-difference between biased and unbiased inter-ethnic brokerage found in this study rather suggests that the negative association between inter-ethnic brokerage and mental wellbeing solely depends on the ethnic dissimilarity of the broker's friends, regardless of the broker's own ethnic origin and shared ethnic origins.

Notably, there was generally no significant difference between ethnic majority and minority students regarding the association between inter-ethnic brokerage and mental wellbeing. This contrasts earlier findings by Mollenhorst et al. (2015:910), who suggest greater negative consequences for minority inter-ethnic brokers. This aligns with an assimilationist understanding of integration, according to which ethnic minority individuals feel pressure to assimilate culturally and socially towards the dominant (native) majority group (Gordon 1964; Wimmer 2013:18). The school grades in this sample are ethnically diverse with less than half of the students in a grade being (native) majority members on average. One explanation for the lack of differences in this study could be that this great ethnic diversity may lead to ambiguous rankings of ethnic groups which is less uniformly dominated by the (native) majority group in these contexts. Consequently, conformity pressures should equally apply to any ethnic group and the experience of inter-ethnic brokerage should become more similar for majority and minority brokers, making differential effects less likely. Nevertheless, differences between minority and majority students might emerge dependent on the ethnic composition of the school grade. Although statistically insignificant, the study's subsample analyses indicate that the school grade's share of majority students relates differently to mental wellbeing for minority and majority students. Future research should use data with more variation in school ethnic composition, including ethnically homogenous contexts, and investigate potential differences between minority and majority students under different contextual conditions.

This study's findings have important limitations. First, as in earlier empirical work in this emerging area (Mollenhorst et al. 2015), causality cannot be determined due to its cross-sectional design and the correlational analyses: Reversed causality cannot be ruled out, the observed negative association could also originate from a selection process in which individuals with higher mental wellbeing are less likely to occupy inter-ethnic brokerage positions. Inter-ethnic brokerage and mental wellbeing could also influence each other reciprocally. The observed relationship may also be brought about by unobserved factors such as personality traits. For instance, neuroticism, extraversion (Kalish and Robins 2006), and self-monitoring abilities (Oh and Kilduff 2008) have been associated with brokerage but also with psychological strain and lower wellbeing (Gale et al. 2013; Pillow et al. 2017). Against this background, it needs future research that takes a longitudinal approach to investigate causality as well as underlying selection and influence processes. However, caution is needed due to the potential pitfalls and limitations associated with using longitudinal data for causal inference, in particular the risk of misspecification of the underlying temporal processes (e.g.

Vaisey and Miles 2017). If the time lag in the data does not match the true causal time lag, this can introduce serious bias. For example, the underlying causal process between inter-ethnic brokerage and mental wellbeing might be shorter than the one-year time lag between panel waves in the SOCIALBOND survey.

Second, the regression approach employed in this study is limited in its ability to consider the endogenous mechanisms that influence inter-ethnic brokerage: an individual's amount of inter-ethnic open triads will be influenced by the overall tendency to befriend each other, the size and variety of ethnic groups and the overall level of ethnic segregation of friendships in the school grade networks. Future research could use explicit statistical models for social networks, such as exponential random graph models (ERGMs) (e.g. Robins et al. 2007) to understand which (endogenous) network processes are associated with inter-ethnic brokerage in a school grade network.

Third, the study assesses students' ethnic origin based on parents' and students' country of birth, but this may not align with students' subjective ethnic identity. Adolescence is a period of ethnic identity exploring and shaping through peer interactions (Medina et al. 2020; Umaña-Taylor et al. 2014). Furthermore, previous research suggests that inter-ethnic brokerage can create identity imbalance in adolescents (Mcfarland and Pals 2005). Against this background, future research could investigate whether ethnic identity development acts as a moderator of the relationship between inter-ethnic brokerage and mental wellbeing. For instance, inter-ethnic brokers who are very clear about their ethnic identity may be less susceptible to inter-ethnic cross-pressures, which in turn should come with better mental wellbeing for these individuals.

While inter-ethnic brokerage in friendship networks is vital to bridge ethnic divides, this study highlights the psychological challenges and costs individuals in these positions may face. Policymakers and practitioners encouraging inter-ethnic contact should be aware of the demands related to inter-ethnic brokerage and support individuals in these structural positions to function as mediators or promoters of integration processes.

3.8 Acknowledgements

I am grateful for support and advice from Clemens Kroneberg, Hanno Kruse, Karoline Mikus, Patrick Mayer, Andrea Wingen, Mark Wittek, Xinwei Xu, Heike Krüger, Lars Leszczensky, David Kretschmer and Lea Ellwardt. I thank Hannah Laumann from the Mannheim Centre for European Social Research (MZES), University of Mannheim for language editing.

3.9 Funding

This work was supported by the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme under grant number 716461.

4 How gendered religious norms contribute to the emerging gender gap in Muslim youths' interreligious friendships (Study 3)³³

4.1 Abstract

Recent research finds that Muslim girls increasingly have in-group friendships in adolescence, while Muslim boys remain more open to interreligious friendships. This gender gap mirrors established findings of female Muslims' lower involvement in interreligious romantic relationships, which is attributed to gendered religious norms. In this study, we examine whether gendered religious norms also contribute to the emerging gender gap in Muslim youths' inter-religious friendship-making. Building on the literature on intergroup dating, we identify religiosity, parental control, and leisure time activities as key factors through which religious norms may not only constrain Muslim girls' intergroup romantic relationships, but also their interreligious friendships. We also examine the contribution of gendered experiences of religious discrimination and rejection by non-Muslims to religious friendship-making. We study 737 Muslim youth from age 11–17 with six waves of longitudinal German data and find that religiosity, parental control, and leisure time activities all contribute to the emerging gender gap in interreligious friendship-making. Religiosity is associated with more in-group friendships, but only rises among Muslim girls in adolescence, not among boys. By contrast, parental control increases among both genders, but it only constrains girls' interreligious friendships. Muslim girls' declining participation in clubs also is associated with fewer interreligious friendships. Gendered experiences of religious discrimination and rejection do not contribute to the gender gap. Jointly, these factors explain one third of the emerging gender gap in interreligious friendship-making. This finding suggests that gendered religious norms not only limit interreligious romantic relationships but also interreligious friendships of Muslim girls.

Keywords: Muslims, religion, gender, friendship, adolescence, norms

³³ This chapter presents Study 3 in its published form, with only the citation style, formatting, and placement of tables and figures adjusted where necessary: Kretschmer, David, Kathrin Lämmermann, and Lars Leszczensky. 2024. 'How Gendered Religious Norms Contribute to the Emerging Gender Gap in Muslim Youths' Interreligious Friendships'. *International Journal of Intercultural Relations* 98:101919. doi:[10.1016/j.ijintrel.2023.101919](https://doi.org/10.1016/j.ijintrel.2023.101919).

4.2 Introduction

Across European countries, the distinction between Muslims and non-Muslims has become a bright boundary, as reflected in relatively few close social relations between these groups (Drouhot and Nee 2019; Foner and Alba 2018). This also applies to Muslim and non-Muslim *youth*, even though they usually are exposed to a diverse set of peers in schools and have many opportunities for interreligious interaction. Still, both romantic relationships and friendships between Muslim and non-Muslim youth are comparably rare (e.g., Carol 2016; Leszczensky and Pink 2017; Simsek et al. 2022; van Zantvliet et al. 2015). As close interreligious interaction can lower prejudice and stereotypes (Davies et al. 2011; Pettigrew and Tropp 2006) and support minority structural and cultural integration (Kornienko and Rivas-Drake 2022), this relative lack of close interreligious ties can have negative consequences for intergroup attitudes and Muslim integration into Western societies.

Recent research has documented important *gender differences* in intergroup relations among young Muslims in the West. Both interreligious romantic ties and interreligious friendships are less frequent among Muslim girls than among Muslim boys. While interreligious dating is generally rare, Muslim boys engage in it more frequently than Muslim girls (Wachter and de Valk 2020; van Zantvliet et al. 2015). Similarly, Muslim *in-group bias*, the tendency to predominantly be friends with other Muslim peers, is stronger among Muslim girls than among Muslim boys, even after accounting for opportunities for interreligious friendships (Kretschmer and Leszczensky 2022, 2023). However, this gender gap only emerges during adolescence (Kretschmer and Leszczensky 2023). While 11-year-old Muslim girls have at least as many non-Muslim friends as Muslim boys, their in-group bias increases sharply as adolescence progresses. By contrast, Muslim boys' in-group bias remains constant over time. Because of this gendered development, at age 17, Muslim girls have fewer friendships with non-Muslims than Muslim boys do. Notably, among non-Muslim youth, previous studies find no comparable gender difference and, throughout adolescence, non-Muslim boys and girls display very similar patterns of interreligious friendship-making (Kretschmer and Leszczensky 2022, 2023).

Yet how to explain these gender differences in Muslim youths' intergroup relations? For *interreligious romantic relationships*, the sources of the gender gap are well-established. More than Muslim boys, Muslim girls are confronted with religious norms that constrain their interreligious romantic relationships, particularly endogamy norms that disapprove of girls' interreligious romantic relationships (Carol and Teney 2015; van Pottelberge et al. 2019) and

norms on female chastity (Abo-Zena 2019; Saharso et al. 2023) that most non-Muslim youth do not share (Kogan and Weißmann 2020; Yip and Page 2016).

In this study, we ask whether gendered religious norms are also responsible for the gender gap in Muslim youths' interreligious *friendships* that emerges in adolescence. To that end, we assess how *individual religiosity, parental control, and leisure time activities* shape the friendship-making of Muslim boys and girls. All three factors have been shown to constrain Muslim girls' interreligious romantic relationships (Carol and Teney 2015; Hennink et al. 1999), but their contribution to gendered interreligious friendship-making has not been investigated so far. For all factors, we further differentiate whether they result in gendered interreligious friendship-making because they *develop differently* or because they have *different effects* among Muslim boys and girls. In addition, we consider the contribution of *non-Muslim youth* to the emerging gender gap, assessing whether Muslim boys and girls have different experiences of discrimination and rejection by non-Muslims in adolescence. For our empirical analysis of the emerging gender gap in interreligious friendship-making among Muslim youth, we rely on random-effects growth curve models estimated on six waves of panel data for 737 Muslim adolescents aged 11–17.

4.3 Gendered religious norms and the emerging gender gap in Muslim adolescents' interreligious friendships

4.3.1 Gendered religious norms and romantic relationships among Muslim youth

With the onset of puberty, many youth develop a romantic interest, and, during adolescence, romantic relationships become increasingly widespread and serious (Collins et al. 2009). In many religious groups, various norms target romantic relationships. This includes *endogamy norms* that disapprove of interreligious romantic relationships (Carol 2016; Talbani and Hasanali 2000) and *chastity norms* that reject premarital sexual activity but can also entail broader restrictions on cross-gender interaction (Hawkey et al. 2018; Saharso et al. 2023). These norms tend to be particularly strong in ethnoreligious minorities, where inter-religious romantic relationships are perceived to endanger the preservation of cultural heritage (Dion and Dion 2001; van Pottelberge et al. 2019) and premarital sexual activity is considered a threat to family reputation and cohesion (Le Espiritu 2001; Saharso et al. 2023). Frequently, these religious norms are *gendered* and more strongly apply to the romantic relationships of girls due to women's role as preservers of culture (Dion and Dion 2001; Le Espiritu 2001) and the association of family reputation with female chastity and purity (Saharso et al. 2023).

Endogamy and chastity norms are both widespread among Western Muslim youth and stronger for Muslim girls than for Muslim boys (Carol and Teney 2015; van Pottelberge et al. 2019; Saharso et al. 2023). Among Muslims, endogamy norms tend to be gendered because the father determines children's religion, so Muslim women's, but not Muslim men's, interreligious romantic relationships threaten intergenerational religious transmission (Cila and Lalonde 2014; van Pottelberge et al. 2019). Furthermore, dominant interpretations of the Qur'an prohibit marriage between Muslim women and Christian or Jewish men, but not between Muslim men and Christian or Jewish women (Cila and Lalonde 2014; Munniksma et al. 2012). Due to the tight link between family reputation and female purity, chastity norms are also much stronger among Muslim girls than among Muslim boys (Cense 2014; Hawkey et al. 2018; Kogan and Weißmann 2020). On top of gendered endogamy norms, intergroup dating is further complicated for Muslim girls who have internalized these chastity norms. Many Western non-Muslims do not share these norms and thus are reluctant to deal with the expectations they come with, such as a renunciation of premarital physical intimacy (Kogan and Weißmann 2020).

The consequences of gendered religious norms for the romantic relationships of adolescent Muslim boys and girls in Western societies are well-documented. Muslim girls generally have fewer romantic relationships than their brothers (Wong et al. 2017; Yahyaoui et al. 2013). And if they have romantic relationships, these relationships less frequently cross religious boundaries than those of Muslim boys (Wachter and de Valk 2020; van Zantvliet et al. 2015).

4.3.2 How gendered religious norms may also affect interreligious friendship-making

Even though gendered religious norms target romantic relationships, they may also constrain interreligious *friendships*, particularly for Muslim girls (Carol 2014; Kretschmer and Leszczensky 2022). Gendered religious norms directly complicate Muslim girls' friendships with non-Muslim boys because these friendships can be (perceived as) a first step towards romantic relationships. Muslim girls who have internalized these norms may consider these friendships inappropriate or be concerned with evolving romantic feelings they cannot act upon because they conflict with their religious values (Giuliani et al. 2017; Seward and Khan 2016). Chastity norms further limit cross-gender interaction and thus also impede friendships with non-Muslim boys (Basit 1997b; Giuliani et al. 2017). Yet, gendered religious norms can also complicate friendships with non-Muslim girls, who may have laxer standards for cross-gender interaction, bring Muslim girls into contact with non-Muslim boys, and facilitate (interreligious) romantic relationships (Basit 1997a; Hennink et al. 1999; Zine 2001). In some

cases, Muslim parents or adolescents who have internalized these norms therefore perceive non-Muslim girls as undesired role models with whom contact is to be avoided (Hawkey et al. 2018; Hennink et al. 1999; Zine 2001).

Though these considerations suggest that religious norms may hamper Muslim girls' interreligious friendships, we know little about the specific factors through which these norms constrain friendship-making. However, research on intergroup dating has identified three key factors through which religious norms can hamper interreligious romantic relationships: *individual religiosity, parental control, and leisure time activities* (Carol 2016; Carol and Teney 2015; Hennink et al. 1999; van Zantvliet et al. 2015). We suggest that these factors are also likely to shape Muslim girls' interreligious friendship-making.

First, Muslim girls with higher levels of *religiosity* are more likely to have internalized endogamy, chastity, and modesty norms and to be motivated to comply with them (Carol and Teney 2015; Grønli Rosten and Smette 2023). Following the considerations above, they therefore are more likely to consider not only intergroup dating, but also interreligious friendships as problematic. Second, irrespective of Muslim girls' own religious convictions, *parental control* targeted at enforcing religious norms can also not only constrain intergroup romantic relationships, but also complicate interreligious friendships. Finally, to comply with religious norms about modest public behavior, some Muslim girls limit *leisure time activities* that provide regular exposure to members of religious out-groups, such as participating in sports clubs or youth centers (Giuliani et al. 2017; de Knop et al. 1996; McGrath and McGarry 2014; Stodolska and Livengood 2006). This not only prevents out-group friendships within the context of these leisure time activities but can also affect friendships with their schoolmates, as schoolmates frequently meet and get to know each other better during leisure time activities.

4.3.3 How can gendered religious norms produce the emerging gender gap? Two developmental pathways

Given their link to religious norms and friendships, how can religiosity, parental control, and leisure time activities create the gender gap in in-group bias emerging in adolescence? Understanding this requires understanding how religious norms and the factors through which they constrain interreligious friendship-making *develop* during the adolescent years. Since romantic relationships become more prevalent throughout adolescence (Collins et al. 2009), gendered religious norms also become increasingly important in this period of time (Abo-Zena 2019; Hennink et al. 1999; Scourfield et al. 2013). This, in turn, suggests gendered patterns

and consequences of religiosity, parental control, and leisure time activities in adolescence. A gender gap in in-group bias can then emerge through two developmental pathways: through *gender-specific trajectories* of these factors on the one hand, and through their *gender-specific effects* on the other.

4.3.3.1 Gender-specific trajectories of religiosity, parental control, and leisure time activities

As gendered religious norms become salient in adolescence, religiosity, parental control, and leisure time activities may start to develop differently among Muslim boys and girls. These gender-specific trajectories can, in turn, result in gendered patterns of interreligious friendship-making.

Since many religious norms primarily target girls, parents and religious communities may seek to strengthen Muslim girls' *religiosity* in adolescence to ensure their norm adherence (Abo-Zena 2019; Scourfield et al. 2013). Muslim girls themselves may also become more aware of the importance of religion in their life as puberty marks the transition to fully accountable members of the religious community (Abo-Zena 2019; Giuliani et al. 2017). Accordingly, Muslim girls' religiosity may rise relative to that of Muslim boys and increasingly limit their interreligious friendship-making.

As they grow older, Muslim girls may also face increasingly stricter *parental control* than their brothers. Studies have shown that parents start to more strongly monitor their teenage daughters' than their sons' social interactions and increasingly prevent Muslim girls' out-group friendships when romantic relationships become a realistic possibility in adolescence (Basit 1997b; Hennink et al. 1999; Scourfield et al. 2013).

Finally, both Muslim girls themselves and their parents may consider *leisure time activities* with regular out-group contact increasingly inappropriate in adolescence (Hennink et al. 1999; Scourfield et al. 2013). As adolescence progresses, Muslim girls thus may participate less in sports, extracurricular school activities, parties, and other events that facilitate mingling across religious boundaries than Muslim boys (Basit 1997b; Hennink et al. 1999). This development may increasingly limit their interreligious friendship-making.

4.3.3.2 Gender-specific effects of religiosity, parental control, and leisure time activities

With gendered religious norms becoming more relevant in adolescence, religiosity, parental control, and leisure time activities may also produce a gender gap in in-group bias because they have different *effects* on the friendship-making of Muslim boys and girls.

As religious norms like chastity and endogamy norms primarily target adolescent Muslim girls, high *religiosity* should more strongly affect interreligious friendships of Muslim girls than of Muslim boys. Indeed, research on romantic relationships indicates that high religiosity reduces the openness of Muslim girls' out-group dating, but not that of Muslim boys (Buunk and Dijkstra 2017; Carol and Teney 2015).

Similarly, though Muslim parents may exert *control* on both their sons' and their daughters' behavior, the extent of interreligious contact they tolerate may be lower for girls (Basit 1997b; Giuliani et al. 2017), so parental control may more strongly inhibit girls' interreligious friendships. In line with this argument, research on intergroup romantic relationships shows that parental control is associated with a lower openness to interreligious dating among Muslim girls, but not among Muslim boys (Carol and Teney 2015).

Finally, due to different socializing patterns of Muslim boys and girls, girls are more likely than boys to depend on leisure time activities with out-group exposure to make out-group friends. Like other adolescent boys, Muslim boys often engage in unstructured activities in larger groups, such as playing soccer on the local sports court (Maccoby 1998; McDougall and Hymel 2007). These large groups are likely to encompass at least some out-group members, thus providing Muslim boys with opportunities to befriend non-Muslims. By contrast, girls tend to engage in one-on-one interactions or in smaller and more pre-selected groups (McDougall and Hymel 2007; Rose and Rudolph 2006) that provide less exposure to out-group members. This general interaction pattern is further amplified among Muslim girls, who are strongly involved with their family and religious community (Basit 1997b; Hennink et al. 1999; McGrath and McGarry 2014). As girls do not have regular access to out-group peers in the unstructured larger group activities boys engage in, spending leisure time in clubs, youth centers or other contexts that provide opportunities for out-group interaction should be more decisive for Muslim girls' out-group friendships than for Muslim boys'.

4.3.3.3 Gendered experiences of religious discrimination and rejection

Interreligious friendship-making is a two-sided process, so it not only depends on Muslim youth and their gendered religious norms, but also on the behavior of *non-Muslims*. If Muslim girls more so than Muslim boys face increasing discrimination and rejection by non-Muslim youth in adolescence, this can also result in a stronger focus of Muslim girls on in-group friendships and an emerging gender gap in in-group bias.

With the onset of puberty, some Muslim girls begin to veil (Abo-Zena 2019; Giuliani et al. 2017). Non-Muslim youth may react by treating Muslim boys and girls differently, as the veil renders Muslim girls' religious otherness highly visible and is known to be associated with discrimination and harassment (Chakraborti and Zempi 2012; Choi et al. 2023). Accordingly, Muslim girls who start to veil may anticipate rejection and/or be frustrated by experiences of discrimination. Even those Muslim girls who do not veil may become increasingly sensitive to non-Muslim behavior due to their veiling peers' experiences of discrimination. Therefore, Muslim girls may increasingly abstain from interreligious friendships as adolescence progresses.

However, non-Muslim youths' behavior towards Muslims boys may also change in adolescence. Research shows that many non-Muslim Westerners view Muslim men as dangerous and oppressive (Archer 2009; Erentzen et al. 2022), so discrimination and rejection of Muslim boys based on these stereotypes may increasingly surface in adolescence. As these stereotypes characterize Muslim men as "anti-social" (Fourgassie, Subra, and Sanitioso 2023), they are also likely to specifically constrain social relations, such as interreligious friendship. By contrast, stereotypes towards Muslim women mostly concern religiosity and submissiveness (Erentzen et al. 2022; Fourgassie et al. 2023), which are less likely to hamper friendship-making. In line with these gendered stereotypes, past research has found that non-Muslims are more reluctant to be friends with Muslim boys than with Muslim girls (Kretschmer and Leszczensky 2022).

In conclusion, both Muslim boys and Muslim girls may experience increasing discrimination and rejection in adolescence and therefore retreat to in-group friendships. Thus, whether *trajectories* of perceived discrimination and rejection develop similarly among Muslim boys and girls or are gender-specific is not obvious. In principle, perceptions of discrimination and rejection could also have *gender-specific effects*, shaping interreligious friendship-making differently among Muslim boys and girls. However, we have no specific expectations on gender-specific effects, as we expect discrimination and rejection to be detrimental for interreligious friendships of Muslim boys and girls alike. Still, and in line with the assessment of the factors behind gendered religious norms, we empirically investigate whether gendered experiences of discrimination and rejection contribute to the emerging gender gap in in-group bias, either through gender-specific trajectories or through gender-specific effects.

4.4 Data and methods

Our empirical analysis uses longitudinal data from the Friendship and Identity in School (FIS) study (Leszczensky et al. 2022). The data cover six waves and include information on 2701 students nested within 29 grades from ten ethnically diverse secondary schools in the German federal state of North Rhine-Westphalia. All schools were either lower secondary, intermediate secondary, or comprehensive schools. In each wave, students filled out a questionnaire in class. In each school, the study surveyed all students who attended the fifth, sixth and seventh grade (i.e., academic year) during the first wave. Subsequent waves were about nine months apart. In the first wave, fifth-graders were 11–12 years old, sixth-graders 12–13 years, and seventh-graders 13–14 years. By the sixth wave, students who initially attended the seventh grade were 17–18 years old.

As we are interested in Muslim youths' friendship-making, we reduced the sample to students who self-reported Islam as their religion. We limited observations to the age range between 11 and 17 years, as there are too few observations for younger and older ages to obtain reliable estimates. This results in a sample of 760 Muslim students and 2562 observations over time (person-waves). After listwise deletion of missing values, the analysis sample consists of 737 Muslim students and 2239 observations over time.

4.4.1 Measures

4.4.1.1 *In-group bias in adolescents' friendships*

In each wave, students could nominate up to ten best friends from their own classroom and from other classrooms in their grade. We operationalize a Muslim student's *in-group bias* as the difference between the share of Muslims among a student's friends and the share of Muslim students in the grade, the latter of which represents the opportunities to make in-group friends. If friendship-making was independent of religion, the average share of Muslim friends should equal the average share of Muslim students in the grade. A positive value indicates a Muslim in-group bias.

4.4.1.2 *Age and gender*

Students self-reported their year and month of birth, based on which we calculate their (monthly) *age* at the time of each wave.

Gender is measured by students' self-reports of whether they are male or female. 52.6% of the Muslim students were female.

4.4.1.3 *Religiosity, parental control of friendships, and leisure time activities*

We measure *religiosity* by students' self-reported frequency of prayer, which they could indicate on a six-point scale ranging from "never" (0) to "five times a day or more" (5).

We assess *parental control* of friendships with four items: (1) "My parents tell me that it is important what friends I have", (2) "My parents tell me, that I should not relate with certain people", (3) "My parents tell me when they don't like my friends", and (4) "My parents encourage me to do something with friends they like". All items were rated on five-point scales ranging from "completely applies" (0) to "does not apply at all" (4). We use the mean of these four items as a measure of parental control of friendships. This scale is highly reliable (Cronbach's alpha= 0.77). We recoded the scale such that higher values indicate stronger parental control.

We consider three *leisure time activities* that can provide opportunities for out-group contact: (1) "going to the youth center", (2) "spending time in a club (sports, music, theatre, or some other club)", and (3) "partying". Students could indicate how often they engage in these activities on a six-point scale ranging from "never" (0) to "daily" (5).

4.4.1.4 *Perceived religious discrimination and public rejection of Islam*

We measure perceived *religious discrimination* with a mean index of three items. After students indicated their religion, they were asked how often other children or adolescents (1) "speak badly about their religion", (2) "insult or offend them because of their religion", and (3) "treat them badly or unfairly because of their religion". Students could answer on a four-point scale ranging from "never" (0) to "often" (3). This scale is highly reliable (Cronbach's alpha = 0.88).

We capture perceived *public rejection of Islam* with a mean index of three items: (1) "Most Germans respect my religion", (2) "Most Germans like my religion", (3) "Most Germans have a positive attitude towards my religion". Students rated these statements on a five-point scale ranging from "completely applies" (0) to "does not apply at all" (4). Higher values on the scale thus indicate a stronger perceived rejection of Islam, while lower values indicate a high public regard of Islam. This scale is highly reliable (Cronbach's alpha= 0.89). Table 4.1 gives a descriptive overview of all variables included in our analyses. (A detailed overview by gender and wave is shown in Table A1 in Appendix A.).

Table 4.1 Descriptive statistics for Muslim youth (average over waves, standard deviation (SD) and minimum and maximum values)

Variable	Mean	SD	Min.	Max.
In-group bias	0.22	0.28	-0.56	0.89
Age	14.15	1.41	11	17
Gender: Girl (%)	52.61			
Religiosity	2.84	1.69	0	5
Parental control of friendships	2.93	0.92	0	4
Leisure time activities				
Leisure time: spending time in a club	2.16	2.02	0	5
Leisure time: going to youth centre	0.75	1.31	0	5
Leisure time: partying	0.87	1.28	0	5
Perceived religious discrimination	0.51	0.68	0	3
Perceived public rejection of Islam	1.13	0.97	0	4

4.4.2 Method

We use *random-effects group-specific growth curve models* (GCMs; Brüderl et al. 2019; Halaby 2003) to investigate how and why the gender gap in Muslim youths' in-group bias emerges in adolescence. The dependent variable is adolescents' in-group bias in friendships, and the time variable is their (monthly) age. We model *group-specific* growth curves by interacting age with students' gender and estimate random-effects rather than fixed-effects GCMs to be able to compare the development of in-group bias between boys and girls. This is not possible in fixed-effects GCMs because the time-invariant gender effect is not identified (Brüderl et al. 2019). We estimate linear age effects to ease interpretation, and in Appendix B we show that the age trend indeed is linear among both Muslim boys and girls. To only estimate intertemporal variation within grades, all analyses include grade dummies, thereby controlling for time-stable differences between school grades, including differences between educational tracks.³⁴

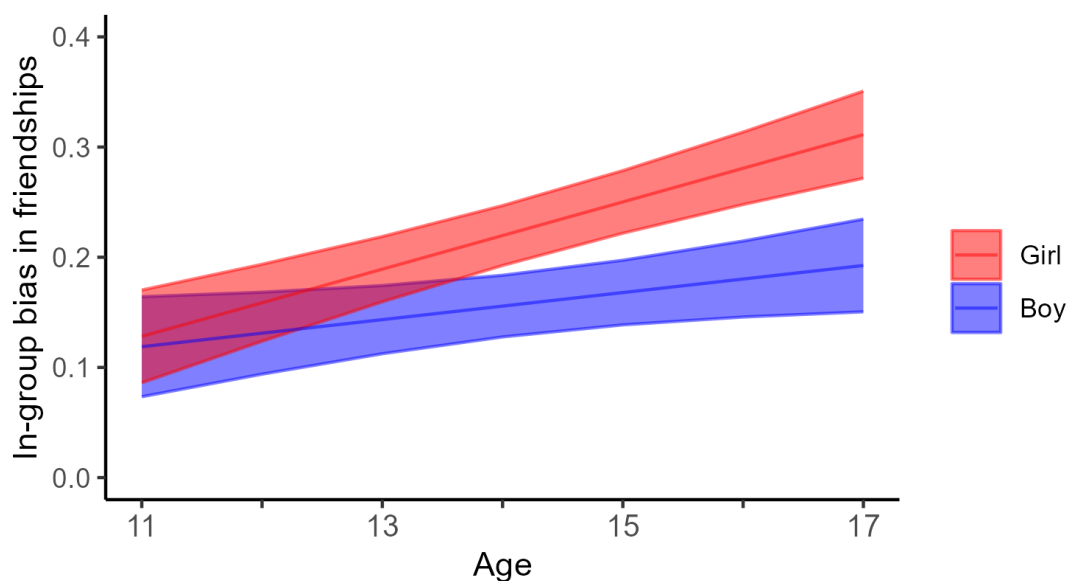
³⁴ All substantive results are identical when we include further controls (socio-economic status, ethnic background, and migrant generation; see Appendix C, Table C1). Because missing values on these variables reduce the sample size, we do not include them in the main analyses.

4.5 Results

4.5.1 The emerging gender gap in Muslims' interreligious friendship-making in adolescence

The starting point of our analysis is the expectation that a gap in religious in-group bias emerges between Muslim boys and girls in adolescence. To investigate this, we estimate a baseline GCM (M0) that examines whether the development of in-group bias with age differs between Muslim boys and girls (see Appendix D, Table D1, M0 for the full results). Figure 4.1 presents the corresponding predicted values of Muslim boys' and girls' in-group bias from age 11–17, showing that a gender gap in-group bias does emerge in adolescence. At age 11, Muslim boys and girls have a similar in-group bias of about 13% points. From age 11–17, the in-group bias of Muslim girls increases steeply by 18.3% points ($p < .001$; increase of 140% relative to age 11). This increase is twice as large as the increase in the in-group bias of Muslim boys, which only rises by 7.4% points ($p < .05$; 60% relative to age 11). As a result, a gender gap of 10.9% points ($p < .05$) emerges between Muslim girls and boys between age 11 and 17, which almost equals the in-group bias observed at age 11 in size. Notably, this emerging gender gap of 10.9% points only applies to Muslim youth, while no gender gap emerges in adolescence among the non-Muslim youth in our sample (see Appendix E).

Figure 4.1 Predicted in-group bias over age for Muslim girls and boys from random-effects GCM (M0)



Note: 95% confidence intervals. Controlled for school-grade fixed-effects.

This emerging gender gap among Muslim youth is the starting point of our subsequent analyses. In these analyses, we examine whether this gap can be explained by the gender-specific trajectories and effects of religiosity, parental control, leisure time activities, and/or perceived religious discrimination and public rejection of Islam. We first investigate each factor separately to assess its individual contribution to the gender gap and to determine the pathways through which it operates. Afterwards, we present a combined model that includes all factors that significantly contribute to the emerging gender gap to assess how much of the gap they explain jointly.

4.5.2 Gender-specific trajectories and effects of religiosity, parental control of friendships, and leisure time activities

To investigate each factor’s contribution to the gross gender gap identified in the baseline GCM, M0, we estimate two additional GCMs. First, M1 considers the factor’s contribution to the gender gap through *gender-specific trajectories*, estimating an overall effect of the factor for both genders. Second, M2 includes an interaction effect of the factor and gender to study whether the factor contributes to the gender gap through *gender-specific effects*. This interaction effect allows us to estimate separate effects of the factor for boys and girls and to evaluate whether the gender difference is statistically significant. Results from these factor-specific analyses are displayed in Figures 4.2.–4.4. (see Appendix F, Table F1-F5 for full results).

4.5.2.1 Religiosity

Figure 4.2 Religiosity: Gender-specific trajectories, effect on in-group bias, and gender gap in in-group bias among Muslim youth.

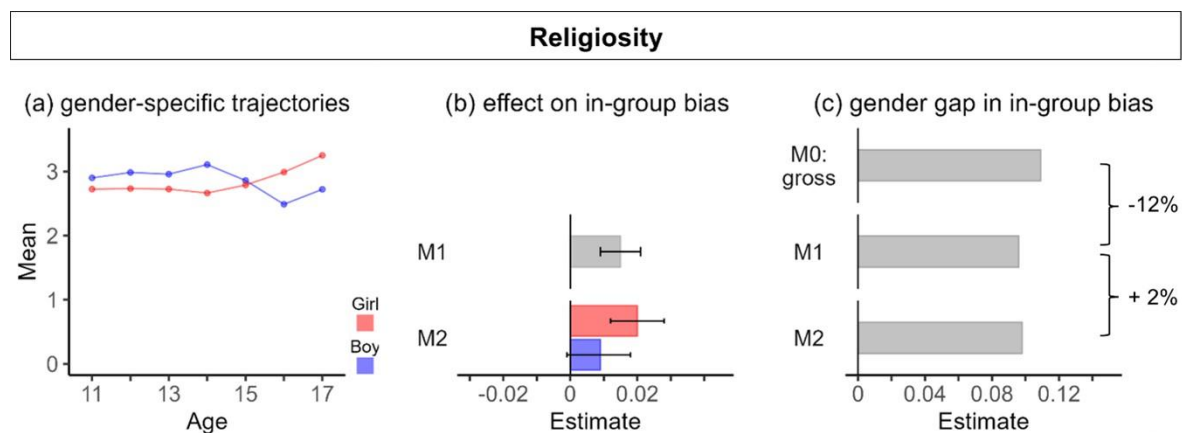


Figure 4.2 illustrates how religiosity contributes to the gender gap in Muslim youths' in-group bias. To assess the gender-specific trajectory of religiosity, panel a depicts the mean religiosity of Muslim boys and Muslim girls over the adolescent years, showing that Muslim girls' religiosity rises in adolescence, while Muslim boys' religiosity declines.

Panel b shows estimates of the two GCMs for the effect of religiosity on in-group bias, one from the model estimating an overall effect for Muslim boys and girls (M1) and one from the model estimating gender-specific effects (M2). According to M1 in panel b, higher religiosity is associated with a stronger in-group bias among Muslim youth ($b = .015, p < .001$). Further taking gender-specific effects into account, point estimates from M2 suggest that this effect tends to be stronger among Muslim girls ($b = .020, p < .001$) than among Muslim boys ($b = .009, p > .1$), but this difference itself is not statistically significant ($p > .1$).

Panel c compares the gross gender gap from the baseline model without religiosity (M0) with the estimated gender gap in M1 and M2. The percentage change is depicted on the right, whereby the upper percentage value indicates the decrease in the gender gap compared to M0 when gender-specific *trajectories* of religiosity are accounted for in M1. The combination of the increase in religiosity among Muslim girls relative to Muslim boys (panel a) and the effect of religiosity on in-group bias in M1 (panel b) results in a statistically significant reduction of the gender gap by 12% ($p < .05$).³⁵ By contrast, the lower percentage value indicates that the gender gap in M1 is not further reduced when accounting for gender-specific *effects* of religiosity on friendship-making in M2. Religiosity thus contributes to the emerging gender gap in Muslim in-group bias through its gender-specific trajectory rather than its gender-specific effects.

³⁵ We assess the significance of changes in the gender gap between the models M2, M1, and M0 with generalized estimating equation (GEE) models that allow the comparison of coefficients between nested linear models with clustered data (Yan, Aseltine, and Harel 2013). GEE estimation differs slightly from the estimation of random-effects growth curve models, but all differences are marginal and do not change any substantive conclusions.

4.5.2.2 Parental control

Figure 4.3 Parental control of friendships: Gender-specific trajectories, effect on in-group bias, and gender gap in in-group bias among Muslim youth.

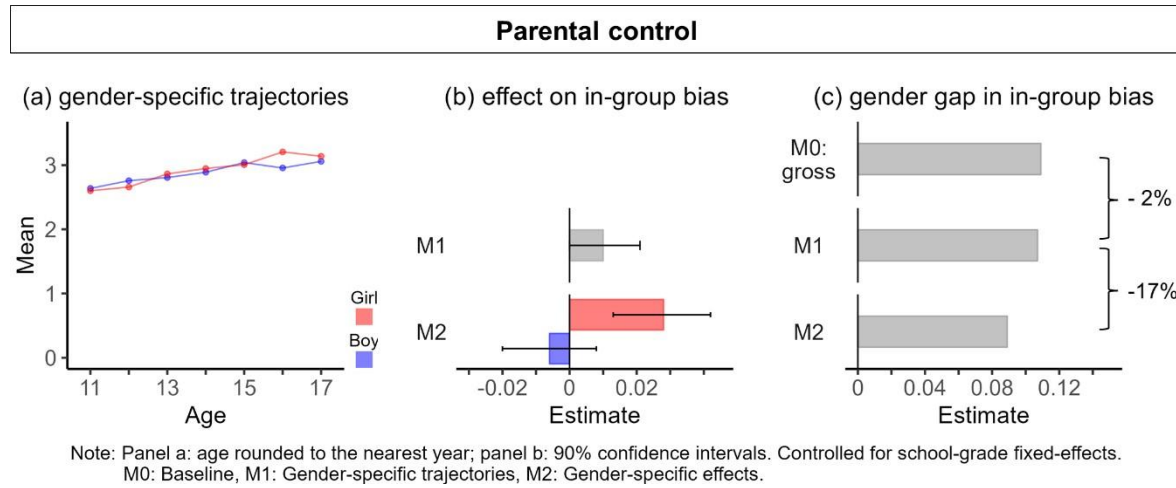


Figure 4.3 investigates whether parental control of friendships contributes to the gender gap in in-group bias. Panel a in Figure 4.3 shows that, unlike for religiosity, the trajectory of parental control is almost identical for Muslim boys and girls, with a steady, yet moderate increase in adolescence. In panel b the overall effect of parental control of friendships (M1) indicates that higher control is associated with a stronger in-group bias ($b = .010$, $p < .1$). However, once we differentiate this effect by gender (M2), higher parental control turns out to be strongly associated with higher in-group bias among Muslim girls ($b = .028$, $p < .01$), but not at all among boys ($b = -.006$, $p > .1$). This gender difference is statistically significant ($p < .01$). Echoing the identical trajectories of parental control among boys and girls, the estimated gender gap in panel c is not significantly reduced when accounting for gender-specific trajectories in M1 ($p > .1$). By contrast, the gender gap falls by 17% when accounting for gender-specific effects in M2, which is a statistically significant reduction ($p < .05$). Though parental control of friendships does not develop differently for Muslim boys and girls in adolescence, it thus contributes to the emerging gender gap because it only is related to a higher in-group bias among Muslim girls.

4.5.2.3 Leisure time activities

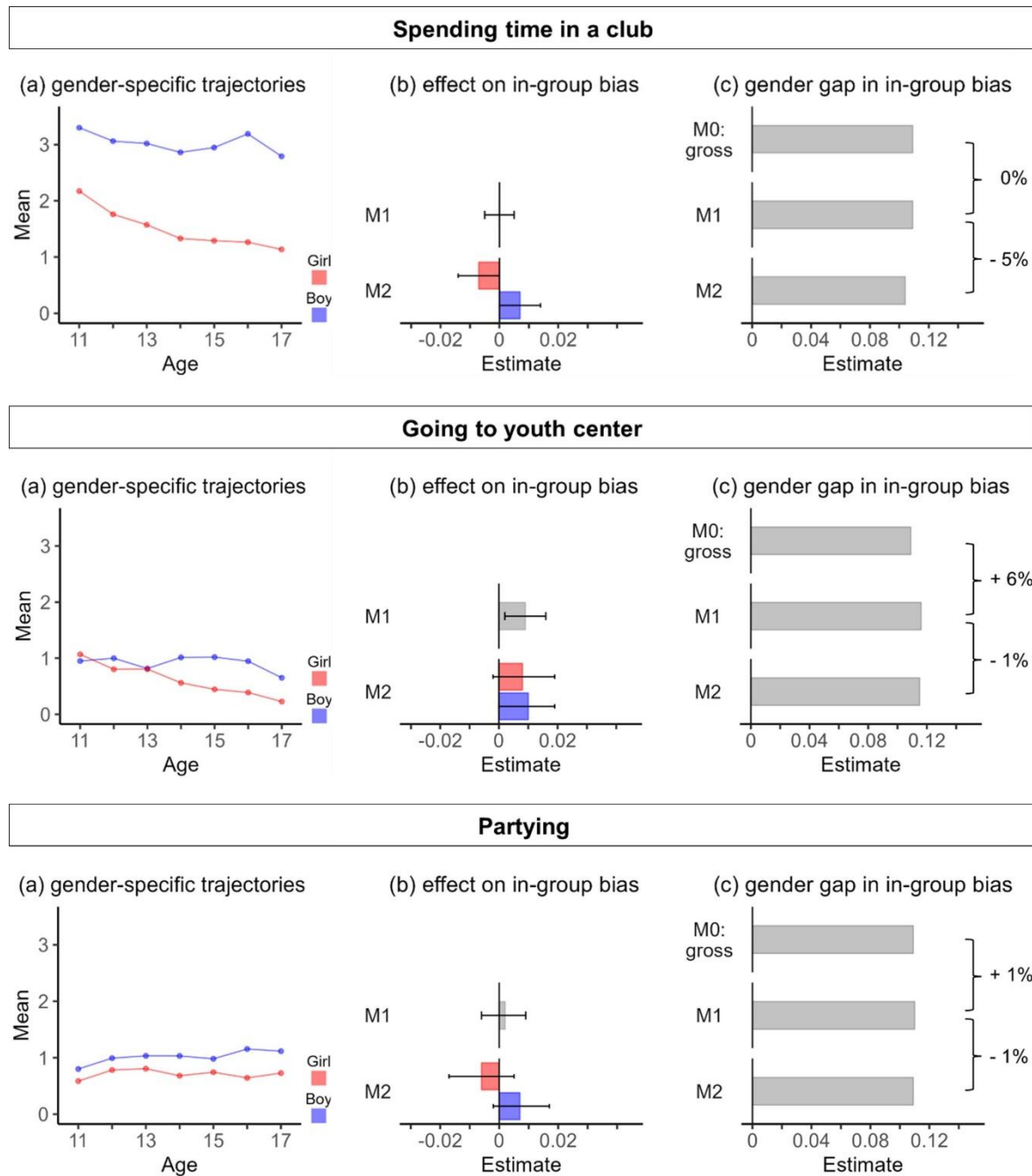
Figure 4.4 investigates how leisure time activities contribute to the emerging gender gap among Muslim youth, distinguishing between spending time in a club (top row), going to a youth center (middle), and partying (bottom). Starting with *spending time in a club*, panel a shows that Muslim girls generally spend less time in clubs than Muslim boys, and this difference

grows as adolescence progresses. Panel b indicates no overall effect of club attendance on in-group bias ($b = .000$, $p > .1$, M1). However, the gender-specific estimates from M2 suggest diverging effects of club attendance for Muslim girls and boys, though both are at the brink of statistical significance. In-group bias tends to be lower among Muslim *girls* who attend clubs more frequently ($b = -.007$, $p = .103$), but higher among Muslim *boys* who attend clubs more frequently ($b = .007$, $p = .113$). Though the gender-specific effects fail to reach conventional levels of statistical significance, the gender difference itself is statistically significant ($p < .05$). When accounting for gender-specific effects (M2), the gender-gap falls by 5% compared to M1; this decrease is statistically significant ($p < .1$).

By contrast, neither attending *youth centers* nor *partying* are leisure time activities that contribute to the emerging gender gap in in-group bias. Though Muslim girls less frequently attend *youth centers* than Muslim boys throughout adolescence, this is associated with a higher rather than a lower in-group bias among both boys and girls ($b = .009$, $p < .05$), with no significant gender difference ($p > .1$). While attending *parties* tends to be tied to a lower in-group bias among Muslim girls ($b = -.006$) and a higher in-group bias among Muslim boys ($b = .007$), neither these effects nor the gender difference are statistically significant (all $p > .1$). And since both Muslim boys and girls attend parties rarely throughout adolescence, the gender gap in in-group bias remains unchanged when accounting for this leisure time activity.

In sum, leisure time activities are less consistently linked to the emerging gap in in-group bias than individual religiosity and parental control. Only the attendance of clubs contributes to the gender gap because it tends to reduce Muslim girls', but not Muslim boys' in-group bias.

Figure 4.4 Leisure time activities: Gender-specific trajectories, effect on in-group bias, and gender gap in in-group bias among Muslim youth



Note: Panel a: age rounded to the nearest year; panel b: 90% confidence intervals. Controlled for school-grade fixed-effects. M0: Baseline, M1: Gender-specific trajectories, M2: Gender-specific effects.

4.5.3 Gender-specific trajectories and gender-specific effects of perceived religious discrimination and public rejection of Islam

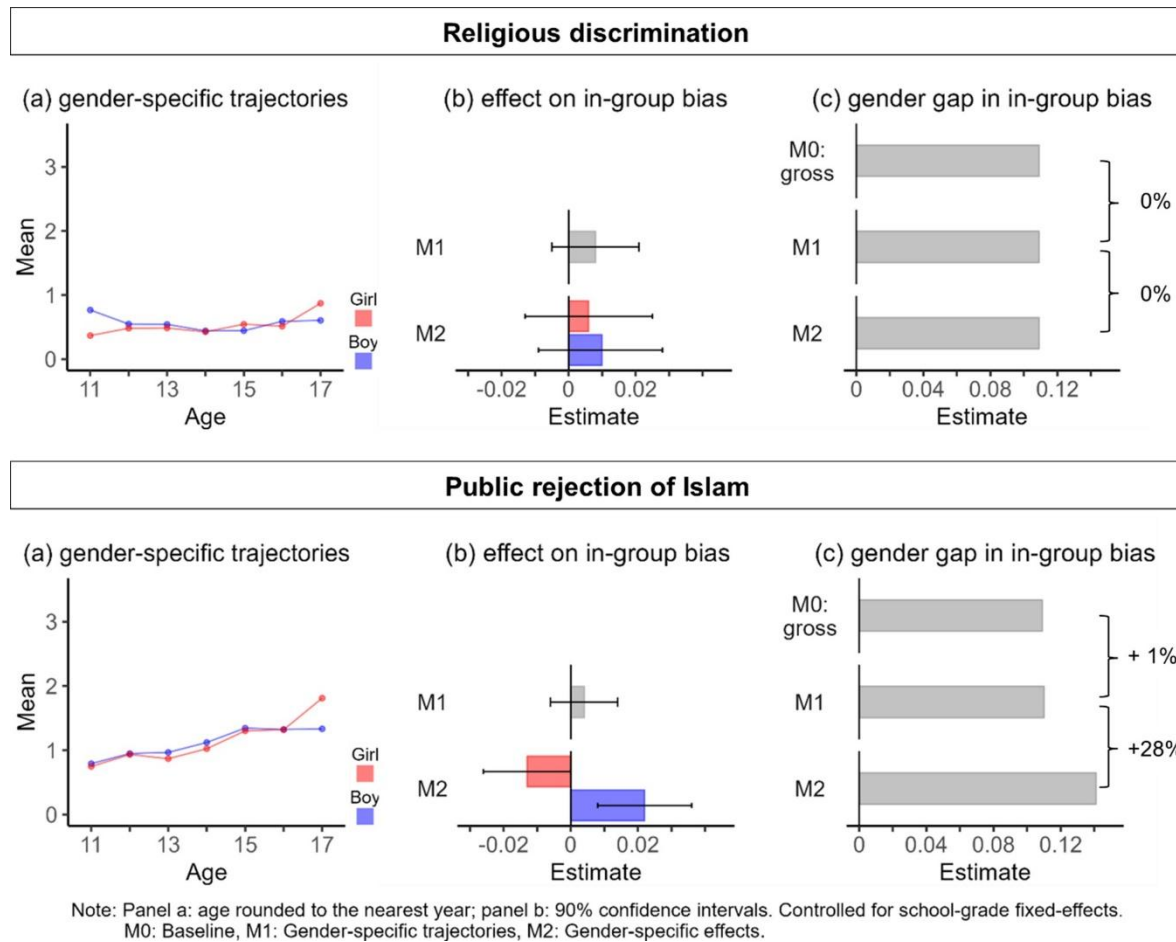
Figure 4.5 investigates whether gender-specific trajectories and gender-specific effects of Muslim adolescents' perceived *religious discrimination* and *public rejection of Islam* also contribute to the emerging gender gap in in-group bias (see Appendix F, Table F6 and F7 for full results of the factor-specific analyses).

Panel a in Figure 4.5 shows no systematic gender-specific trajectories of perceived *religious discrimination*, and panel b demonstrates that experiences of discrimination are not related to Muslim boys' or Muslim girls' in-group bias, with no gender-specific effects either ($p > .1$, panel b). In the absence of gender-specific trajectories and gender-specific effects, the gender gap remains unchanged when accounting for religious discrimination (panel c).

Perceived *public rejection of Islam*, displayed in the bottom row of Figure 4.5, increases to a similar extent among Muslim boys and girls over time. However, panel b shows that while the overall effect of public rejection of Islam on in-group bias in M1 is negligible, there are highly gender-specific effects of rejection in M2. Among Muslim boys, higher perceived rejection of Islam is associated with a higher in-group bias ($b = .022$, $p < .01$). Among Muslim girls, it tends to be linked to a lower in-group bias, though this effect is not statistically significant ($b = -.013$, $p > .1$). The gender difference in the effect is statistically significant ($p < .01$). As perceived public rejection rises in adolescence, these gendered effects result in a higher in-group bias among Muslim boys and the gender gap *increases* after accounting for these effects in M2. Perceived rejection thus does not explain the emerging gender gap in in-group bias. In fact, without the gender-specific effects of perceived rejection, the gender gap would be even larger.

To summarize, neither perceptions of religious discrimination nor of a public rejection of Islam can explain the gap in in-group bias emerging between Muslim boys and girls in adolescence.

Figure 4.5 Religious discrimination and public rejection of Islam: Gender-specific trajectories, effect on in-group bias, and gender gap in in-group bias among Muslim youth



4.5.4 Explaining the gender gap: Combined analysis of religiosity, parental control of friendships, and spending time in clubs

In the factor-specific analyses above, accounting for religiosity, parental control, and the attendance of clubs during leisure time each resulted in a statistically significant reduction of the gender gap. We next conduct a combined analysis of all three factors to determine how much of the emerging gender gap can be explained by the identified factors *together*. Like in the factor-specific analyses, we first consider the factors' contribution through their *gender-specific trajectories*, estimating their overall effects (M1). Then, we estimate *gender-specific effects* by including interaction effects that allow us to estimate separate effects for boys and girls and to assess whether differences in the gender-specific effects are statistically significant (M2). Table 4.2 presents the results (see Appendix D, Table D1 for the full results).

Table 4.2 The emerging gender gap in in-group bias (M0) and the contribution of gender-specific trajectories (M1) and gender-specific effects (M2) of religiosity, parental control, and spending time in a club among Muslim youth

	M0: Baseline <i>Gross gender gap</i>	M1: Gender-specific trajectories	M2: Gender-specific effects
Emerging gender gap	0.109 (0.045)*	0.094 (0.045)*	0.072 (0.045)
% change relative to M0		-14%	-34%
<i>Factors:</i>			
Religiosity		0.015 (0.004)***	
Boys			0.009 (0.006)
Girls			0.019 (0.005)***
Gender difference			0.011 (0.007)
Parental control of friendships		0.010 (0.006)	
Boys			-0.007 (0.009)
Girls			0.027 (0.009)**
Gender difference			0.034 (0.012)**
Spending time in a club		0.000 (0.003)	
Boys			0.007 (0.004)
Girls			-0.007 (0.004)†
Gender difference			-0.014 (0.006)*
N person-waves	2239	2239	2239
N students	737	737	737

Notes. All results from random-effects growth curve models with in-group bias as dependent variable. School grade fixed effects (grade dummies included - not shown). Emerging gender gap: difference in in-group bias emerging between girls and boys between age 11 and age 17. Satterthwaite-method used for computing the degrees of freedom and t-statistics. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. Standard errors in parentheses.

The baseline model (M0) in Table 4.2 shows the gross gender gap in in-group bias of 10.9% points emerging between Muslim boys and girls from age 11–17 ($p < .05$). Accounting for the *gender-specific trajectories* of religiosity, parental control of friendships, and club attendance in M1, this gender gap reduces to 9.4% points, which is a significant decrease of 14% ($p < .01$). When additionally accounting for *gender-specific effects* in M2, the gender gap falls to 7.2% points and is no longer statistically significant ($p > .1$). Relative to M1, this is an additional significant decrease of 23% ($p < .05$), and relative to M0, a total decrease of 34% ($p < .001$). Jointly, religiosity, parental control of friendships, and attendance of clubs in leisure time thus

account for one third of the gender gap in in-group bias emerging between Muslim boys and girls from age 11–17.

The developmental pathways through which religiosity, parental control, and club attendance operate in Table 4.2 reiterate the findings from the factor-specific analyses. Accordingly, religiosity primarily contributes to the gender gap through its gender-specific trajectory, though it also is more strongly associated with an in-group bias among Muslim girls than Muslim boys. By contrast, parental control and club attendance reduce the gap through their gender-specific effects, with higher control and lower club attendance only associated with a higher in-group bias among Muslim girls but not among Muslim boys.

4.6 Discussion

Interreligious romantic relationships have long been known to be rarer among Muslim girls than among Muslim boys (Wachter and de Valk 2020; van Zantvliet et al. 2015). Recently, a similar gender gap has been found among Muslim youth for interreligious friendships (Kretschmer and Leszczensky 2022, 2023). More so than Muslim boys, Muslim girls show a growing in-group bias in adolescence, meaning that they increasingly are friends with other Muslims as adolescence progresses, while no comparable gender difference emerges among non-Muslim youth. This gender-specific development of in-group bias among young Muslims may have consequences for Muslim girls beyond their friendship networks as friendships with the non-Muslim majority can provide information about the education system and labor market opportunities (Kornienko and Rivas-Drake 2022; Kretschmer 2019), facilitate language acquisition (Moyer 2008), and support cultural integration by, for example, promoting more egalitarian gender role attitudes (Kretschmer 2018; Ng 2022b). A lack of interreligious friendships in late adolescence may therefore cause disadvantages for Muslim girls and complicate their integration into Western societies.

Against this background, we investigated how gendered religious norms contribute to the emerging gender gap in Muslim adolescents' in-group bias. Specifically, we assessed whether a gender-specific development and gender-specific effects of religiosity, parental control, and leisure time activities can explain the gender gap. All of these factors have been shown to not only be tied to gendered religious norms but to also contribute to Muslim girls' fewer interreligious romantic relationships (Carol and Teney 2015; Hennink et al. 1999; van Pottelberge et al. 2019; Talbani and Hasanali 2000). However, their consequences for gendered friendship-making have not been assessed so far. We also considered that gender-specific

experiences of discrimination and rejection may contribute to the gender gap in Muslim in-group bias emerging in adolescence.

Analyzing six waves of longitudinal data on German Muslim youth aged 11–17 with random-effects growth curve models, we find that religiosity, parental control, and leisure time activities contribute to the gender gap in in-group bias emerging in adolescence. However, they do so in different ways. Religiosity contributes to the gender gap through its *gender-specific trajectories*: While higher religiosity is associated with a stronger in-group bias among both Muslim boys and girls, religiosity rises among girls but falls among boys as adolescence progresses. With rising religiosity, Muslim girls' in-group bias thus increases in adolescence, while Muslim boys' in-group bias decreases given their falling religiosity. By contrast, parental control contributes to the gender gap through its *gender-specific effects*: Parental control similarly increases for both Muslim boys and girls in adolescence, but it is only associated with higher in-group bias among Muslim girls. Finally, Muslim girls' declining participation in clubs also affects the gender gap because it is associated with fewer out-group friendships. In combination, our findings thus demonstrate that gendered religious norms operate through two different pathways, both of which contribute to the diverging in-group bias among Muslim boys and girls in adolescence.

These insights matter both substantively and methodologically. Substantively, our findings highlight the various channels through which gendered religious norms constrain adolescent Muslim girls' interreligious friendship-making. On the one hand, Muslim girls' increasing religiosity and decreasing participation in clubs contribute to their growing in-group bias. On the other hand, the strong link between parental control and friendship-making further limits their interreligious friendships. Accordingly, our findings demonstrate that the same factors that are known to constrain Muslim girls' romantic relationships with non-Muslims also interfere with their interreligious friendships. Moreover, the strong link between parental control and in-group bias suggests that Muslim girls' increasing in-group friendship-making not only reflects their own preferences but is at least partially a consequence of parental influence. Methodologically, the different ways in which religiosity, parental control, and leisure time activities shape friendship-making highlight that only an analysis that accounts for both *gender-specific trajectories* and *effects* can comprehensively assess the consequences of gendered religious norms for in-group bias. Both theoretically and methodologically, researchers therefore must pay attention to these different developmental pathways to fully capture the impact of religious norms.

That said, religiosity, parental control, and leisure time activities jointly explain only about one-third of the emerging gap in in-group bias between Muslim boys and girls in our analyses. Moreover, gendered perceptions of discrimination and rejection by non-Muslims did not affect the emerging gender gap. In sum, our analysis thus only partially explains the emerging gender difference. In the remainder of this article, we discuss possible reasons for this, point to limitations of our analyses, and outline directions for future research.

4.6.1 Limitations

While we show that religiosity, parental control, and leisure time activities contribute to the emerging gender gap in Muslim youths' interreligious friendship-making, these factors are unlikely to fully capture the impact of gendered religious norms on friendship-making. Accordingly, our assessment is likely to *underestimate* the role these norms play in intergroup friendships. For example, by assessing individual *religiosity*, we captured that gendered religious norms most likely affect highly religious Muslims. However, some studies suggest that religious norms also are influential among moderately religious Muslims (Grønli Rosten and Smette 2023; Munniksmå et al. 2012). To fully capture their impact, direct measures of religious norms such as endogamy, chastity, and modesty norms, would be preferable.

Similarly, while we concentrated on parental control, other actors may also seek to constrain Muslim girls' interreligious friendship-making. In addition to parents, siblings or Muslim peers can also monitor and influence Muslim girls' social behavior (Altinyelken 2022; Grønli Rosten and Smette 2023). Along these lines, recent research suggests that Muslim girls are not only more exposed to peer pressure than Muslim boys (Grønli Rosten and Smette 2023) but also more likely to adapt their attitudes and behavior in reaction to it (Mastari et al. 2022). Our analyses do not capture the influence of other agents of social control besides parents that might also constrain Muslim girls' religious friendship-making.

Our analyses further show that *leisure time activities* contribute to the gender gap in in-group bias, though not as strongly as religiosity or parental control. While leisure time activities frequently provide adolescents with opportunities to establish or deepen relationships with their schoolmates outside of an academic setting, they may even more directly affect friendships outside of school, for example in clubs or youth centers. Our study of school-based friendships thus may underestimate the contribution of leisure time activities to intergroup friendship-making more broadly.

Furthermore, our assessment of the role of non-Muslims' behavior for Muslim youths' intergroup friendships may be limited. While we found that gender-specific experiences of religious discrimination and rejection by non-Muslims did not help to explain the gender gap in in-group bias among Muslim youth, processes more subtle than those captured by our measures still may undermine Muslim youths' interreligious friendships. For instance, non-Muslims may lose interest in their female Muslim friends because of diverging activities and preferences. Specifically, in adolescence, many non-Muslims start prioritizing romantic relationships, parties, and other activities that Muslim girls actually or supposedly have less interest in due to gendered religious norms (Hennink et al. 1999; McGrath and McGarry 2014). If so, this may result in receding interaction with Muslim girls and thereby contribute to the emerging gender gap in in-group friendships.

Beyond these limitations, our analyses may also miss the contribution of some general processes of friendship formation to the emerging gender gap in interreligious friendship-making. Several general network processes are known to *reinforce* existing biases towards making in-group friends (Goodreau et al. 2009). For example, given Muslim girls' increasing in-group bias in adolescence, Muslim girls tend to have Muslim friends who also tend to have Muslim friends. Since adolescents often become friends with their friends' friends over time (Goodreau et al. 2009), this pattern facilitates further in-group friendships and aggravates in-group bias. A part of the observed gender gap may thus not directly follow from gendered religious norms, but from more general processes of friendship-making that reinforce the effects of these norms on in-group bias.

In principle, longitudinal social network models can account for these general friendship-making processes (Snijders, van de Bunt, and Steglich 2010). Such models would also allow us to address the limitation that we cannot in all cases infer the direction of causality for the effects we estimate. For example, we cannot differentiate whether the stronger in-group bias we observe at higher religiosity is a consequence of higher religiosity causing a stronger in-group bias or of a stronger in-group bias inducing higher religiosity, e.g., due to the influence of in-group friends' religiosity. However, the network models suitable for disentangling these effects are too complex to estimate with our data and so far lack methods to assess coefficient changes, such as the change in the gender gap we are interested in.

4.6.2 Directions for future research

Though our study establishes that gendered religious norms can impede interreligious friendships of Muslim girls, a key task for future research is to obtain a more complete understanding of the relevant norm-related factors to fully explain the emerging gender gap in interreligious friendship-making. On the one hand, as indicated above, this requires a more *direct* empirical assessment of the specific norms most likely to constrain interreligious friendship-making – endogamy and chastity norms. On the other hand, it necessitates a more comprehensive perspective on the social actors that can influence Muslim youths’ friendship-making. In our analyses, we focused on the impact of parental control, but recent research suggests that young Muslims’ attitudes and behavior are also shaped by expectations from other family members, Muslim peers, and the religious community more broadly (Altinyelken 2022; Mastari et al. 2022; Mir 2009).

Our study further raises the follow-up question of how friendship-making evolves as Western Muslim adolescents age further and enter adulthood. In early adulthood, the impact of the factors related to in-group friendship-making we considered is likely to change. Parental influence is likely to decline as Muslim youth become more independent, particularly if they leave their parents’ home to live on their own. Transitions into work or tertiary education may also result in changes in Muslim girls’ social environment. Supporting Muslim girls in this transition, for example through promoting their structural integration into the labor market and tertiary education, may reduce family influence on their interreligious friendship-making. At the same time, however, the transition to marriage or long-term romantic relationships many young adults experience can further limit opportunities for interreligious friendship-making. Since most Muslim women marry Muslim men, integration into their partner’s circle of friends may reinforce gendered in-group friendship-making. Given these countervailing effects, the further development of Western Muslims’ gendered friendship-making beyond adolescence is not clear and merits further study.

Finally, our findings on the importance of gendered religious norms for Muslim youths’ friendships also call for future research on *other forms of social relationships*. In particular, they raise the question of whether weaker relationships focused on certain activities and goals—such as doing homework together or preparing for an exam – may be less strongly regulated by religious norms. Given their specific focus, these relationships may be considered less of a risk for romantic relationships than open-ended relationships like close friendships. At the same time, these weaker relationships may at least partially compensate for the resources adolescent

Muslim girls may miss out on due to their limited friendships with non-Muslim youth. The school context provides an environment where these kinds of interactions can be routinely and formally promoted and organized. Additionally, as aspirations for academic performance tend to be high in many Muslim families (Neumeyer et al. 2022; Salikutluk 2016), their reservations about interreligious interaction that focus on this goal are likely to be lower. Accordingly, strengthening these relationships may help to promote both the interreligious social interaction of Muslim girls and provide them with resources to further their integration into Western societies more broadly.

4.6.3 Conclusion

Our analyses provide important insights into gendered processes of friendship-making among Muslim adolescents in the West by showing that gendered religious norms contribute to the emerging gender gap among Muslim youth. Through the norm-related factors we identified, gendered religious norms produce an increasing in-group bias among Muslim girls relative to boys, with religiosity, parental control, and leisure time activities jointly explaining one-third of the emerging gender gap. Our analyses furthermore uncover that gendered religious norms work through two very different developmental pathways, demonstrating the necessity to account for both gender-specific trajectories and gender-specific effects of the factors through which these norms can operate.

4.7 Funding

This research was supported by a grant from the German Research Foundation (DFG/LE 3446/1-1).

5 General discussion

Social integration constitutes a central dimension of integration in multi-ethnic societies such as Germany. Theoretical approaches and empirical studies have shown that social integration, in the form of intercultural friendships, promotes cultural integration and vice versa. A prerequisite for both dimensions is structural integration, for example, through shared interaction contexts where individuals from different ethno-religious groups can meet. In Germany, the educational system promotes structural integration for adolescents. Against the background of compulsory schooling and past and ongoing immigration, German schools are contexts with ethnically and religiously mixed student bodies, which offer opportunities for adolescents to form intercultural friendships. Nevertheless, empirical studies have repeatedly found that adolescent friendship networks in educational settings tend to be segregated along ethno-religious lines in Germany, as in other Western European societies (e.g., Kalter and Kruse 2015; Leszczensky and Pink 2015, 2017; Simsek et al. 2022; Smith et al. 2016; Wittek et al. 2022; Zhao 2023). Besides this segregation pattern in close positive relations at the social dimension, integration research has reported enduring differences between German majority and ethnic and religious minority youth on the cultural dimension with regard to specific cultural norms, expectations, and practices (e.g., Jacob and Kalter 2013; Kogan 2018; Kogan and Weißmann 2020; Kretschmer 2018; Simsek et al. 2018). These persistent cultural and social divides call for a closer examination of the interplay between the cultural and social dimensions of integration. However, this aspect has received comparatively little attention in previous integration research, which has primarily focused on structural integration (Kalter 2022:140).

This dissertation aimed to contribute to this research task by addressing critical knowledge gaps in previous research on the interplay between social and cultural dimensions of adolescents' integration in schools. As these gaps reflect both scholarly controversy and contemporary public discourse surrounding cultural differences and social cohesion in multi-ethnic societies, a greater understanding of how ethno-religious groups integrate socially and the role of cultural factors in this process is of academic and societal significance. Specifically, this dissertation investigated whether the interplay between social and cultural integration is connected to (1) frictions between students of different ethnic origins, (2) lower mental wellbeing for students in social and cultural brokerage positions, and (3) the emergence of a gender gap in Muslim youths' ingroup bias in friendships.

To address these gaps, this dissertation employed a specific analytical approach that combines a social network perspective with an ecological perspective on the social integration of ethno-religiously diverse adolescents in schools. The social network perspective encompassed the use of complete social network data and advanced network analytical methods. It also implied a specific theoretical lens on social phenomena, which pays attention to the nature of different types of social relationships, the relational structures they form, and the mechanisms underlying their formation. The ecological perspective situated adolescents, their social relationships and networks in school within a broader sociocultural framework composed of different levels of interrelated systems. This perspective enabled the integration of culture, group norms, and diverse sociocultural contexts beyond the school setting into the study of relationship formation among students from different ethno-religious backgrounds.

To implement this analytical approach, this dissertation leveraged cross-sectional and longitudinal data from three social network surveys conducted between 2012 and 2019 among schoolchildren in Germany, encompassing up to 39 secondary schools and up to 2,700 students across the datasets. These surveys provide large and ethnically and religiously diverse samples with rich information on students' attributes and social relations, captured as complete social networks at the school grade level. Building on these comprehensive data, advanced cross-sectional and longitudinal analysis methods were used to address the specific research questions pursued in the three studies. Study 1 employed exponential random graph models and meta-analytical techniques to investigate various types of positive and negative relationships (e.g., friendship, dislike, and physical violence) among students, as well as the role of ethnicity in these relationships. It further inquired into how ethnic homophily relates to both ethnic heterophobia in dislike and intra- rather than inter-ethnic violence across schools. Study 2 combined network analytical methods and linear regression techniques to study the complex interplay between ethnicity, brokerage structures in personal friendship networks, and mental wellbeing. It also explored group differences and evaluated whether this interplay differs between ethnic minority and (native) majority students. Study 3 employed random-effects group-specific growth curve models to probe whether a gender gap in Muslim youths' ingroup bias emerges between the ages of 11 and 17. It identified the pathways and mechanisms through which religious norms contribute to this divergent pattern of interreligious friendship formation between Muslim girls and boys.

In the following section (Chapter 5.1), I will outline the key insights and perspectives generated in this dissertation. Subsequently, in Chapter 5.2, I will critically assess its analytical approach

and delineate central theoretical and methodological issues and limitations. Alongside this, I will present directions and relevant follow-up questions for future research. In the next chapter (Chapter 5.3), I will outline specific practical implications and suggestions derivable from this dissertation's findings, illustrating how schools can monitor and understand integration processes on-site and how they, as organisational contexts, can actively shape and strengthen their role in facilitating social integration. I conclude this dissertation with final remarks and reflections on its findings and indicate broader implications for integration research (Chapter 5.4).

5.1 Insights and new perspectives

This dissertation's combination of analytical approaches, social network data, and advanced analysis methods created analytical possibilities that not only allowed for more rigorous empirical testing of previous research assumptions. It also enabled a deeper understanding of the underlying mechanisms and the development and empirical examination of *new* explanatory mechanisms. As a result, the findings of each study offer novel methodological and substantive insights into the interplay between cultural and social dimensions of adolescents' integration in school.

Study 1 utilised complete social network data on positive and negative relations, along with advanced network analytical methods, to clarify whether the interplay between cultural and social dimensions of integration is associated with frictions between students of different ethnic origins. The study generated the following key insights:

Frictions in the form of physical fighting between students of different ethnic origins can be part of social integration, as increased social closeness and interactions make conflicts more likely. In schools where friendships and social interaction primarily take place within ethnic groups, physical fighting also tends to occur among ingroup members, while dislike is more often directed toward ethnic outgroup than ingroup members. To understand integration comprehensively, theoretical and analytical approaches must consider the interplay of positive and negative relationship types and the role of ethnic origin therein.

Previous research has suggested that ethnic segregation or ethnic homophily in friendships is linked to *adverse* pathways of integration processes, such as tensions and violent interactions between students of different ethnic groups (e.g., Agirdag et al. 2011; Boda and Néray 2015;

Durkin et al. 2012; Kawabata and Crick 2011; Smith et al. 2016; Thijs and Verkuyten 2014; Vervoort et al. 2010; Walsh et al. 2016). That said, most of these studies were unable to test this assumption due to limitations in their data and methods. Importantly, previous victimisation research using conventional survey data could not assess the ethnic origin of both involved parties, that is, the victim and the perpetrator, making it impossible to determine whether victimisation was in fact inter-ethnic. Beyond that, even previous network research was often focused on either positive or negative relationships and thus was unable to test the proposed link between ethnic segregation in positive relations and negative relations between ethnic groups.

Study 1 overcame these crucial limitations by utilising comprehensive, complete social network data, which enabled the identification of the ethnic origins of perpetrators and victims of negative relations. By applying exponential random graph models (ERGMs), Study 1 rigorously evaluated the role of ethnic background in relationship formation, controlling for other relationship-generating mechanisms such as opportunity structures and network endogenous mechanisms. The study generated additional methodological and substantive insights by considering multiple positive and negative relationship types. Through the integration of insights from network research, sociology and criminology, Study 1 incorporated new explanatory mechanisms into the analyses and explored how friendship is connected to dislike and violence relationships between students, and how this interplay affects the role of ethnicity in relationship formation.

Study 1's findings reveal the necessity to distinguish between dislike and violence as two different types of negative relations, as their distinct characteristics lead to different associations with friendship and, consequently, ethnic origin. Violence as a behaviour was significantly shaped by exposure, such that interpersonal violence became more likely the closer two students were in the friendship network. Conversely, dislike is a negative relational sentiment which seems rather characterised by avoidance – such that students were more likely to dislike each other the more distant they were in the friendship network. Notably, only by considering this interplay between different relationship types both theoretically and methodologically could the study reveal that social mechanisms – such as exposure, social closeness, avoidance, and status struggles – shaped the role of ethnic origin in positive and negative peer relations, even though these mechanisms are not per se related to ethnicity. The large sample, which contained complete network data from multiple schools, enabled the use of advanced meta-analyses across school grade networks. This allowed Study 1 to empirically

evaluate the notion in previous research that school contexts with stronger ethnic homophily in friendships tend to show higher levels of frictions and tensions between ethnic groups.

Challenging this notion, the study's findings suggest that ethnic homophily in friendship networks actually makes inter-ethnic violence *less* likely. This notion appears to be largely attributable to the reduced social closeness and limited interactions across different ethnic groups. At the same time, it found that ethnic homophily tended to increase the likelihood of inter-ethnic dislike. Against this background, violence between students of different ethnic origins may actually indicate successful processes of social integration, at least partially, as it is likely to occur when students of different ethnic origins are close in the friendship network or spend time together outside school. Based on Study 1's findings, we should expect more inter-ethnic violence in schools with lower ethnic homophily in friendship networks. It requires future longitudinal research to advance the cross-sectional evidence of Study 1 and evaluate whether violent interaction between students of different ethnic origins has nevertheless detrimental consequences for intergroup relations or whether conflicts with socially close actors should be considered a normal by-product of integration.

While Study 1 exploited the analytical possibilities of complete social networks at the school grade level, Study 2 zoomed in on the micro-level information embedded in students' personal network structures and their ethnic composition. It did so to clarify whether the interplay between social and cultural dimensions of integration is connected to lower mental wellbeing for students who occupy social and cultural brokerage positions. Study 2 generated the following key insights:

The structural characteristics of inter-ethnic friendships reveal particular psychological challenges that individuals can experience as part of social integration. Students who occupy social and cultural brokerage positions within their friend group tend to have lower mental health. The mental health risks associated with these ethnic brokerage positions not only apply to ethnic minority students but also to individuals of the (native) majority.

Earlier research on social integration has often focused on inter-ethnic friendships due to the numerous positive aspects associated with positive inter-ethnic contact, such as reduced prejudice (e.g., Titzmann et al. 2015; Tropp et al. 2022) as well as enhanced individual psychological wellbeing and resilience (e.g., Bagci et al. 2017; Graham et al. 2014; Jugert and Feddes 2017). At the same time, another strand of integration research points to the stress and

psychological challenges that individuals may experience from intercultural contact since engaging with peers from different cultural backgrounds requires individuals to navigate diverse norms and practices (e.g., Jonsson et al. 2018; Lay and Nguyen 1998; Sam and Berry 2010; Vega and Rumbaut 1991). Apart from these different perspectives on the psychological benefits and downsides of inter-ethnic contact, it is striking that most prior research on inter-ethnic contact has not considered the structural characteristics of individuals' intercultural social relations and their implications for mental wellbeing. The majority of previous research lacks the required social network data to assess structural features and has relied on broad individual perceptions of intercultural contact, such as the number of friends with a different ethnic origin. Prior research also focused predominantly on simple dyadic forms of inter-ethnic contact, such as the friendship between two individuals of different ethnic backgrounds.

Going beyond previous research, Study 2 used complete social network data on students' friendships in school. This data allowed for a more accurate and objective assessment of relational structures and their ethnic compositions. Specifically, Study 2 found that brokerage structures in an adolescent's friendship network, that is, having friends who are not also friends with each other, were significantly associated with lower mental wellbeing. Most importantly, Study 2 discovered that ethnic origin plays a significant role in this relationship: Brokerage between friends of different ethnic origins (inter-ethnic brokerage) was significantly related to lower mental wellbeing. In contrast, brokerage between friends of the same ethnic origin (intra-ethnic brokerage) showed a weaker, statistically nonsignificant relationship with lower mental wellbeing.

In addition, the large and ethno-religiously diverse dataset used in Study 2 enabled a more nuanced analysis of ethnic brokerage than previous research, which has often been limited to broad majority-minority distinctions or analyses of specific ethnic groups. The diverse data permitted Study 2 to explore different variants of inter-ethnic brokerage structures and the role of biased brokerage through the brokers' one-sided ingroup alliances for their mental wellbeing. Contrary to the study's expectations based on previous literature (Deaux and Martin 2003; Gould and Fernandez 1989; Stovel and Shaw 2012), the negative association between inter-ethnic brokerage and mental wellbeing was not significantly stronger for biased inter-ethnic brokerage than for unbiased inter-ethnic brokerage. In other words, sharing ethnic group membership with one of the brokered friends made no significant difference to brokers' mental wellbeing, suggesting that the psychological strain associated with the inter-ethnic brokerage

position is primarily attributable to the friends' dissimilarity rather than the brokers' ethnic ingroup alliance.

The study also contributes to recent integration research that calls for expanding the analytical focus beyond ethnic minorities to include the acculturation process of ethnic majority group members (Kunst et al. 2021). Research on the psychological aspects of the interplay between social integration and cultural differences, for example, has predominantly concentrated on ethnic minority populations (e.g., Berry et al. 2006; Mollenhorst et al. 2015), often attributing the challenges of navigating different cultures and the integration process primarily to ethnic minority individuals. Drawing on a dataset with large majority and minority shares, Study 2 probed whether the link between inter-ethnic brokerage and lower mental wellbeing differs between ethnic minority and majority students, but no significant difference was evident in the sample.

Study 2 demonstrated that considering micro-level structures of inter-ethnic contact provides new insights into the social-psychological processes underlying the interplay between social and cultural integration. In particular, the study highlights that *inter-ethnic brokerage* is a crucial structural facet of this interplay, which tends to be associated with reduced mental wellbeing. Comprehensive analyses of adolescents' inter-ethnic friendships and their associated benefits and costs should therefore consider this specific network structure. The results of Study 2 point to the potential strains that accompany the interplay between social integration and cultural aspects. The study's findings imply that individuals who broker cultural and social divides in their friendship network occupy structural positions that can create overdemanding psychological challenges and strain for them and ultimately lower mental wellbeing. This evidence qualifies previous integration research, which has focused on the positive aspects of intercultural friendship networks and has not examined their structural aspects. Finally, the findings of Study 2 question previous research's focus on ethnic minorities when considering the potential individual challenges of integration. The struggles of navigating different norms and behavioural expectations between friends in the inter-ethnic brokerage position apply without significant difference to both ethnic majority and minority individuals.

This dissertation's findings underline that schools are not isolated microcosms in which ethnic peer relations develop endogenously. Ethnic peer relations in school are also influenced by external norms and cultural backgrounds that students bring with them. While Study 2 demonstrated the impact of external group norms and cultural differences within existing

friendships, Study 3 in this dissertation showed that cultural norms can influence adolescents' tendency to be friends with outgroup peers in school in the first place. Using longitudinal data, Study 3 examined whether the interplay between cultural and social dimensions of integration is related to the emergence of a gender gap in ingroup bias in Muslim adolescents' friendships and generated the following key insights:

Cultural norms can shape students' tendency to form and sustain intergroup friendships in school indirectly through their impact on students' sociocultural environments outside of school. Importantly, the influence of cultural norms can interact with other relevant social categories and developmental processes, such as gender and puberty. Muslim youths navigate their friendships with non-Muslims against the background of gendered religious norms. These norms contribute through different pathways to the emergence of a gender gap in Muslim youth's ingroup bias in friendships as they grow from childhood into adolescence.

Previous research and social debates suggest that Muslim religious culture might be a potential barrier to social integration, as it contributes to the self-segregation of ethnic minorities and is met with exclusionary behaviour by non-Muslims (Crozier and Davies 2008; Drouhot and Nee 2019; Kornienko et al. 2022; Kretschmer and Leszczensky 2022; Sniderman and Hagendoorn 2007). Kretschmer and Leszczensky (2022) observed a stronger ingroup bias in friendships for Muslim girls than for boys, later finding that this pattern emerges during adolescence (Kretschmer and Leszczensky 2023). These studies indicate that gendered religious norms, such as endogamy and chastity norms, which prior studies found discourage interreligious friendships (e.g., Carol 2014; Giuliani et al. 2017), may be partly responsible for this emerging gendered pattern in friendship ingroup bias. Research on interreligious romantic relationships has identified several factors which are shaped by these religious norms in gender-specific ways, thereby constraining interreligious romantic relations of ethno-religious minorities (Carol 2016; Carol and Teney 2015; Hennink et al. 1999; van Zantvliet et al. 2015). Examining whether and how these may also constrain Muslim girls' and boys' interreligious *friendships* differently was the aim of Study 3. The study offers a comprehensive analysis by simultaneously considering various norm-related factors of Muslim adolescents' social ecology, including individual religiosity, parental control, leisure activities, and experiences of discrimination by non-Muslims. In addition, whereas previous research on the role of gendered religious norms relied primarily on qualitative or cross-sectional quantitative data and often lacked complete social network data, Study 3 used longitudinal, complete social network data

that covered the developmental span from ages 11 to 17. It also advanced previous research by assessing Muslim ingroup bias above and beyond Muslim youths' opportunities to form ingroup friendships within the school grade. Moreover, it generated substantive and methodological insights by identifying *how* these factors contribute to the emergence of a gender gap in ingroup bias throughout adolescence. Study 3 showed that both gender-specific *effects* and gender-specific *trajectories* of these factors are relevant mechanisms through which the gap between Muslim girls and boys emerges. The study identified that individual religiosity, parental control, and leisure time activities collectively contribute approximately one-third to the emergence of the observed gender gap through these mechanisms. In contrast, gender-specific experiences of discrimination and rejection by non-Muslims did not explain why Muslim girls' ingroup bias increased more strongly than that of Muslim boys during adolescence.

On a broader level, the findings of Study 3 also demonstrate the value of adopting an ecological perspective when studying the interplay of social and cultural integration, as it brings specific aspects of the integration process into sharper focus. The results indicate that gendered religious norms can shape Muslim adolescents' friendships in school by influencing the sociocultural environments they are involved in beyond school. Specifically, these norms operate by influencing how their parents monitor and regulate their friendships and the way adolescents engage in leisure time activities that provide outgroup contact opportunities. The findings also imply that integration researchers should carefully consider how developmental life stages and changes may affect the interplay between social integration and cultural aspects. This highlights the need for longitudinal data spanning a sufficiently long period to reveal the influence of factors such as the onset of puberty. Study 3 showed that cultural barriers to Muslim youths' interreligious friendships related to Muslim religious norms become relevant during adolescence. Moreover, Study 3 underscores the importance of considering the intersection of different social categories (McCall 2005; Warikoo and Carter 2009) when examining the social and cultural dimensions of integration. The study provides further empirical evidence that religious norms guide the social integration of Muslim girls and boys differently, particularly increasing the ingroup bias among Muslim girls.

5.2 Limitations, critical reflections and future research directions

After recapturing the insights and new perspectives generated by this dissertation, I will now identify and critically reflect on several theoretical and methodological limitations, also related to this dissertation's analytical approach. The assessment focuses on four key areas: (1) causal

inference, reverse causality and longitudinal perspectives on integration; (2) assessing the ecological conditions of integration beyond the school grade; (3) capturing the influence of cultural norms on social integration; and (4) considering the broader social context of integration in schools. Alongside this, I will derive implications for future research from these critical reflections and outline important follow-up questions.

5.2.1 Causal inference, reverse causality and a longitudinal perspective on integration

The first critical point of this dissertation is its limited capacity to make causal inferences based on its findings, as it used cross-sectional data and correlation analysis methods. For example, Study 2 cannot rule out the possibility of reverse causality. The observed negative association between inter-ethnic brokerage and mental wellbeing could also originate from a selection process in which individuals with higher mental wellbeing are less likely to occupy inter-ethnic brokerage positions. Similarly, the positive association between Muslim adolescents' ingroup bias in friendships and religiosity observed in Study 3 could also be due to social influence processes. Muslim youth with stronger ingroup bias in friendships may exhibit higher religiosity due to the influence of their ingroup friends' religiosity. However, in Study 1, which examined the role of ethnic origin in positive and negative relationships, reverse causality is less of a concern, as ethnic origin – measured by the country of birth of parents and grandparents – is a relatively stable individual characteristic. The found patterns of ethnic homophily in friendship and violence relations and ethnic heterophobia in dislike relations are likely to reflect the effect of ethnic origin on relationships and network structure rather than the other way around.

5.2.1.1 *Panel data and longitudinal analysis methods*

Against this background, one direction for future research is utilising panel data and longitudinal analysis methods, which could offer a more substantial basis for establishing causality and the causal direction of relationships. In general, longitudinal social network models, such as stochastic actor-oriented models (SAOMs) (Snijders et al. 2010), can mitigate the limited capability to rule out reverse causality. These models enable the simultaneous assessment of selection and influence processes, that is, how individual attributes influence social relationships (selection) and how social relationships impact individual attributes (influence). Nevertheless, these models do not currently represent viable alternatives for all of the studies in this dissertation. To illustrate, in Study 3, specifying such network models to identify the mechanisms of interest, such as the gender-specific age effect on ingroup bias and the mediations by norm-related factors such as religiosity – while also controlling for reversed

causality through influence processes – would require incorporating several higher-order interaction effects with correlated constitutive terms. Such specifications would be too complex to achieve convergence with the used dataset. In addition, certain analytical features essential to the aims of this dissertation’s studies are currently unavailable for SAOMs. For example, coefficient changes cannot yet be statistically evaluated, which would have been a problem for Study 3. To evaluate whether the norm-related factors contribute to the emerging gender gap, it was necessary to assess the changes in gender gap estimates when these explanatory mechanisms were included in the analyses. Furthermore, SAOMs currently do not allow for the specification of the ethnic composition of brokerage structures – an essential interest of Study 2, which aimed to distinguish between intra- and inter-ethnic brokerage, as well as more complex compositions of ethnic brokerage.

A more general issue connected to using longitudinal panel data and analysis for causal inference in future research concerns the accurate specification of the causal temporal process and the appropriate time lag between cause and effect. Recent research has cautioned against the substantial bias that misspecifications of underlying temporal processes might introduce (Hill et al. 2020; Leszczensky and Wolbring 2022; Vaisey and Miles 2017). Vaisey and Miles (2017:62–63) have pointed out that cross-sectional analyses can produce more robust, albeit correlational, evidence when substantive knowledge on the temporal ordering is missing or when the actual causal time lag likely deviates from the time lag in the available panel data. These are issues which follow-up research on Study 2 should consider. Currently, knowledge on the temporality of brokerage, especially ethnic brokerage in adolescent friendship networks, is limited, and the causal time lag between ethnic brokerage and mental wellbeing is unclear.

Research on the temporality of brokerage, in general, is scarce and inconclusive. The prevailing notion in prior literature is that brokerage is fragile and short-lived due to the tensions, conflicting loyalties, and cross-pressures associated with it – especially when brokers connect individuals with differing norms and practices (e.g., Kwon et al. 2020; Stovel, Golub, and Milgrom 2011; Stovel and Shaw 2012). The scarce empirical evidence supports this notion. Burt (2002), for example, using longitudinal data on bankers' business relationships with one-year measurement intervals, found that 90 per cent of brokerage ties in that organisation's network decayed within the first year. Similarly, Sasovova et al. (2010) observed a comparable decay rate of brokerage structures in workplace friendship networks within a radiology department over a period of nine months. Yet, as previous research has examined adult social networks in workplace settings, it remains an open question whether these insights can be

extended to brokerage in friendship networks of adolescents in the school context. In her review of the negative aspects of social relationships, Offer (2021) argued that individuals often maintain social relationships, such as friendships, despite tensions due to accumulated obligations or a desire to preserve identity-defining group memberships. Nevertheless, in light of previous research, there is reason to expect that the causal process linking inter-ethnic brokerage and mental wellbeing might take effect within shorter intervals than the one-year time lag between panel waves in the SOCIALBOND data used in Study 2, for example.

In sum, for follow-up studies probing reverse causality with panel data, specifying the correct time lag for the causal process between inter-ethnic brokerage and mental wellbeing is crucial. Given the substantial knowledge gaps on this topic, empirical and theoretical explorations of the underlying causal temporal dynamics of this relationship will be a preceding task. To achieve this, future research could benefit from using multiple timescale longitudinal network data. This type of data captures social networks, interactions, and health changes at granular levels through assessments of daily experiences of social relations and their effects on short-term health experiences, as well as their potential longer-term implications in mental health (e.g., Elmer et al. 2025; Goldman and Cornwell 2023). Additionally, qualitative methods such as in-depth event histories and case studies could help illuminate how brokerage develops over time and generates different outcomes (Kwon et al. 2020:1113). Comparing different cases of ethnic brokerage dynamics and mental health outcomes could provide insights into the theoretical mechanisms that make certain time lags more plausible than others.

Taken together, a longitudinal perspective could not only provide a more substantial basis for causal inference but also help clarify issues of reverse causality, especially if accompanied by methodological and theoretical advancements. Beyond that, it would also allow inquiring into substantive follow-up questions that could shed light on the dynamics and consequences of the cross-sectional mechanisms and phenomena identified in Studies 1 and 2, as I will delineate in the following. The resulting insights would enable a more comprehensive evaluation of their implications for integration processes in schools.

5.2.1.2 A longitudinal perspective to explore substantive follow-up questions

5.2.1.2.1 The micro-level relational dynamics of inter-ethnic brokerage and its larger consequences for social integration

Study 2 found that inter-ethnic friendships in the form of brokerage structures were associated with mental health risks for those who occupy a brokerage position. This finding has diagnostic

value, as it identifies a specific micro-level network structure and position where cultural and social dimensions of integration interact in ways related to reduced mental wellbeing. One intuitive follow-up question for longitudinal research concerns how individuals in these positions fare over time – whether reduced mental wellbeing among inter-ethnic brokers reflects a persistent health condition or improves over time as they learn to cope with the associated cross-pressures and strains more effectively. Such research would help to address broader knowledge gaps on the health impacts of sustained negative exchanges in social relationships (see Offer 2021).

That said, future longitudinal research on inter-ethnic brokerage in friendship networks should also go beyond mental wellbeing as the dependent variable. Responding to Stovel and Shaw's (2012) call to explore the relational dynamics of brokerage and its broader structural consequences, future research should examine the relational processes and decisions fostered by inter-ethnic brokerage in friendship networks. Such research is relevant because these dynamics can contribute to the breakdown, maintenance, or closure of inter-ethnic brokerage structures and thereby change the local friendship network structure. Importantly, these may also have consequences for higher-level structures, such as the school grade's friendship network, and thereby contribute to social integration at school more broadly.

How may inter-ethnic brokerage influence friendship dynamics and, ultimately, social integration between ethnic groups in schools?³⁶ Based on the insights generated by Study 2 and previous brokerage research, several pathways appear plausible and warrant further exploration. Given the potential for internal and external conflict and detrimental effects on mental wellbeing within inter-ethnic brokerage positions, one possible dynamic is that brokers decide to terminate their friendship with one of the brokered friends, thereby dissolving the inter-ethnic brokerage structure. In inter-ethnic brokerage structures where one of the brokered friends is an ethnic ingroup and the other friend an outgroup member, the broker should be more likely to end the friendship with the ethnic outgroup member, as previous research has shown that individuals tend to deselect friends who are dissimilar in attitudes and behaviours from oneself (e.g., Jugert and Leszczensky 2024; Laursen 2017). At the school grade level,

³⁶ Although relational dynamics produced by brokerage structures may be initiated by any involved party, including the unconnected friends whom the broker links, the following considerations will focus primarily on the individual occupying the brokerage position, their specific situation and subsequent relational decisions, as this approach aligns with Study 2's focus on ethnic brokers and their mental wellbeing outcomes.

such relational dynamics would risk further fragmentation of the school grade's friendship network and magnify segregation along ethnic group lines. Apart from this pathway, research on brokerage in organisational networks highlights two further relational dynamics that brokers can foster within networks: bringing initially unconnected parties together or maintaining their separation (Grosser et al. 2019; Obstfeld 2005; Stovel and Shaw 2012). Applied to adolescents' friendship networks, these two dynamics imply two additional broader integration pathways. Suppose a new inter-ethnic friendship develops between previously unconnected friends. In that case, inter-ethnic brokerage can facilitate social integration more broadly by closing gaps between ethnic groups within the school grade friendship network. In contrast, if the friendship gap between the brokered friends is maintained, inter-ethnic brokerage may even contribute to the manifestation of social divides between ethnic groups within the school grade.

Taking this reasoning a step further, future integration research should also generate knowledge on the *conditions* that make one pathway more likely than the other. Adults in brokerage positions of organisational networks may be motivated to maintain the separation of their contacts for strategic reasons such as advantageous access to and control over non-redundant information (e.g., Burt 2005; Stovel and Shaw 2012). It is an open question whether adolescents maintain brokerage positions between their culturally different friends in school for comparable strategic purposes. In this non-economic setting, one motivation for adolescent brokers to maintain their friends' separation might be avoiding the expected effort required to foster positive connections between their disconnected, culturally different friends. For future integration research, an even more important question concerns the specific conditions under which inter-ethnic brokerage stimulates the formation of new inter-ethnic friendships between students who were not previously friends, thereby closing relational divides within an ethnically segregated student body. This integration-fostering dynamic is likely conditioned by the individual broker's capacity to cope with the psychological strains associated with this position, as well as their ability to navigate cross-pressures, cultural differences, and contrasting normative expectations between their not-yet-connected friends.

Some individuals may be better able than others to do so. Specific individual traits may influence whether inter-ethnic brokers struggle in their position or manage and succeed in fostering connections between their friends. The identification of individual traits that could buffer the adverse effect of inter-ethnic brokerage on mental wellbeing and, thereby, make it easier for brokers to weave formerly unconnected friends together and promote social integration is an important avenue for future longitudinal research. For example, Love and

Levy (2019) suggest that individuals with mixed ethnic or racial parentage combine different ethnic groups through their heritage and, therefore, have the potential to serve as social bridges between these groups. In addition, previous research has found that ethnic minority adolescents with a mixed-ethnic or racial background are more prone to occupy inter-ethnic brokerage positions (Echols and Graham 2020; Love and Levy 2019:419; Quillian and Redd 2009). Future integration research could interrogate whether children of mixed ethnic parentage in inter-ethnic brokerage positions are particularly skilled at reconciling cultural differences between their separate friends. This may be the case because they have acquired these skills through primary socialisation and experience of dealing with cultural differences in their bi-cultural family context.³⁷

5.2.1.2.2 Exploring the role of inter-ethnic brokerage in friendship networks to foster cultural competencies

Equally important is the question of whether the inter-ethnic brokerage position may also endogenously generate relevant individual skills and capacities over time. Despite the mental challenges involved, inter-ethnic brokerage within friendship networks may create the conditions necessary for developing the intercultural skills that are crucial building blocks for multi-ethnic societies to function and foster successful integration processes. Previous research on brokerage in organisational networks supports this idea. Burt, Kilduff, and Tasselli (2013:536), for instance, highlighted that the performance advantages associated with brokerage positions arise not primarily from enhanced access to diverse information and resources but “from intellectual and emotional skills developed in the process of encoding and decoding information to communicate between diverse contacts”. Inter-ethnic brokerage may thus encourage the development of emotional and cognitive skills necessary for communicating with culturally different individuals and navigating effectively in culturally diverse settings.

These capabilities closely resemble skills that prior research has identified as conducive to integration: Social psychological research has shown that perspective-taking and empathy – actively considering another person’s viewpoint and empathising with their concerns – serve as key mediators of close intercultural contact with positive consequences for intergroup

³⁷ Preliminary evidence from exploratory follow-up analyses of Study 2 supports this notion: for ethnic minority adolescents with one foreign-born and one German-born parent, the association between inter-ethnic brokerage and mental wellbeing is no longer statistically significant (see Appendix Chapter 5, Table A2).

relations (e.g., Hewstone 2009:263–64; Pettigrew 2008; Todd and Galinsky 2014; Wang et al. 2014). Additionally, cross-cultural psychology has emphasised the importance of cultural competence in fostering positive relationships with culturally diverse individuals (Barrett 2018). This competence encompasses emotional, cognitive, and behavioural dimensions, including both the understanding of different perspectives and cultural norms, as well as the ability to interact appropriately and effectively with individuals perceived as culturally different (Ang et al. 2007; Barrett 2018:94; Schwarzenhal et al. 2019:62).

Building on this research, the inter-ethnic brokerage position in friendship networks may create conditions that are particularly conducive to the development of cultural competence, more so than diverse friend group compositions alone. In their study on how intercultural friendships foster intercultural competence among German adolescents, Schwarzenhal et al. (2019) have argued that such friendships generally provide adolescents with a safe social environment in which they can experience cultural differences, discuss divergent perspectives, and negotiate behavioural expectations. Contact situations and friendship networks that expose individuals to cultural differences are, therefore, essential prerequisites for developing cultural competence. Accordingly, the authors explored the role of a friendship group's cultural composition (the proportion of culturally different friends and the cultural diversity among these) as a predictor in their analyses (Schwarzenhal et al. 2019:66).

Study 2 can complement these considerations, as its findings signal that the *structure*, rather than composition alone, may be a stronger indicator of the developmental potential that is embedded in an adolescent's intercultural friendship network. Brokerage structures in adolescents' intercultural friendship networks should provide especially rich conditions for developing cultural competencies, as these structures indicate a substantial cultural variation and distinctiveness of perspectives adolescents encounter in their friendship groups. To illustrate, a culturally diverse but predominantly closed friendship network – where most friends are also friends with each other – likely exposes individuals to fewer, less pronounced cultural differences and contrasting perspectives. Due to friend selection and peer influence processes (e.g., Jugert and Leszczensky 2024), tightly connected friend groups tend to exhibit greater similarity in attitudes and behaviours than fractured friendship networks comprising inter-ethnic brokerage structures. In the latter, friends have different cultural backgrounds *and* relational divides between them, likely indicating salient and substantial cultural discrepancies between them (see also Mollenhorst et al. 2015:912). Consequently, inter-ethnic brokers should encounter more significant cultural differences and greater opportunities to develop cultural

competence in their friendship network than individuals embedded in diverse but closed friendship cliques.

Taken together, future longitudinal research should explore whether individuals in inter-ethnic brokerage positions are more likely to develop the cognitive and emotional skills that promote positive intergroup relations and support the functioning of multi-ethnic societies. At the individual level, inter-ethnic brokers who remain in their challenging positions or those who foster friendships between their dissimilar, unconnected friends may develop stronger reflection skills by navigating and reconciling differences within their immediate friendship networks than students who have diverse but densely connected networks. On the school level, these competencies should serve as important building blocks for social integration processes in culturally diverse schools.

5.2.1.2.3 A more differentiated examination of the role of inter-ethnic negative relations in integration

It is a common notion in integration research that reduced inter-ethnic aggression and violence is an indicator of social integration (e.g., van Tubergen 2020:380). The findings of Study 1, however, call the universality of this notion into question as they suggest that social integration may come along with incidences of inter-ethnic violence due to increased inter-ethnic interactions, social closeness and friendship formation between ethnic groups. Against this background, a more nuanced perspective on the role of inter-ethnic violence within the integration process appears warranted. To achieve this, future research on inter-ethnic violence among students could build on insights from previous longitudinal research on the role of conflicts within friendships in general, which has demonstrated that conflict between friends can be both destructive *and* constructive.

On the one hand, longitudinal network research reported that aggression from friends increased depression and anxiety and reduced school attachment among adolescents (Faris, Felmlee, and McMillan 2020). While conflicts were identified to be the most common reason for friendship dissolution among adolescents (Flannery and Smith 2021), scholars suggest that friendships involving aggression and negative social exchanges can remain relatively stable (Faris et al. 2020; Offer 2021). Nevertheless, a study by Andrews, Hanish, and Pepler (2021) on aggressive behaviour among adolescent friends found that such friendships tended to be reported as less satisfying than those without aggression. On the other hand, prior research indicates that conflicts between friends can be beneficial for the social and emotional development of

adolescents and promote friendship stability and quality. Friends were found to be more likely than non-friends to employ conflict resolution strategies that mitigate tensions, such as perspective-taking and negotiation (Nelson and Aboud 1985). Correspondingly, successful conflict management within friendships was associated with higher levels of empathy and perspective-taking abilities in a previous study by de Wied, Branje, and Meeus (2007). In addition, compared to weaker relationships, friends were observed to be more likely to continue interacting after a conflict and to report that the conflict had improved their relationship (Laursen 1993).

This background of research offers a more constructive perspective on inter-ethnic conflict – when embedded within inter-ethnic friendship – than commonly applied in integration research. Conflicts and aggression between friends of different ethnic origins could be conducive to social integration by strengthening social competencies such as empathy and perspective-taking, which previous research has identified as key competencies that support successful intergroup contact and prejudice reduction (e.g., Hewstone 2009; Pettigrew 2008; Todd and Galinsky 2014; Wang et al. 2014). Jugert, Noack, and Rutland (2013), for example, found that empathy increased the stability of cross-ethnic friendships but not of same-ethnic friendships among 10-year-old children in Germany. Furthermore, inter-ethnic friendships that endure and resolve conflicts, including instances of physical fighting, may develop better friendship quality and strengthen an individual's confidence in intergroup contact – a micro-level factor recently identified as a key facilitator for high-quality and sustained intergroup friendships (Kauff et al. 2021; Turner and Cameron 2016). For instance, Bagci et al. (2020) discovered that prior positive and close inter-ethnic contact enhanced children's confidence in their ability to form and maintain close and trusting outgroup friendships. In turn, higher confidence in contact predicted greater inter-ethnic friendship quality.

Taken together, inter-ethnic friendships that experience frictions, such as physical fighting, but resolve the conflict, may be even more conducive to social integration than inter-ethnic friendships that do not experience and resolve conflict. Building on these considerations, future research should go beyond the cross-sectional snapshot of Study 1 by using longitudinal social network data and analytical methods, such as SAOMs. This approach would enable researchers to investigate the co-evolution of violence and friendship relations, the role of ethnic origin in this context, and how these dynamics may contribute to the development of relevant social competencies and impact social integration more broadly.

That said, not all instances of inter-ethnic violence take place within the context of friendships. Study 1 showed that violence occurs in markedly different relational contexts. While the network analytical models in Study 1 indicate that closeness in the friendship network and spending leisure time together makes violence relations more likely, they also show that dislike between two students makes violence more likely. Dislike, however, tends to occur rarely in conjunction with friendships, as descriptive analyses of Study 1 suggest. Against this background, violence between students of different backgrounds may have a different quality and consequences depending on the relational context from which it emerges.

In light of the research insights on conflict in friendships outlined above, it can be assumed that physical violence arising within inter-ethnic friendships has a greater potential to be resolved successfully due to the friendship bond than violence emerging from inter-ethnic dislike, which may have more damaging consequences. Future longitudinal research should advance on the findings of Study 1 and adopt a multiplex approach, examining the co-evolution of violence and friendship compared to violence and dislike to understand how different relational contexts shape the consequences of inter-ethnic conflict for broader integration processes. Specifically, future research could explore whether inter-ethnic violence emerging from dislike causes more harm to intergroup relations than violence between friends. Intergroup contact theory suggests that negative contact experiences increase ethnic group membership salience, which in turn has a particularly strong effect on subsequent group generalisations and leads to more negative intergroup attitudes (e.g., Paolini et al. 2021; Paolini, Harwood, and Rubin 2010; Schäfer et al. 2021). However, as previous research has shown, close positive and intimate inter-group contact can buffer this detrimental impact (Árnadóttir et al. 2018; Fuochi et al. 2020; Graf, Paolini, and Rubin 2020; Paolini et al. 2014). Inter-ethnic violence occurring between individuals who dislike each other lacks this buffering factor and should carry a higher risk of leading to negative intergroup attitudes than violence between friends.³⁸

³⁸ Prior research has furthermore indicated third parties as amplifiers of perceptions of inter-group conflict when witnessing negative inter-group contact of others (Labianca, Brass, and Gray 1998). Research also has pointed to the relevance of third-party peers in shaping the victims' responses, either by amplifying anger and exacerbating adverse outcomes or promoting emotional regulation and resilience (e.g., Higheagle Strong et al. 2020). Which factors determine how students' involvement in inter-ethnic violence is perceived and dealt with by the wider peer network? The larger social context where inter-ethnic violence occurs may constitute a relevant scope condition. As Study 1 demonstrated, in school grades with stronger ethnic segregation in friendships, students are more likely to dislike outgroup members than ingroup members. In such contexts, third-party peers may be more inclined to encourage perceptions of inter-group conflict and contribute to detrimental responses to outgroup

5.2.2 Assessing the ecological conditions of integration beyond the school grade

Another limitation of this dissertation is its restricted ability to evaluate the influence of external sociocultural factors and interaction contexts beyond the school grade, which constrains its ecological perspective. This limitation also arises from the use of data from complete social network surveys, which typically capture information on the characteristics and relationships of members within a predefined network boundary (e.g., Wölfer and Hewstone 2017). In all three datasets employed in this dissertation, this network boundary corresponds to the school grade.

The school grade network boundary is particularly well-suited for studying ethnic peer relations of adolescents. First, it constitutes an institutionally defined context that aligns with adolescents' lived experiences – a context in which they form and maintain their close relationships and where interactions are generally frequent. Second, when school grades exhibit at least some degree of ethno-religious heterogeneity, they provide opportunities for intergroup interactions. Third, teachers regularly supervise student interactions within this context, and positive intergroup contact is generally institutionally supported. These conditions make school grades well-suited contexts to study how adolescents navigate ethno-religious diversity and how their social relations form (Wimmer 2013:41; Wölfer et al. 2018:203–4). Methodologically, school grade-level boundaries are also preferable for this dissertation's research objectives, as previous research has found that using classrooms as network boundaries to study intergroup relations instead may underestimate the degree of ethnic segregation present at larger levels, such as the school grade (Leszczensky and Pink 2015). In addition, complete social network data at the school grade level offers significant analytical advantages over traditional survey data, which are critical for this dissertation's analytical goals. Beyond more accurate information on social relations, network structures and their ethno-religious composition, they enable statistical analyses that estimate the relative importance of different determinants of relationship formation in school grades, including individual attributes (e.g., ethnic origin, religiosity, gender), opportunity structures (e.g., relative ethnic group sizes in the school grade), and network-endogenous processes (see Chapter 1.3.2. for a comprehensive delineation of the advantages of the network perspective and its application in the individual studies).

victimisations, compared to school grades with weaker ethnic segregation and lower levels of ethnic heterophobia.

Despite its essential advantages, this survey approach and data come with significant blind spots regarding students' broader social ecology beyond the school grade. The focus on within-grade relationships means that relationships beyond this network boundary remain largely unobserved, such as students' friendships or fights with ethnic outgroup peers encountered in parks or recreational activities who do not belong to their school grade. Additionally, there is limited knowledge about the characteristics of students' out-of-school interaction contexts, such as opportunities for in- and outgroup contact, and other sociocultural influences, including parental control of friendships, that can shape their integration at school.³⁹

In sum, complete social network surveys and data with the school grade as the network boundary provide crucial advantages for studying the interplay between social and cultural dimensions of integration among adolescents. These advantages notwithstanding, when viewed through the lens of an ecological perspective, certain limitations become evident. Influences stemming from an adolescent's broader social ecology that lie outside this network boundary may be systematically overlooked or captured only indirectly through students' reports. These external factors may, nevertheless, intervene in students' intergroup relationship formation in school, which points to methodological and theoretical limitations but also to fruitful avenues for future research.

5.2.2.1 Capturing sociocultural influences through which norms shape adolescents' relations

The challenge of capturing external influences that operate through adolescents' sociocultural environments beyond the school grade is exemplified in Study 3, which aimed at examining the role of gendered religious norms in interreligious friendships among Muslim youths. To assess the impact of gendered religious norms, the study investigated various sociocultural factors in the lives of Muslim youth through which these norms may operate, such as parents' control over their children's friendships and adolescents' engagement in leisure-time activities with opportunities for outgroup contact. While the study identified parental control as the factor with the largest contribution to the emerging gender gap in Muslim youths' ingroup bias, the way Study 3 measured parental control potentially underestimates its contribution – and,

³⁹ In principle, complete social network surveys can include questions about students' contexts and relationships beyond the school grade – for example, the share of in- or outgroup friendships outside school. Equally, these surveys may gather information about third parties (e.g., parents' parenting styles or networks) and out-of-school activities (e.g., leisure time engagements). However, all such information about others and external contexts relies on students' self-reports and is, therefore, prone to inaccuracies or perception biases.

thereby, the role of gendered religious norms for interreligious friendships of Muslim adolescents. The operationalisation relied on students' perceptions of their parents' control and monitoring over their friendships, which may have overlooked subtler forms of parental involvement that promote bonding with ingroup peers while limiting mixing opportunities with non-Muslim peers.

Qualitative research indicates that Muslim parents actively guide and organise their children's free time and encourage participation in ethnic recreational activities that consolidate cultural values and contact with other Muslims, such as events organised by the mosque (Karam 2021; Paat 2013; Stodolska and Livengood 2006). This form of parental involvement could be relevant to Study 3's research focus if Muslim parents increase their efforts during adolescence to organise their daughters' free time compared to their sons' and give priority to activities that promote norm compliance and predominantly provide ingroup contact for their daughters. However, adolescents are likely less aware of such parental strategies and would, therefore, be unable to report them in surveys. Consequently, Study 3's measurement of parental control, which relied exclusively on students' reports and perceptions, is unlikely to capture these subtler forms of parental control. As a result, Study 3 may have underestimated the influence of religious norms operating through parental control.

Study 3 may thus have assessed the contribution of religious norms through parental control only partially. Furthermore, it did not consider the influence of norm-related social control that includes agents other than the adolescent's own parents.⁴⁰ Previous literature points to the relevance of social control exerted through the interconnections between social settings that adolescents are not part of, as these can nevertheless affect their behaviour at school.⁴¹ Important sources of social control that have been identified in the literature are parental networks and intergenerational closure, as interconnections between parents of befriended children facilitate parental control of their children's behaviour and, thereby, enforcement of norms (Coleman 1988; Windzio and Heiberger 2024). For Muslim parents, relationships with other parents of the Muslim community may be an important tool to monitor their daughter's

⁴⁰ While various social groups likely employ the norm-related social control mechanisms discussed here, I delineate these mechanisms in relation to Muslims, as Study 3 concentrated on Muslim youths, their gendered religious norms, and the norm-related social control prevalent within this religious group.

⁴¹ Such interconnections of social contexts in which adolescents are not directly involved are also referred to as "exosystem" in Bronfenbrenner's perspective on the ecology of human development (e.g., Bronfenbrenner and Morris 2006:818; Steinberg, Darling, and Fletcher 1995).

social behaviour in spaces outside the family, as qualitative research has documented (Ashbourne, Baobaid, and Azizova 2012). In addition, Muslim parents can rely on the parents of their daughters' Muslim friends to agree with their own gendered religious norms. Mutual agreement on norms has been identified as a crucial condition for the effectiveness of this network-based form of control and norm enforcement (e.g., Fasang, Mangino, and Brückner 2014). However, social control through social closure is not limited to parents. Prior research has shown that it may also involve other individuals from the ethno-religious community, such as Muslim peers (Mastari et al. 2022), siblings and their friends (Saharso et al. 2023), and neighbours (van Kerckem et al. 2014). Particularly in socially and locally organised religious communities, surveillance and communication processes among their members should be effective (van Kerckem et al. 2014; Oberwittler 2004; Wimmer and Soehl 2014:177–78). With the available data, Study 3 was not able to capture the contribution of norm-related social control exerted by agents other than students' parents or the interconnections between different agents, as the used data only covered students' social networks and provided information based on students' perceived monitoring by their own parents.

To address the potential underestimation of the influence of gendered religious norms operating through social control, a more comprehensive assessment of norm-related social control mechanisms is needed. Future school-based social network surveys could achieve this by expanding data collection to include parents of the students in the school grade. Collecting network data on social relations among these parents would allow for the evaluation of the role of Muslim parental networks and intergenerational closure as forms of norm-related social control. In addition, such a parent survey should include questions on parenting styles and parents' involvement in organising their children's daily lives to capture the contribution of these subtler forms of parental control that encourage religious activities and ingroup contact (see Karam 2021).

In sum, while this dissertation demonstrates that complementing a social network perspective with an ecological approach is a fruitful avenue in integration research, it remains limited in its capacity to capture sociocultural influences in adolescents' lives from third parties. As a result, it likely underestimates the extent to which gendered religious norms operate through these. The next chapter will focus more explicitly on the role of opportunity structures outside the school context. These structures are part of an ecological perspective and a relevant explanatory mechanism for the formation of students' intergroup relationships. However, given the

available data, this dissertation also had a limited capacity to consider students' contact opportunities beyond their school grade.

5.2.2.2 Where and with whom do students experience and engage in inter-ethnic violence?

Study 1 examined how ethnic homophily in friendship networks within school grades relates to tendencies of inter-vs. intra-ethnic violence in that same context. However, because the network boundary of the data used in Study 1 was limited to the school grade, the study likely captured only part of the extent of inter-ethnic violence experienced by the students. The complete social network data used did not provide information on violent interactions with outgroup peers that do not belong to the same school grade or take place with individuals outside school in relatively unsupervised interaction spaces. While this was not a limitation for Study 1, which explicitly focused on the school grade context, its findings – combined with insights from criminology and adolescent delinquency research – suggest that future research on the role of ethnic origin in students' violence relations should also consider interaction contexts and partners beyond the school environment. Students may be more likely to experience and engage in inter-ethnic violence with individuals and in locations outside than inside the school context.

Study 1 found that spending spare time together outside school increased the likelihood of physical violence between students. Relatedly, criminological research has identified that unsupervised and unstructured socialising among peers facilitates violence and delinquency: The absence of authority figures reduces the risks of detection and formal sanctions, and the lack of structured activities leaves room for deviant behaviour to emerge (Clarke and Felson 1993; Osgood et al. 1996). In addition to the lack of social control and structure in activities, research has pointed out further characteristics of interaction spaces that are relevant determinants of deviant behaviour. Research by Hoeben and Weerman (2014) showed that unstructured socialising increases adolescent offending only in semi-public and public spaces, such as entertainment settings (e.g., fast food restaurants, pubs), public transportation, streets, and parks. These findings connect to Small and Adler's (2019) call for a more nuanced consideration of spatial contexts and their characteristics, such as whether they are private or public, and the degree to which they encourage shared activities – and how these characteristics shape social relationships. Furthermore, research by Jose et al. (2021) found that adolescents' out-of-school friendships are more likely to promote deviant behaviour, including physical fights, than in-school friendships.

Against this background, the expectation could be derived that students might be more likely to be involved in inter-ethnic violence with external individuals and in contexts outside of school. Also outside of school, adolescents from different ethnic groups are exposed to each other. In these settings, however, unstructured and unsupervised socialising is more likely, such as when peers from neighbouring schools meet while waiting at the bus stop or when they encounter each other in focal public places within the neighbourhood. Rational choice and deterrence theory provide further reasoning as to why we should expect inter-ethnic violence to be more likely to occur in interaction settings outside school – especially when it is motivated by ethnic outgroup hostility and negative intergroup attitudes. These theories suggest that the perceived severity of sanctions and the expected certainty of sanctions – that is, the subjective probability of being caught – are relevant deterrents of deviant behaviour that interact with each other (e.g., Becker 1968; Kroneberg, Heintze, and Mehlkop 2010; Mehlkop and Graeff 2010; Wikström 2007). Building on this, specifically in the case of inter-ethnic violent interactions with peers in the school context, both deterrents – expected sanction severity and, especially, the probability of being caught – should be relatively high. These deterrent characteristics are also due to the institutional role of schools in fostering tolerance and cohesion (e.g., School Act NRW 2005), which should create heightened attentiveness to signs of ethnically motivated conflicts and violence by both school personnel and students. These deterrent characteristics of the school context suggest that students may be more likely to experience and engage in inter-ethnic violence with individuals and in locations outside this space.

In sum, to better understand the interplay between the social and cultural dimensions of integration among adolescents, future research should develop a more comprehensive knowledge of students' opportunity structures and contacts, extending beyond the school context. This dissertation provides a starting point for such research through its ecological perspective and analytical methods. The findings demonstrate the relevance of this perspective. However, in light of the limitations discussed, future research and data collection efforts should go further and more thoroughly assess sociocultural influences as well as interaction spaces and partners outside the school (grade) context.

5.2.2.3 Limited knowledge of out-of-school opportunity structures for in- and outgroup contact

The data used in this dissertation focuses on students within school grades and, therefore, provides limited insight into students' interaction spaces and opportunity structures outside of

school. Information about these contexts must be inferred or indirectly assessed from students' self-reports, which introduces uncertainty regarding their actual characteristics. More detailed information about out-of-school opportunity structures would enable greater understanding and more precise analyses of the role of ethnicity and culture in students' relations.

For instance, Study 3 considered leisure time activities which should provide contact opportunities with non-Muslims, such as going to the youth centre, partying, or spending time in a club (sports, theatre, music, or some other club), as one pathway through which religious norms might influence the gender gap in ingroup bias among Muslim youth. The study found that more frequent club attendance was indeed associated with a lower ingroup bias among Muslim girls but, unexpectedly, with a *higher* ingroup bias among *Muslim boys*. These findings might indicate that, for Muslim boys, spending time in a club – assumed to be characterised by outgroup contact opportunities – could instead provide additional ingroup contact opportunities. Future research with more comprehensive information on the religious and ethnic composition of leisure contexts could help clarify this unexpected finding. Relatedly, future research might also examine gender differences in leisure time activities that primarily provide *ingroup* contact, such as those related to the religious community, to more thoroughly assess leisure time activities as pathways through which religious norms shape a gender gap in ingroup bias among Muslim youth. More comprehensive and detailed information is needed on how Muslim boys and girls spend their leisure time, as well as on the composition of these leisure time contexts, to advance our understanding in this area.

More detailed information on students' opportunity structures outside of school would also allow an even more precise statistical assessment of the role of ethnic origin or religion in relationship formation. The complete social network data and analytical methods used in this dissertation already improve on previous research in this respect by providing estimates of ingroup tendencies in, for example, friendships, net of various intertwined mechanisms, such as opportunity structures for ingroup friendships in the school grade. However, recent network research cautions against interpreting such residual ingroup tendencies as genuine ingroup preferences or unequivocal indications of salient group boundaries (e.g., Kroneberg and Wittek 2023; Wimmer 2013; Wimmer and Lewis 2010), as these might still be partly due to unobserved opportunity structures. For instance, Study 1 found a relative tendency towards same-ethnic friendships among students even after taking into account the availability of in- and outgroup students in the school grade and several network endogenous mechanisms. Part of this remaining relative tendency towards ingroup friendships could, however, be attributable

to *unobserved*, ethnically segregated interaction opportunities among students. For instance, students of the same ethnic group may share the route to school, engage in the same leisure time activities, or have more contact with ingroup schoolmates due to their parents' intra-ethnic acquaintances (see also Kroneberg and Wittek 2023:615; for an overview of opportunity-related mechanisms of friendship formation see Jugert and Leszczensky 2024:3–4). This reasoning can also be applied to religion – students of the same religious affiliation may participate in the same faith-based recreational activities organised by a mosque after school. These segregated spatial and organisational opportunity structures outside school may contribute to tendencies towards ingroup friendships and segregation along group lines observed in school networks, even in the absence of actual preferences for ingroup friends. Yet, the data used in this dissertation did not capture such out-of-school opportunity structures. Against this background, future research should aim for a more comprehensive assessment of students' opportunity structures beyond the school grade to avoid overinterpreting evidence of relative tendencies for ingroup relations with schoolmates as actual social psychological preferences for ethnic or religious ingroup members (see Kroneberg and Wittek 2023).

The data employed in this dissertation provide limited possibilities to assess the influence of out-of-school aspects on students' relationships. Beyond that, the school grade social network boundary generally narrows the analytical focus to relationships with schoolmates, which can be problematic when certain interactions are even more likely to occur with actors and in spaces outside the school grade context. This facet may apply to physical fighting with outgroup peers, which Study 1 focused on.

5.2.3 Capturing the influence of cultural norms on social integration

A further critical point concerns the methodological approaches adopted in this dissertation to capture the influence of cultural norms. In the following section, I will critically examine how the influence of Muslim religious norms was captured and how cultural differences were assessed using ethnic origin. I will also reflect on this dissertation's use of ethnic origin as an explanatory category and outline ways to advance its approach in light of recent insights from social boundary-making and network research.

5.2.3.1 Capturing the influence of specific religious norms

Religious groups are social groups with specific norms according to which their members are expected to behave to remain part of the group. Like other religious groups, the Islamic religion has religious norms according to which Muslims should behave. To evaluate the influence of

gendered religious norms, specifically, endogamy and chastity norms, on interreligious friendships among Muslim youths, Study 3 explored whether norm-related factors (religiosity, parental control, and leisure time activities) contribute to the emerging gender gap in Muslim youths' ingroup bias in friendships. While this indirect approach to assessing the influence of norms advanced our understanding of the pathways through which they constrain interreligious friendship formation, the study may have captured their impact only partially and underestimated their role in Muslim youths' interreligious friendships. For example, using individual religiosity to capture religious norms likely underestimated their influence, as some studies indicate that religious norms also guide the behaviour of moderately religious Muslims (e.g., Carol and Teney 2015; Grønli Rosten and Smette 2023; Kogan and Weißmann 2020; Munniksmä et al. 2012). Direct measures of endogamy and chastity norms in future research would avoid this limitation and allow a more thorough assessment of the influence of these religious norms.

Beyond that, a more direct measurement of religious norms would allow for the investigation of several substantive follow-up questions. First, while Study 3 identified endogamy and chastity norms as theoretically relevant, future research could benefit from directly measuring these specific norms to assess their relative relevance, as one may be more influential than the other for Muslim youths' interreligious friendships. Second, Study 3's theoretical argumentation linked specific gendered motives and social sanctions within Muslim religious culture to norm adherence, particularly among Muslim girls. These factors included Muslim women's particular role in cultural preservation (e.g. Dion and Dion 2001; Le Espiritu 2001) and the strong association between female purity and reputation in the Muslim community (e.g., Saharso et al. 2023). But these underlying mechanisms remained implicit and untested in Study 3. Future research could explicitly measure youths' perceptions and expectations regarding these motives to understand how adolescents assess the expected utility of norm compliance and uncover systematic individual differences in Muslim youths' cost-benefit calculations. Third, with direct norm measurements, future research could further clarify the extent to which religious norms influence interreligious friendships through individual norm internalisation versus external third parties or other socio-ecological factors. While study 3's analysis results on parental control showed that these norms also operate through external forces, such as third-party influences, the findings on individual religiosity and leisure time activities likely also captured norm influence through individual internalisation. Future research could assess the extent to which direct measures of religious norms account for the

gender gap in ingroup bias. This would help to disentangle the relative contributions of these norms as they operate through external factors compared to their direct influence through individual norm internalisation.

In sum, a direct measurement of the endogamy and chastity norms and the underlying motives for norm compliance would advance our understanding of how these norms shape Muslim youths' ingroup bias in gender-specific ways.

5.2.3.2 Assessing the influence of cultural differences by ethnic origin

While the assumed explanatory mechanisms in Study 3 relate to the influence of *specific* social norms, which future research should directly measure, Study 2 did not focus on particular norms. Instead, its explanatory mechanism referred to cultural differences in a broad sense. Study 2's central assumption was that individuals who bridge salient differences between their friends experience cross-pressure and strain, ultimately resulting in lower mental wellbeing. Thereby, cultural differences and their significance were assessed by the dissimilarity in ethnic origins of friends *and* the brokerage structure – that is, the fact that these friends do not have a direct friendship with each other. The study understood ethnic origin as a composite variable encompassing various constituent elements (see Sen and Wasow 2016), including cultural norms and codes, practices and behavioural expectations that differ between ethnic groups. Given the composite nature of ethnicity, a more specific measurement would be less straightforward in Study 2 than in Study 3 and should be carefully considered. On the one hand, choosing a particular norm to assess cultural differences may underestimate the overall relevance of ethnic origin for individuals in ethnic brokerage positions. On the other hand, identifying all constituent elements that make it meaningful for social integration will be challenging. In addition, ethnic origin, operationalised by the student's and parents' country of birth, is an objective indicator of ethnicity that is less prone to endogeneity bias compared to alternative measures such as cultural traits, norms and values as independent variables (see Polavieja 2015) or subjective indicators of ethnicity such as self-subscribed ethnic identity (Dollmann et al. 2014).

Despite these considerations, it may still be fruitful to scrutinise whether there are specific aspects related to ethnic origin that are responsible for the significant association between inter-ethnic brokerage and mental wellbeing found in Study 2. In contrast to ethnic origin, which is a relatively immutable demographic attribute, some of the aspects identified in this process could be manipulable. If so, future intervention studies might target these attributes, exploring

and developing effective strategies to mitigate cultural cross-pressures and stress for individuals in inter-ethnic brokerage positions (see Sen and Wasow 2016:508).

That said, ethnic origin is a relevant analytical category in understanding integration outcomes which is also underscored by this dissertation's findings. Across Studies 1 and 2, ethnic origin significantly influenced both patterns of relationship formation and the association between network positions and mental wellbeing. Nevertheless, as the next section elaborates, in light of recent methodological and theoretical developments, the use of ethnic origin as an explanatory variable in integration research warrants further critical reflection.

5.2.3.3 Probing the role of ethnicity and ethnic origin for explanatory mechanisms

In integration research, it has been common to use ethnic origin as an indicator of cultural similarity and difference, assuming it to be a relevant social force shaping individuals' experiences and social relations. The assumption of cultural similarity between individuals of the same ethnic group and difference between individuals of different ethnic groups underpins both assimilationist and multiculturalist theoretical approaches (see also Wimmer 2013:1–15) and also underlies the explanatory mechanisms tested in this dissertation. For instance, Study 1 examined ethnic homophily in friendship networks, suggesting that individuals prefer friends of the same ethnic origin, also due to shared experiences, values, and attitudes. Study 2 assumed that individuals of different ethnic origins tend to have different norms, values and behavioural expectations because they belong to different ethnic groups (following Mollenhorst et al. 2015), which creates cross-pressures and lower mental wellbeing for those individuals in brokerage positions between different ethnic friends.

The studies found that ethnic origin systematically shaped negative and positive relationship formation and that ethnic brokerage positions influenced mental wellbeing negatively. However, recent insights from network and social boundary-making research caution against interpreting significant effects of ethnic origin as definitive evidence of salient ethnic group boundaries or cultural differences between groups (e.g., Kroneberg and Wittek 2023; Wimmer 2013; Wimmer and Lewis 2010). The social boundary-making perspective advocates a more critical approach to the use of ethnic origin as a predictor variable, emphasising the need to probe the explanatory role of ethnicity and associated mechanisms; other socially relevant categories and mechanisms may be at play or simply be more relevant for social integration processes among adolescents. To this end, Wimmer (2009, 2013) has proposed to employ

analytical strategies that can disentangle ethnic from non-ethnic explanatory mechanisms and identify their scope conditions.

The social networks perspective employed in this dissertation, with its network data and analytical methods, is already well-suited to achieve this (e.g., Wimmer 2013; Wimmer and Lewis 2010). In Study 1, this approach enabled the consideration of several explanatory mechanisms – both ethnic and non-ethnic – that shape students' social relationships in school. The study evaluated the role of ethnicity net of other intertwined mechanisms, such as opportunity structure (e.g., due to relative ethnic group size) and network endogenous mechanisms (e.g., reciprocity), and also the relevance of other attributes, including gender. The findings showed that ethnic origin was a relevant force that influenced friendship, dislike, and violence relations among students, even after controlling for other explanatory mechanisms. However, Study 1's analyses also revealed that aspects such as gender and school class membership were more influential factors in shaping peer relations.⁴²

Moreover, Study 2's results provide a starting point for addressing calls to probe ethnic and non-ethnic explanations and to explore relevant scope conditions for these mechanisms. Future research should inquire into the extent to which the explanatory mechanisms investigated in this study are indeed ethnic and related to cultural differences. To probe and disentangle the non-ethnic and ethnic forces underlying the observed association between inter-ethnic brokerage and lower mental wellbeing, future research could employ a mixed-methods approach (Small 2011). Such an approach would complement quantitative network analyses with qualitative methods. Specifically, school-based social network surveys, such as the one employed by Study 2, could be enriched through in-depth interviews or ecological momentary assessment methods, such as student diaries or school-based observations by researchers (see Shiffman, Stone, and Hufford 2008). These qualitative methods can capture students' experiences of internal strains, cross-pressures, and external conflicts with peers in greater depth and more comprehensively than quantitative instruments. Given that these qualitative

⁴² In general, Study 1 and also Study 2 adopted relatively de-ethnicised analytical designs by using non-ethnic units of analysis, that is, individuals and their social relations, instead of focusing on a particular ethnic group or only ethnic minority individuals. This allowed for investigating whether and how ethnic origin influences individuals and their social networks (see Wimmer 2013). Also, Study 3 took a critical stance and probed its theoretical and analytical focus on Muslims by testing and confirming that the identified pattern in ingroup bias and the considered norm-related explanatory mechanisms did not apply to non-Muslims in the sample.

methods are applied without a predefined focus on ethnicity, researchers can also use the collected qualitative information to draw conclusions about the role of ethnic and non-ethnic factors in these internal and external conflicts. Combined with information about the students' network positions, it becomes possible to compare how the nature, frequency, and intensity of these experiences differ between individuals in inter-ethnic versus intra-ethnic brokerage positions. Such a mix of methods is one way in which future research could probe the role of ethnicity in the mechanisms through which inter-ethnic brokerage affects mental wellbeing.⁴³

Another promising avenue for future research is to examine the scope conditions of the explanatory mechanism identified in Study 2. It is an open question whether this mechanism primarily applies to ethnic groups or whether it extends to other socially relevant groups that expose individuals in brokerage positions to the challenge of navigating divergent norms and expectations. Future studies should therefore go beyond Study 2's focus on ethnic origin and explore whether and how other relevant social categories, such as religion or gender – and their intersection – might constitute relevant conditions for *inter-group* brokerage and its association with mental wellbeing and other integration outcomes.

For example, religion – in particular the distinction between Muslims and non-Muslims – may constitute a relevant group boundary that conditions the relation between inter-group brokerage and its mental health implications in adolescents' friendship networks. Given the emphasis on cultural maintenance within Muslim religious culture and the bright social divide between Muslims and non-Muslims adults and adolescents in Europe (e.g., Drouhot and Nee 2019; Simsek et al. 2022), the negative association between inter-group brokerage and mental wellbeing might be stronger for Muslim students who broker between Muslim and non-Muslim

⁴³ A general limitation of Study 2 is the absence of direct measures of stress, given that the study assumed that occupying inter-ethnic brokerage positions ultimately leads to lower mental wellbeing through the increased stress and strain experienced by individuals in these positions. To explore the hypothesised mechanism more thoroughly, future quantitative research should include direct measurements of perceived friendship-related stress (e.g., Benner, Hou, and Jackson 2020). These assessments should also include an item that captures the reasons for such stress, for example, by including semi-open or open-ended follow-up questions that ask respondents to specify the perceived reasons for the peer-related stress. This would allow for the identification of both non-ethnic and ethnic reasons for stress perceived by inter-ethnic brokers, including those linked to ethnicity and cultural differences, such as acculturation and bicultural stress (e.g., Berry 2005; Romero and Piña-Watson 2017), and also the challenge of navigating divergent norms and expectations among one's different ethnic friends. This approach provides a parsimonious means for future quantitative research to gain nuanced insights into the relevance of cultural differences and ethnicity in inter-ethnic brokers' experiences of friend-related stress. Such an approach would go beyond closed-ended questions on the mere presence of friend-related stress.

friends (inter-religious brokerage) than for students who broker between friends with different ethnic origins (inter-ethnic brokerage). Moreover, as Muslim religious norms are gendered and more strongly discourage interreligious friendships for Muslim *girls*, the mechanism is likely to interact with gender such that the cross-pressure and strain of inter-religious friendship brokerage should be particularly intense for female Muslim brokers. By contrast, other forms of inter-group brokerage, such as brokerage between friends of different genders alone, might carry less strain potential and adverse effects on mental wellbeing. This, however, is an open question and requires empirical investigation.

5.2.4 Considering the broader social context of integration in schools

A further critical point is that this dissertation primarily focused on micro- and meso-level mechanisms and structures in schools. Although it considered macro-level influences through ethnic and religious group norms, it did not explore broader contextual and macro-sociological conditions that may interact with the identified lower-level mechanisms and influence the integration of adolescents in schools.

The datasets used in this dissertation exhibit relatively low variation in terms of the ethnic composition of the school contexts and the societal conditions during which the data were collected. All three datasets were gained from secondary schools predominantly located in ethnically diverse urban areas in North Rhine-Westphalia, one of Germany's most populous federal states. This federal state has one of the highest proportions of residents with a migration background in Germany (Federal Office for Migration and Refugees (BAMF) 2020:10; Federal Statistical Office (Destatis) 2020:37,42) and a sizeable Muslim population (Pfündel et al. 2021:52–53). As a result, the majority of schools in the samples were ethno-religiously diverse, with relatively large shares of ethno-religious minority students in the school grades. Additionally, the data collections took place during periods of relative societal stability and peace. These conditions apply in particular to the FUGJ dataset collected in 2013, used in Study 1, and the FIS dataset collected in 2013–2014, used in Study 3.

The relative homogeneity of the used data with regard to these characteristics raises questions about the generalisability of the findings to school contexts with lower ethnic diversity or schools located in more rural areas. Additionally, the identified mechanisms may not apply to societal conditions characterised by profound inequalities, tensions, or even conflicts between ethno-religious groups. Beyond the question about generalisability, these data also limit the possibility of substantive explorations of how contextual conditions, such as the ethnic

composition of the school grade or societal-level conditions, influence the mechanisms discovered in this dissertation.

Nevertheless, the ethno-religious diversity within the sampled schools was an essential prerequisite for investigating intergroup relations and the key mechanisms explored in this dissertation. Unlike previous research, which was often constrained to broad ethnic majority-minority distinctions or a few ethno-religious groups, the large and diverse samples enabled more nuanced and comprehensive analyses of ethnicity-related mechanisms. To illustrate, for Study 1, examining the role of ethnic origin in both positive and negative relationships required a sufficient number of students from diverse ethnic backgrounds. Similarly, Study 2's analyses of different inter-ethnic brokerage types demanded a sufficient number of cases per type to ensure reliable results.⁴⁴ The comprehensive representation of several ethnic origins in the data allowed for broader generalisations about the role of ethnic origin in social networks beyond statements confined to specific ethnic groups. Furthermore, the large scale of the samples and the large share of ethno-religious minority individuals in the data made it possible to analyse complex explanatory mechanisms within minority populations. In Study 3, for instance, a substantial sample size of Muslim adolescents aged 11–17 was necessary to test the various interaction effects when investigating the emergence of a gender gap in ingroup bias in this group.

Despite these substantial advantages, future research should address the delineated limitations by using data with greater contextual variation, including more ethno-religiously homogeneous schools and different societal conditions, to assess the generalisability of the findings in this dissertation. Beyond questions of generalisability, future research should also leverage such data to gain substantive insights into whether and how contextual conditions shape the lower-

⁴⁴ A comparison of Study 2 with Mollenhorst et al. (2015), the only previous study examining ethnic brokerage and mental wellbeing, further illustrates these data advantages. Their research was limited to specific ethnic groups (native Swedes and immigrants from Iran and former Yugoslavia – both major sources of migration to Sweden). In their sample, inter-ethnic brokerage was significantly less common among the native majority group than among ethnic minority groups, creating challenges for reliable comparative analyses – a limitation not present in Study 2. Also, Study 2 was able to address more complex research questions regarding ethnic brokerage and mental wellbeing than was possible in previous research. Specifically, Study 2 distinguished between two types of inter-ethnic brokerage: biased brokerage and unbiased brokerage. While Mollenhorst et al. (2015) acknowledged the relevance of such more differentiated forms of ethnic brokerage in their theoretical introduction when conceptualising inter-ethnic brokerage, they aggregated both types into a single, simplified category in their main analyses. Notably, unbiased brokerage structures were barely present in their sample, particularly among the native majority group.

level mechanisms identified in this dissertation and the interplay between cultural and social dimensions of adolescent integration more broadly.

The social boundary-making scholarship offers one analytical lens to address these questions. Recent research in the boundary-making tradition suggests that the contextual composition at the school level, as well as larger, societal-level conditions and events, are macro-sociological factors that should influence the configuration of boundaries and boundary-making among students. For example, Lamont & Molnár (2002:168,189) have described how symbolic boundaries – the conceptual distinctions by which actors categorise people into groups – can create inequality and status differences. Additionally, social boundaries – the manifested social differences in access to resources and social opportunities – can affect the experiences of individuals, their interactions, and the formation of social relations according to these authors.

In the following, I will outline how the composition of school contexts, as well as larger societal-level conditions and events, may affect the relevance of ethno-religious group boundaries and, thereby, the social experiences and relationships of adolescents with diverse ethno-religious backgrounds in schools. I will delineate how these might influence the lower-level mechanisms found in this dissertation and suggest future research directions.

5.2.4.1 The sociodemographic composition of school grades

The composition of schools may represent a relevant local condition for the configuration and significance of group boundaries among students, thereby shaping their experiences and social lives in school. Compositional characteristics of school grades may therefore constitute an important contextual factor shaping the mechanisms identified in this dissertation.

For example, Study 2 found no significant difference in the association between inter-ethnic brokerage and lower mental wellbeing when comparing ethnic minority and ethnic majority students. This finding contrasts with the argument formulated by Mollenhorst et al. (2015: 910) that there are greater conformity pressures and mental health consequences for ethnic minority brokers. This argument assumes a status asymmetry between these groups, which is dominated by the (native) ethnic majority, in line with a traditional assimilationist perspective. In Study 2, however, the school grades were characterised by ethnic diversity and relatively low shares

of majority students.⁴⁵ This contextual composition may reflect a social situation in which the ethnic hierarchy may be more ambiguous. Under such contextual conditions, conformity pressures could be distributed more evenly across ethnic groups, creating similar pressures for both majority and minority brokers, which could explain the absence of significant minority-majority group differences found in Study 2. Conversely, in more ethnically homogeneous school grades with a more salient and dominant ethnic majority, majority norms may be taken for granted and less contested, creating lower conformity pressures for majority brokers and potentially higher pressures for minority brokers. In light of these considerations, future research should use data with greater variation in the ethnic composition of school contexts, including ethnically more homogeneous schools, to explore whether significant group differences emerge in these settings.

Beyond the influence of ethnic composition alone, recent research by Kroneberg, Kruse, and Wimmer (2021) suggests that the interplay of multiple compositional characteristics can constitute local contextual conditions that shape adolescents' experiences and social relations in school. Studying survey data from schools in four European countries, Kroneberg et al. (2021) found that the alignment of ethnic origin and gender in school classes is a relevant local condition for inter-ethnic friendships and ethnic group belonging, particularly for minority students. In school classes where outgroup members, that is, all classmates of different ethnic origin, also tended to be of the opposite sex, minority students had predominantly same-ethnic friends. They also identified less as members of the national majority.

If certain contextual compositions make ethnic group boundaries more salient, the findings of this dissertation give rise to important follow-up questions. In school contexts where students of other ethnic groups are predominantly of the opposite sex, minority inter-ethnic brokers' awareness of their ethnic group membership and the importance of complying with their ingroup norms and behaviours may be intensified, along with the challenges of bridging between different ethnic groups. Building on the insights generated by Kroneberg et al. (2021), a promising research avenue lies in examining how the alignment between ethnic origin and gender in school grades – and potentially other social categories such as religion and socioeconomic status – conditions the association between ethnic brokerage in friendship

⁴⁵ The mean share of majority students across school grades (N=39) was 38% with a standard deviation of 20%, and the share of majority students is equal to or smaller than 56% in three-quarters of the school grades included in the sample (M= 0.38, SD= 0.20, Min.= 0.04, Max= 0.75, p25= 0.20, p75= 0.56).

networks and mental wellbeing. Furthermore, Study 2 found no significant difference in the link between mental wellbeing and inter-ethnic brokerage when one friend was an ingroup member (biased inter-ethnic brokerage) compared to when neither friend shared the broker's ethnic background (unbiased inter-ethnic brokerage). However, in contexts where ethnic group boundaries are salient, ingroup membership may be more consequential. Under such conditions, inter-ethnic brokerage involving an ingroup friend may indeed be more likely to produce intensified cross-pressures and loyalty conflicts, thereby aggravating psychological strain and the adverse effects on the broker's mental wellbeing.

5.2.4.2 The level of social inequality between ethno-religious groups in broader societal contexts

Extending the focus beyond the characteristics of the school context, broader societal conditions are also likely to shape the mechanisms explored in this dissertation. The social boundaries present among students in school will at least partially reflect those that exist in the broader society. The extent to which ethno-religious groups are integrated into society, such as the degree of status asymmetries or social inequality between the ethnic (native) majority and ethnic minorities, may constitute a relevant contextual factor shaping these boundaries. For instance, Study 2, which examined a sample of students in Germany, found no significant difference between ethnic minority and (native) majority students in the association between inter-ethnic brokerage and mental wellbeing. However, significant group differences may be evident in societal contexts where the boundaries between these groups are more salient and strongly related to social status – such as the Black-White divide in the United States or the boundary between Roma and non-Roma in Hungary (e.g., Boda and Néray 2015). Future research employing comparative analyses across social contexts that vary in the salience of boundaries and status asymmetries between ethno-religious groups could offer valuable insights. In particular, it could help to explore whether the level of inequality and disadvantage between ethno-religious groups on a societal level shapes meso- and micro-level mechanisms in schools, such as inter-ethnic brokerage and its negative association with mental wellbeing. Future research could address such questions through cross-country data that capture variation in societal conditions, thereby enabling systematic comparative investigations.

Alternatively, the role of societal-level conditions may also be studied in one and the same societal context, for example, when public discourses, ethnic polarisation and mobilisations change group boundaries, inequality and status asymmetries. Previous research has shown that higher levels of media attention on immigration issues are associated with increased natives'

concerns about immigration (Czymara and Dochow 2018). Salient immigration-related political discourses and controversies have been found to polarise natives' attitudes towards immigration (Schmidt-Catran and Czymara 2023) and shape attitudes towards Muslim immigrants in particular (Czymara 2020).

Although the impact of these societal-level processes on boundary-making among students in schools remains to be clarified, it is plausible that salient and polarising public discussions related to immigration or specific ethno-religious groups heighten the salience of group membership not only among adults but also among adolescents. This, in turn, may shape adolescents' social behaviour and intergroup relations in school and could be a relevant scope condition for the mechanisms studied in this dissertation. For instance, heightened political controversy over integration policies and a nativist movement could foster an assimilationist understanding of integration where the native majority is the dominant group that defines the mainstream. If status and perceived opportunities are greater in the mainstream – and entry into the mainstream is principally possible through acculturation and not blocked by high levels of discrimination (see Drouhot and Nee 2019; Nee and Alba 2013; Wimmer and Soehl 2014) – this should increase the pressure on ethnic minority students to assimilate towards the ethnic majority. Such an asymmetry may, for example, be relevant to the mechanisms studied in Study 2.

Repeating the analyses of Study 2 with more recent data might yield markedly different results. While no group differences were evident in the data from 2018, significant differences between ethnic minority and native majority ethnic brokers may be present in more recent data, potentially due to changes in the salience of ethnic boundaries in the current context. To evaluate how such societal processes might shape ethno-religious boundaries and thereby condition the micro-level mechanisms identified in Study 2, future research could conduct a before-and-after comparison and collect recent data from the same schools as those comprised in the school sample of Study 2, applying identical measures and analyses. Such a research design would hold school-level characteristics constant and allow a more precise assessment of the role of societal-level processes as relevant contextual conditions.

However, societal-level conditions may also influence the cultural dimension of integration. Through their impact on values and norms, societal-level aspects shape how cultural and social integration interact, thereby constituting important conditions for the mechanism examined in this dissertation. Research by Wimmer and Soehl (2014), for instance, suggests that societal

conditions such as high levels of discrimination against ethno-religious immigrant minorities can even block integration processes. Analysing large-scale survey data on 23 European countries, they investigated why some immigrant groups differ from the cultural values of mainstream society. Their study found that for second-generation immigrants, the source of value differences with natives was rather endogenous, driven by social burdens such as discrimination and legal disadvantages experienced in the host country. The authors concluded that such inequalities hinder acculturation processes and foster adherence to parental values from the country of origin among the children of immigrants.

Building on these insights, future research could explore how such societal conditions influence the interplay between social and cultural dimensions of integration among students in schools. For instance, Study 3 identified that gendered religious norms partly drive the emergence of a gender gap in Muslim youths' interreligious friendships. Drawing on Wimmer and Soehl (2014), this raises the question of whether the relevance of religious norms for forming interreligious friendships varies across different levels of social inequality experienced by Muslim students in the social contexts where their schools are located. While this dissertation included only schools located in the federal state of North Rhine-Westphalia, future research in the German context could benefit from including social network data from schools in eastern federal states. Such data would enable meaningful comparisons and analyses of how regional differences in social conditions shape the role of religious norms in interreligious friendship formation.

Empirical evidence has found stronger anti-immigrant and particularly anti-Muslim sentiments in East Germany compared to West Germany (Kalter and Foroutan 2021; Pickel and Yendell 2018).⁴⁶ Additionally, evidence from field experiments conducted in North Rhine-Westphalia (West German federal state) and Brandenburg and Saxony (East German federal states) revealed significantly greater discrimination against immigrant females identifiable as Muslims (by wearing a hijab) in the East (Choi, Poertner, and Sambanis 2019). Given these East-West differences in racial resentments and Muslim discrimination, the mechanism proposed by Wimmer and Soehl (2014) would suggest that the acculturation processes of children of Muslim immigrants should be blocked to a greater extent in the East than in the

⁴⁶ This differentiation between “East” and “West” Germany refers to German federal states that comprised the former territory of the German Democratic Republic (East Germany) versus those that did not (West Germany), prior to the German reunification in 1990.

West, such that the maintenance of Muslim gendered religious norms should be stronger among the second generation of Muslim adolescents living in East-German federal states. Against this background, the finding of Study 3 – that gendered religious norms explained about one-third of the emerging gender gap among Muslim students visiting schools located in North Rhine-Westphalia – should be considered a lower-bound estimate for the influence of religious norms. Among Muslim students in schools located in Eastern German federal states, the influence of these norms on their interreligious friendships is likely even greater.⁴⁷

5.2.4.3 The impact of exogenous ethnic conflicts and political events

Research also points out that exogenous ethnic conflicts and political events, such as wars or terrorism, can lead to stigmatisation or destigmatisation of particular ethno-religious groups (Velásquez et al. 2024:190–91). Notably, terrorist events can have transnational effects on migration concerns: Böhmelt, Bove, and Nussio (2020) found that terrorist events in Europe after 9/11 significantly increased concerns in neighbouring countries and beyond. Relatedly, intergroup contact research has shown that negative contact experiences with outgroup members – even in the case of indirect exposure through media consumption such as television – make ethnic group memberships and categorisations more cognitively salient (Paolini et al. 2014), which in turn increases the likelihood that this negative contact experience will shape attitudes towards the outgroup as a whole (e.g., Graf and Paolini 2016; Paolini et al. 2014, 2010).

To what extent can international political conflicts shape adolescents' social lives and intergroup relations within schools? Do exogenous ethno-religious conflicts create ripple effects such that indirect exposure to negative intergroup contact adversely affects students' intergroup attitudes and relationships in school? Kroneberg (2022:77–79), for example,

⁴⁷ A systematic analysis of societal conditions using data that include schools from East Germany might be limited by the low proportion of Muslims living in the East compared to the West (3.5% vs. 96.5% of the total German Muslim population, Pfündel, Sticks, and Tanis 2021:52). To demonstrate, 31.8% of Muslims living in Germany reside in North Rhine-Westphalia. In Saxony-Anhalt – the eastern state with the highest share of Muslims – this figure is 1.1% (Pfündel et al. 2021:52). However, Bavaria and Baden-Württemberg have sizable Muslim populations (11.7% and 17.1%, respectively, of the total German Muslim population; Pfündel et al. 2021:52) and were among the West German federal states with the largest share of Alternative für Deutschland (AfD) votes (The Federal Returning Officer 2025:330). The AfD explicitly opposes Muslim immigration in particular, and its voters show the highest level of aversion towards Muslims and Islam (e.g., Pickel and Yendell 2018). Against this backdrop, school-based data from these federal states may be better suited for capturing variation in social conditions and exploring how these conditions shape the influence of gendered religious norms on the religious mixing of Muslim adolescents.

suggested that school contexts where positive relationships are ethnically segregated may be less resilient to the emergence of group-based conflicts in the face of external shocks, ethnic conflicts, and mobilisations.

The cross-sectional findings of Study 1 showed that school grades with higher levels of ethnic homophily in friendships tended to exhibit a higher tendency to dislike ethnic outgroup members, that is, ethnic heterophobia. At the same time, higher ethnic homophily in friendship networks was associated with a greater relative prevalence of violence *within* ethnic groups, such that in schools where positive relations and interactions focus on the ethnic ingroup, physical aggression tends to occur among ingroup members. However, Study 1 relied on data from autumn/winter 2013, a period of relative social stability and peace. Whether the study's findings are robust to outbreaks of ethnic conflicts at societal or international levels – such as the renewed outbreak of armed violence in the Israeli-Palestinian conflict following the attacks on 7th October in 2023 or Islamist terrorist attacks in Germany – is an open question.

Intergroup contact research in conflict regions has indicated that positive intergroup contact contributes to conflict prevention and resolution (Al Ramiah and Hewstone 2013). For example, Kanas, Scheepers, and Sterkens (2017) studied university students in non-conflict and conflict regions of Indonesia and the Philippines, finding that interreligious friendships between Muslims and Christians reduced negative outgroup attitudes, even when individuals had experienced serious interreligious violence. Additionally, prior research has found that positive intergroup contact can buffer against the adverse effects of negative contact experiences in the present and support prosocial behaviour during periods of intergroup conflict. Paolini et al. (2014) demonstrated this buffering effect in experimental and correlational studies in conflict areas (Northern Ireland, Arizona's border area and Cyprus). While negative intergroup contact increased the salience of group memberships, as well as perceived group typicality and differences, this effect was mitigated for individuals with a prior history of high-quality positive intergroup contact (e.g., friendships). Relatedly, intimacy and closeness in intergroup contact were discovered to counteract the detrimental effects of negative intergroup experiences on attitudes toward the outgroup in previous research (Fuochi et al. 2020; Graf et al. 2020).

These insights from intergroup contact research, as well as the general conflict-resolving and empathy-strengthening capacities of friendships (e.g., Nelson and Aboud 1985; de Wied et al. 2007; see also Chapter 5.2.1.2.3) and Kroneberg's (2022) argument, suggest that when

exogenous outbreaks of intergroup conflict occur at broader societal levels, school grades characterised by a lack of intergroup friendships may be more vulnerable to experiencing deteriorating intergroup relations and inter-ethnic violence based on outgroup hostility, compared to school grades where social cohesion was high and ethnic heterophobia was low prior to such events.

These considerations point to school grade network characteristics as potential scope conditions for understanding when exogenous conflicts affect adolescent intergroup relations. To explore whether exogenous events have a transformative potential on social relations of adolescents and whether specific network characteristics of school grades render some school grades more vulnerable than others, future research should use panel data to trace before-and after impacts and compare school grade contexts with varying pre-existing levels of ethnic segregation in friendships and ethnic heterophobia.

5.3 Practical implications

5.3.1 Integration in action: Monitoring and understanding inter-ethnic violence and dislike relations in schools

There are several practical implications to be drawn from this dissertation's findings. The evidence from Study 1 implies that practitioners, parents, and students should be careful not to misinterpret incidences of physical violence between pupils of different ethnic origins as indicators of unsuccessful integration efforts or ethnic tensions and conflicts within their student body. In schools where ethnic homophily in friendship networks is low, incidents of inter-ethnic violence are more likely to occur, as friendships span across ethnic groups. Study 1 implies that, in these schools, physical fighting occurs between students from different ethnic backgrounds, in part, due to friendships, as exposure and social closeness make violent interactions more likely. Unlike inter-ethnic violence, Study 1 indicates that inter-ethnic dislike is not an indicator of social integration, but social distance between members of different ethnic groups. Dislike, typically associated with avoidance, often means limited interaction and is rather opposed to relations characterised by positive sentiments, such as friendships. Thus, in schools with ethnically segregated friendship networks, dislike tends to occur between members of different ethnic groups. However, this does not automatically suggest hostility between ethnic groups. Against these insights, it is vital to cautiously assess the nature of inter-ethnic violence and dislike, especially amid external ethnic conflicts and polarisations at the societal level. Occasional inter-ethnic violence as part of inter-ethnic friendship and social closeness should be differentiated from violence which results from outgroup hostility. The

underlying motivations are markedly different in each case. Practitioners witnessing inter-ethnic violence among their students should consider that such incidents might signal successful integration, as they tend to happen in environments with more interaction between ethnic groups.

In order to avoid misinterpretation, while also monitoring a school's social resilience to external shocks and potential ethnic polarisations, schools could regularly collect network data with school-based surveys (Kroneberg 2022). The sociometric questions about peer relations could be complemented with additional questions about the context and motivations of these relations and interactions – for example, items asking victims and perpetrators about the situational characteristics and perceived reasons behind violent incidents. Schools can better gauge their social climate by understanding the degree of social integration within the student body and assessing the frequency and perceived quality of inter-ethnic violence and dislike sentiments. This knowledge allows them to avoid overreacting to situational incidents of inter-ethnic violence, while also being prepared to address violence related to *ethnic* aspects and, potentially, ethnic conflict, adequately. A comprehensive understanding of the social landscape could help schools to effectively manage and respond to incidents or trends that may impact their students' safety and wellbeing.

5.3.2 Schools as organisational contexts of socialisation and integration processes

Promoting social integration in schools by encouraging positive intergroup relations among students is valuable. Positive intergroup relations lower outgroup prejudice and improve intergroup attitudes of youth (e.g., Tropp et al. 2022), promote the structural integration of minority youth (e.g., Kornienko and Rivas-Drake 2022; Lorenz et al. 2021) and could enhance schools' resilience to external outbreaks of ethnic conflict and polarisation (Kroneberg 2022).

Schools are shared interaction spaces that provide opportunities to meet and engage with outgroup members. Beyond mere exposure in classrooms and schoolyards, they can offer structured, task- or interest-driven interaction spaces, where students of different backgrounds are brought into relationship with each other through a shared focus and activities (e.g., Feld 1981; Wimmer and Lewis 2010), for example, through setting up peer collaboration tasks in class and encouraging participation in extracurricular activities. Schools are active creators of intergroup interaction and learning environments that facilitate integration (Juvonen 2018; Trinidad 2024). The mechanisms identified in this dissertation indicate several ways in which schools can further strengthen this role. The findings from the three studies point to practical

implications for how schools can enhance their integrative potential and efforts, which I will outline below.

Studies 2 and 3 suggest that cultural factors, like ethnic and religious group norms, shape integration processes and, to some extent, pose hindrances and challenges to social integration and mental wellbeing. Study 3, for instance, reveals specific challenges in social integration for Muslim girls. As adolescence progresses, their tendency to predominantly be friends with other Muslim peers increases sharply compared to Muslim boys. This is partly due to gendered aspects of Muslim endogamy and chastity norms that more strongly apply to girls. The study identified two out-of-school factors through which these religious norms limit Muslim girls' interreligious friendships: stronger control of friendships by parents and lower participation in leisure time activities with outgroup contact compared to Muslim boys during adolescence. Importantly, school-based practices, as well as organisational and instructional strategies, could mitigate the influence of both factors.

5.3.2.1 Create task- and interest-driven interaction spaces in the school

Schools as organisational contexts have the possibility to counterbalance these out-of-school constraints on intergroup friendships. Leveraging the potential of task- or interest-driven in-school activities is one important avenue to achieve this goal. Such activities include topic-specific partner- or groupwork in class, collaborative homework in peer groups, and extracurricular activities and projects. Organised interaction spaces where Muslim and non-Muslim students regularly meet in small groups for joint activities – based on shared interests or tasks – are likely more effective for fostering interreligious friendships than simply meeting outgroup members in broader, less structured settings like school classes or grades. Previous research (e.g., Frank, Muller, and Mueller 2013; Small and Adler 2019; Wimmer 2013) has identified physical proximity, shared interests and social 'foci' (Feld 1981) through which individuals regularly participate in joint activities as important mechanisms that encourage relationship formation between two individuals. Additional support comes from social psychological research, which suggests that the optimal interaction conditions to foster positive intergroup relations require: equal status and cooperation between groups; groups working together towards common goals; and support for such intergroup contact by institutional authorities, norms, or customs (Allport 1954; see Tropp et al. 2022 for a recent literature review on optimal conditions for intergroup contact among youth). Thereby, cooperation should involve some degree of positive interdependence, where individuals must work together and rely on each other to achieve common goals (e.g., Johnson and Johnson 2009). Against this

background, scholars have advocated for implementing cooperative interdependence in diverse school settings, such as group-based learning activities, to improve intergroup attitudes and relations among students (Juvonen 2018; Tropp et al. 2022:343–44; Tropp and Saxena 2018).

Moreover, such task- and interest-based activities might further mitigate constraints on interreligious relationships, as they may promote *weaker positive interreligious relationships* than friendships, such as school-based collaborative relationships, which should be less strongly regulated by religious norms that target intimate relationships. Empirical evidence from intervention studies in educational settings has shown that cooperative learning fosters not only greater academic achievement, but also positive intergroup attitudes and peer relations – overall, and among students of diverse groups (e.g., Hanish et al. 2023; van Ryzin and Roseth 2018; Veldman et al. 2024; for meta-analytic evidence, see Roseth, Johnson, and Johnson 2008; Paluck and Green 2009). Since these interactions centre around specific tasks or activities, they could be perceived as being less likely to lead to romantic relationships compared to more intimate relationships, such as friendships. Consequently, parents and adolescents should be less inclined to monitor or constrain these weaker and task-based interreligious relationships. Furthermore, considering the high academic aspirations of many Muslim parents (Neumeyer et al. 2022; Salikutluk 2016), they might be more open to interreligious interactions that revolve around school performance. In addition, these weaker intergroup relationships could equally facilitate access to integration resources such as instrumental academic support, information, or educational motivations – benefits typically attributed to friendships with majority-group peers (e.g., Kornienko and Rivas-Drake 2022; Lorenz et al. 2021; Wölfer, Caro, and Hewstone 2019). Furthermore, these weaker relationships may still develop into friendships over time, as recent social network studies have reported that helping relationships between students, for example regarding academic issues, promote the formation of friendships (e.g., van Rijsewijk et al. 2020; Shin 2023).

5.3.2.2 Leverage intersectionality and navigate the gender and religious composition of interaction spaces in school

Previous literature indicates that positive intergroup contact is enhanced when students share the same sex. For example, Hooijsma et al. (2021) demonstrated that elementary students were more likely to defend ethnic outgroup peers against bullying if they had the same sex as the victimised peer. This insight could be essential for promoting interreligious friendships among Muslims, especially since religious norms limiting close interreligious contact primarily focus on restricting cross-gender interactions. In addition, the findings of a recent study by Kroneberg

et al. (2021) imply that the gender and religious composition of interaction contexts may play a significant role in interreligious friendship formation. The study found that inter-ethnic friendships among secondary school students were less likely in classes where classmates of different ethnic origins were also predominantly of the opposite sex. These previous research findings point to strategic approaches to encourage interreligious friendships among Muslim *girls*. First, school administrators should avoid classroom compositions where non-Muslim classmates are predominantly male when assigning Muslim female students (for a similar suggestion with focus on ethnicity, see Kroneberg 2022, Kroneberg et al. 2021). Second, creating all-female interaction spaces could enable Muslim girls to engage in positive interreligious interactions without violating religious norms. Because religious norms primarily focus on interreligious romantic relationships with *men*, same-gender interreligious friendships and single-sex activities should face fewer constraints from parents and adolescents themselves. For example, offering same-sex sports teams and encouraging teachers to consider the gender and religious composition when assigning Muslim girls to group work in class could be practical applications of these insights in the school environment.

5.3.2.3 *Diversify interaction spaces in school*

The provision of diverse, interest-based interaction spaces within schools could help mitigate the adverse mental health aspects of inter-ethnic brokerage identified in Study 2. Previous research suggests that inter-ethnic brokerage of close contacts should be particularly stressful in settings where the broker and the brokered friends *share* one interaction context, like a school classroom. Krackhardt (1999:207) has argued that the observability of the broker's behaviour is a relevant additional determinant of the strain experienced by individuals in brokerage positions, beyond the stress arising from internal and external pressures through deviating, and at times conflicting, norms and behavioural expectations from friends. In shared interaction spaces, brokers must navigate their friends' different norms and expectations, while any deviation from one friend's expectations is difficult to hide and easily noticed by the other friend. However, it may reduce their internal and external conflicts when inter-ethnic brokers can meet and interact with each of their friends in separate settings, for example, in different school subjects, extracurricular activities, or clubs. Offering multiple, distinct interaction contexts within the school environment would allow brokers to manage their diverse friendships with less stress, as it would enable them to address their friends' diverging demands at different times and in different spaces.

Individuals in a brokerage position tend to resemble their unconnected, dissimilar friends differently (Small 2017:154). As a slightly stereotypical example, consider a student broker who shares her religious affiliation and religiosity with a Turkish Muslim friend while sharing her love for soccer with a German non-Muslim friend. Chances are, these two friends have little in common and would not typically be friends with each other. The Muslim friend limits her exposure to non-Muslim peers and avoids playing soccer to adhere to religious norms about endogamy and modesty. In contrast, the non-Muslim friend is less suited as a partner for discussing or practising Islam. By offering a variety of interest-based activities and separate interaction spaces, schools could help brokers express their individual traits and pursue their interests with their dissimilar friends at different times and places. This diversification of interaction spaces could alleviate the strains of inter-ethnic brokerage by reducing the risk of internal cross-pressure or external conflict caused by friends' conflicting expectations. Such supportive circumstances for brokers with dissimilar friends might give rise to some of the positive features typically linked to brokerage in adult research, potentially promoting personal development through autonomy and enhanced access to valuable information and resources (e.g., Burt 2005; Stovel and Shaw 2012).⁴⁸

5.3.2.4 Identify and support students in key positions of integration processes via school-based network interventions

School-based intervention programs that foster the skills and competencies needed to navigate cultural differences could benefit students in inter-ethnic brokerage positions. The network perspective adopted in Study 2 allows for the structural identification of students who occupy key network positions within the social fabric of multi-ethnic schools – those students who occupy brokerage positions between friends of different ethnic origins. However, this position was also related to lower mental wellbeing in Study 2.

While Leszczensky and Stark (2020:243) have pointed out network interventions (Valente 2012) as means to promote inter-group contact and positive intergroup relations, they describe

⁴⁸ Despite these specific arguments for diversifying interaction contexts in the school environment, on the one hand, it should be noted that, on the other hand, it is well-documented that shared interaction contexts generally promote relationship formation and increase the likelihood that a broker's friends will get to know each other and become friends (Mollenhorst, Völker, and Flap 2011; Small 2017:155). Consequently, shared interaction contexts are still crucial for social integration, emphasising the need to maintain broader interaction spaces alongside offering spatially and interest-based compartmentalised interaction spaces in school.

the limited knowledge about whom to select as participants as a central challenge to developing effective interventions. The findings of Study 2 alleviate this knowledge gap, pointing to inter-ethnic brokers as potential participants in school-based network interventions. These interventions could aim to enhance the coping skills and competencies of inter-ethnic brokers, such as cultural competence (Barrett 2018) or perspective-taking (e.g., Hewstone 2009). This would enable them to manage cultural differences, discrepancies, and potentially conflicts in their friendship network more effectively. Yet, such competencies could not only mitigate their mental health risks as inter-ethnic brokers by enhancing their ability to cope with the associated strains. They might also encourage them to act as catalysts (Stovel and Shaw 2012:146), promoting positive interactions among their disconnected friends from different ethnic backgrounds and thereby facilitating friendships among them. On a broader scale, beyond the personal benefits that inter-ethnic brokers might gain by serving as connectors within their immediate friendship circles, they may also contribute to closing ethnic divides within the wider school friendship network (see Stovel and Shaw (2012) for a general argument on the macro-structural effects of brokerage). This highlights the potential of inter-ethnic brokers as a valuable target for intervention programmes aiming to promote social integration and cohesion.

5.4 Conclusionary remarks

This dissertation integrates insights and methodologies from sociology and social psychology, integration research, network science, and research on adolescence. It turns the spotlight on the social and cultural dimensions of integration and their interplay, whereas previous integration research has primarily focused on structural integration. It combines social network and ecological perspectives, comprehensive data from three large-scale network surveys in German secondary schools, and advanced analytical methods in all three studies. This approach enabled each study to advance knowledge on different aspects of the interplay between culture and peer relations of adolescents, and its role in integration.

More precisely, the outcomes of Studies 2 and 3 suggest that cultural aspects related to ethnic and religious group norms pose – to some extent – challenges and barriers to social integration: Occupying a brokerage position between friends with different ethnic backgrounds was associated with lower mental wellbeing among adolescents (Study 2). Additionally, gendered religious norms contributed through various sociocultural pathways to the emergence of stronger ingroup bias in friendship among Muslim girls than Muslim boys during adolescence (Study 3). At the same time, the findings of Study 1 refute alarmist notions that culture shapes

peer relations in ways that indicate or promote frictions between students of different ethnic backgrounds. Although schools characterised by stronger ethnic homophily in friendships revealed a greater relative prevalence of *inter*-ethnic dislike, violent interactions tended to be more strongly concentrated *within* ethnic group boundaries in such school contexts.

A broader insight emerging across these studies, which I would like to point out here, refers to the complex and ambivalent role of friendship in the interplay between social and cultural dimensions of integration. Previous integration research focusing on intergroup friendships has primarily emphasised their positive features. However, this dissertation's findings call for a more nuanced perspective on intergroup friendship and its role in integration.

Friendship, as a strong and positive affective relationship, is characterised by emotional closeness and boundedness toward another person. It involves social role obligations and behavioural expectations, as well as frequent exposure and interaction, as friends spend time together (e.g., Bukowski et al. 2009). These features carry specific implications for the interplay between the cultural and social dimensions of integration and introduce complexity to integration processes. Each study reveals different aspects of this complexity: Study 2 demonstrates that the structure of inter-ethnic friendships creates important conditions that can introduce overdemanding tensions and relational complexity for individuals. When individuals bridge cultural differences *and* a social cleavage between their friends – to both of whom they are bound emotionally and by role obligations – this can introduce cross-pressures and psychological strain and ultimately lead to lower mental wellbeing. Study 3 indicates the need to reflect on the role attributed to intergroup friendships in the social integration of Muslim youth, particularly as they enter adolescence. Friendship generally has characteristics that promote the development of intimacy and romantic relationships in adolescence. Consequently, interreligious friendships can pose a threat to compliance with endogamy and chastity norms, thereby complicating Muslim youths' social integration, especially for Muslim girls. Moreover, Study 1 points to an aspect typically not considered in integration research that focuses on intergroup friendships: friendship, characterised by social closeness and exposure, creates opportunities and motives (e.g., status struggles) for physical fighting between individuals. In consequence, inter-ethnic friendship increases the chances of observing (inter-ethnic) violent interaction between friends. These insights reveal specific mechanisms and conditions that comprehensive integration analyses must consider when examining intergroup friendships, including their structural characteristics, their relatedness to external group norms, and their interplay with other relationship types. However, this dissertation

refrains from categorising the found mechanisms into bright or dark sides of integration. As highlighted in the limitations and future directions chapter (Chapter 5.2), future research is needed to assess the implications of these mechanisms for integration, including qualitative and longitudinal studies and the exploration of scope conditions.

This dissertation acknowledges the established benefits of inter-group friendships, which are an essential part of successful integration processes in multi-ethnic societies. At the same time, it draws attention to the complexities and liabilities of inter-group friendship. Its findings suggest that intergroup friendship is not a one-size-fits-all mechanism or panacea for successful integration, as it complicates integration for Muslim adolescents and does not exclusively entail positive aspects, as it may result in lower mental wellbeing or increase chances for physical violence between adolescents of different ethnicities. In sum, this dissertation highlights the need for more nuanced theoretical conceptualisations and methodological assessments of intergroup friendships and their role in the integration of adolescents of different ethnic and religious backgrounds.

In light of these considerations, integration research may direct its focus towards the exploration of weaker types of intergroup relationships that could support integration without carrying the complexities of friendships, such as school-based collaborative relationships, as discussed in the practical implications section (Chapter 5.3). Simultaneously, future integration research may generally need to engage more deeply with the meaning of friendship for adolescents and how it may influence integration processes. Recent qualitative research by Kitts and Leal (2021) showed that adolescents understand friendship as composed primarily of relational norms and expectations for mutual behaviour, such as defending each other against harm or keeping each other's secrets. Notably, the specific norms and expectations associated with friendship varied significantly by gender. In the context of this dissertation, Kitts and Leal's (2021) study raises an important question for integration research: whether friendship meanings also differ systematically across ethno-religious groups, potentially in intersection with gender, and how such differences may influence the integration of different ethno-religious groups.

To conclude, this dissertation demonstrates how a social network perspective enables significant advances in integration research by leveraging complete social network data and analytical methods. Moreover, the studies underscore how a relational lens on integration processes – considering the nature and structure of interpersonal relations – allows researchers

to approach social phenomena differently than previous research. Combined with an ecological perspective that situates social integration in school within a broader cultural and contextual framework, this dissertation identified and addressed specific knowledge gaps in previous research, challenged existing assumptions, and developed new explanatory mechanisms for understanding the interplay between social and cultural dimensions of integration. Through its combination of data, methods and analytical approaches, it was able to rigorously test these mechanisms empirically. The resulting findings yield new methodological and substantive insights into the interplay between cultural and social dimensions of adolescents' integration in school. As the chapter on critical reflections and future research shows, this dissertation's approach involves several theoretical and methodological limitations, which nevertheless also point to promising directions for future research with considerable potential to advance our understanding of integration processes. Moreover, the chapter on practical implications demonstrates how the insights gained can contribute to the design of school practices that facilitate integration in ethno-religiously diverse schools, and encourage the use of school-based social network research as a tool for understanding integration processes on site.

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Appendices

Appendix Chapter 2 (Study 1)

Table A1. Descriptive information on network characteristics.

	Density	Degrees per actor	Out-degrees per actor	Share reciprocity	Number isolates	Percentage isolates
Friendship	0.073 (0.05)	6.67 (1.13)	3.33 (0.57)	0.59 (0.06)	0.82 (1.14)	0.02 (0.03)
Dislike	0.08 (0.06)	6.83 (1.68)	3.41 (0.84)	0.22 (0.08)	2.77 (2.40)	0.04 (0.03)
Violence	0.026 (0.025)	2.10 (0.79)	1.05 (0.40)	0.28 (0.09)	25.9 (17.78)	0.37 (0.14)
Spare time	0.067 (0.04)	7.43 (5.36)	3.87 (2.93)	0.58 (0.10)	2.31 (2.01)	0.05 (0.055)

Note: We report the mean; standard errors in parentheses. $N_{\text{Networks}} = 39$ per tie type

Table A2: Multivariate meta-analysis of friendship networks with measure for parameter heterogeneity.

	M1		
	beta	s.e.	Q
Edges	-5.78***	0.06	151.69***
Mutual	2.37***	0.05	71.89***
GWODEG	1.21***	0.12	55.34**
GWIDEG	0.47***	0.07	56.38**
GWESP	0.81***	0.01	87.78***
Same class	1.15***	0.03	349.72***
Same neighborhood	0.26***	0.03	38.513
Activity female	0.03	0.05	56.38**
Popularity female	-0.06	0.08	53.94**
Same sex	0.94***	0.03	58.83**
Same ethnic	0.30***	0.02	78.49***
AIC	611.80		
N	32		

Note: *beta* denotes the averaged ERGM coefficient weighted by the variance-covariance matrix of all parameters estimated per model specification with a multivariate fixed-effects meta-analysis (An 2015); s.e. reports the standard error associated with this averaged ERGM coefficient; Q reports the statistic of the Cochran Q-test, which tests whether the variance of the true beta equals zero (see, e.g., Snijders and Baerveldt 2003). † $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-sided).

Table A3: Multivariate meta-analysis of dislike networks with measure for parameter heterogeneity.

	M1			M2		
	beta	s.e.	Q	beta	s.e.	Q
Edges	-0.24*	0.11	112.20***	-1.45***	0.14	170.42***
Non-receivers	-0.76***	0.12	35.03	-0.73***	0.12	33.44
Non-senders	-1.07***	0.18	28.20	-1.10***	0.18	28.26
Mutual	1.35***	0.05	59.66***	1.27***	0.05	69.70***
GWODEG	-5.57***	0.23	57.49***	-5.53***	0.23	59.14***
GWIDEG	-1.90***	0.10	72.73***	-1.86***	0.10	63.07***
GW incoming non-edgewise shared partners	-0.19***	0.01	84.95***	-0.20***	0.01	88.37***
GW transitive non-edgewise shared partners	-0.08***	0.004	83.87***	-0.07***	0.005	77.12***
Same class	1.54***	0.04	195.78***	1.77***	0.04	216.25***
Same neighborhood	-0.12**	0.05	27.82	-0.07	0.05	25.75
Activity female	0.14***	0.03	43.50*	0.14***	0.03	38.99†
Popularity female	-0.23***	0.04	35.15	-0.23***	0.04	32.63
Same sex	0.03	0.03	63.96***	0.19***	0.03	62.81***
Same ethnic	-0.11***	0.03	44.53*	-0.10**	0.03	44.26*
Violence entrainment	1.00***	0.06	47.71*	1.11***	0.07	46.28*
Shortest path				0.38***	0.03	138.50***
Shortest path squared				-0.03***	0.002	159.91***
AIC	806.55			728.62		
N	29			29		

Note: *beta* denotes the averaged ERGM coefficient weighted by the variance-covariance matrix of all parameters estimated per model specification with a multivariate fixed-effects meta-analysis (An 2015); s.e. reports the standard error associated with this averaged ERGM coefficient; Q reports the statistic of the Cochran Q-test, which tests whether the variance of the true beta equals zero (see, e.g., Snijders and Baerveldt 2003). † $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-sided).

Table A4: Multivariate meta-analysis of violence networks with measure for parameter heterogeneity.

	M1			M2		
	beta	s.e.	Q	beta	s.e.	Q
Edges	-2.54***	0.12	156.79***	-1.03***	0.15	134.37***
Non-receivers	0.27†	0.15	17.44	0.25†	0.15	17.43
Non-senders	-0.19	0.19	25.13	-0.12	0.19	26.61
Mutual	2.41***	0.08	53.90***	2.32***	0.08	55.81***
GWODEG	-2.05***	0.25	25.15	-1.89***	0.26	26.49
GWIDEG	-1.84***	0.16	20.12	-1.84***	0.16	19.17
Same class	1.57***	0.06	288.75***	1.25***	0.06	229.04***
Same neighborhood	-0.08	0.05	40.42**	-0.08	0.05	38.92**
Activity female	-0.41***	0.04	45.50***	-0.41***	0.04	47.31***
Popularity female	0.21**	0.07	33.97*	0.27***	0.07	35.18*
Same sex	0.07	0.04	49.80***	-0.30***	0.05	38.06**
Same ethnic	0.16***	0.04	30.80†	0.08*	0.04	29.78†
Dislike entrainment	0.98***	0.05	50.45***	1.29***	0.06	46.36***
Shortest path				-0.62***	0.04	51.02***
Shortest path squared				0.05***	0.004	47.89***
Spare time entrainment				0.34***	0.06	47.36***
AIC	1012.63			845.99		
N	21			21		

Note: *beta* denotes the averaged ERGM coefficient weighted by the variance-covariance matrix of all parameters estimated per model specification with a multivariate fixed-effects meta-analysis (An 2015); s.e. reports the standard error associated with this averaged ERGM coefficient; Q reports the statistic of the Cochran Q-test, which tests whether the variance of the true beta equals zero (see, e.g., Snijders and Baerveldt 2003). † $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-sided).

Appendices Chapter 3 (Study 2)

Appendix A. Robustness analyses where school grades with a participation rate below 70% are excluded from the analysis sample.

Excluding those school grades with a participation rate lower than 70% decreases the analysis sample size by 600 (N= 2,157). All substantive conclusions regarding the hypotheses remain the same (Table A1, Model 1- Model 3).

Also, the subsample analyses for minority and majority students yield substantively the same results, with the following exception: for minority students, the negative association of biased inter-ethnic brokerage with mental wellbeing is similar in effect size to that in the main analyses but now only at the brink of statistical significance ($b = -0.015$, $p = 0.102$), Table A2, Model 3b). Testing for differences between minority and majority students, the interaction effect between biased inter-ethnic brokerage and minority status is now significant ($b = 0.020$, $p = 0.068$, Table A3, Model 2).

This deviation could be due to the lower number of cases in the reduced analysis sample, particularly in the subsample analysis. It could also be related to the selectivity of the reduced analysis sample, as the school grades that have been excluded are mainly lower track schools and school grades with low majority shares, such that the resulting analysis sample for the robustness check is characterized by a higher share of upper secondary schools (Gymnasiums) and fewer school grades with low majority share.

Table A1. Results of linear regression analysis with mental wellbeing as dependent variable (cluster-robust standard errors at school grade level); School grades with a participation rate below 70% are excluded (N=2157)

	Model 1		Model 2		Model 3	
	β	P-values	β	P-values	β	P-values
<u>Person characteristics:</u>						
Gender (ref.: boy)	-0.395***	(0.000)	-0.393***	(0.000)	-0.393***	(0.000)
Educational background (ref.: Hauptschule)						
Gymnasium	0.012	(0.886)	0.025	(0.757)	0.026	(0.750)
Realschule	-0.021	(0.826)	-0.012	(0.898)	-0.010	(0.917)
Gesamtschule	-0.111	(0.189)	-0.098	(0.234)	-0.099	(0.231)
Generational Status (ref.: native)						
1st gen.	-0.153**	(0.009)	-0.184**	(0.003)	-0.182**	(0.004)
2nd gen.	-0.032	(0.558)	-0.061	(0.295)	-0.060	(0.304)
2nd gen. inter-ethnic	-0.010	(0.879)	-0.043	(0.483)	-0.043	(0.480)
<u>Friendship network characteristics:</u>						
Number of friends	0.081***	(0.000)	0.072***	(0.000)	0.069***	(0.000)
Number of friends with diff. ethnic origin	-0.020	(0.118)	-0.004	(0.739)	0.001	(0.960)
<u>Brokerage:</u>						
Number opentriads	-0.019***	(0.000)				
<u>Intra- and inter-ethnic brokerage:</u>						
Number intra-ethnic opentriads			-0.006	(0.264)	-0.006	(0.271)
Number inter-ethnic opentriads			-0.025***	(0.000)		
<u>Biased/unbiased inter-ethnic brokerage:</u>						
Number biased inter-ethnic open triads					-0.022***	(0.000)
Number unbiased inter-ethnic open triads					-0.027***	(0.000)
<u>School grade characteristics:</u>						
Total number of students	0.001	(0.276)	0.001	(0.353)	0.001	(0.338)
% majority students	0.046	(0.727)	-0.052	(0.706)	-0.048	(0.728)
Constant	3.419***	(0.000)	3.477***	(0.000)	3.471***	(0.000)
R ²	0.078		0.081		0.081	
N	2,157		2,157		2,157	

Note: p-values in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Table A2. Results of linear regression analysis with mental wellbeing as dependent variable (cluster-robust standard errors at school grade level); School grades with a participation rate below 70% are excluded (N_{Majority students}=1,018, N_{Minority Students}=1,139).

	Model 1a:		Model 1b:		Model 2a:		Model 2b:		Model 3a:		Model 3b:	
	Majority students		Minority students		Majority students		Minority students		Majority students		Minority students	
	β	p-values	β	p-values	β	p-values	β	p-values	β	p-values	β	P-values
<u>Person characteristics:</u>												
Gender (ref.: boy)	-0.315***	(0.000)	-0.474***	(0.000)	-0.310***	(0.000)	-0.475***	(0.000)	-0.310***	(0.000)	-0.475***	(0.000)
Educational background (ref.: Hauptschule)												
Gymnasium	0.123	(0.176)	-0.080	(0.441)	0.154 ⁺	(0.099)	-0.051	(0.603)	0.156 ⁺	(0.093)	-0.046	(0.637)
Realschule	0.101	(0.364)	-0.096	(0.361)	0.118	(0.285)	-0.078	(0.450)	0.119	(0.283)	-0.072	(0.492)
Gesamtschule	-0.060	(0.555)	-0.160	(0.117)	-0.034	(0.733)	-0.125	(0.188)	-0.032	(0.752)	-0.122	(0.199)
Generational status (ref.: 2 nd gen. inter-ethnic)												
1 st gen.			-0.143	(0.105)			-0.140	(0.106)			-0.138	(0.112)
2 nd gen.			-0.021	(0.786)			-0.019	(0.809)			-0.018	(0.815)
<u>Friendship network characteristics:</u>												
Number of friends	0.083***	(0.001)	0.087**	(0.002)	0.065*	(0.011)	0.088**	(0.001)	0.067*	(0.011)	0.072**	(0.004)
Number of friends with diff. ethnic origin	-0.020	(0.336)	-0.035	(0.135)	0.019	(0.563)	-0.033	(0.146)	0.016	(0.630)	-0.015	(0.539)
<u>Brokerage:</u>												
Number opentriads	-0.021***	(0.000)	-0.016**	(0.001)								
<u>Intra- and inter-ethnic brokerage:</u>												
Number intra-ethnic open triads					-0.006	(0.487)	0.006	(0.451)	-0.006	(0.496)	0.005	(0.466)
Number inter-ethnic open triads					-0.029***	(0.000)	-0.023***	(0.000)				

(Table continued on next page)

	Model 1a:		Model 1b:		Model 2a:		Model 2b:		Model 3a:		Model 3b:	
	Majority students		Minority students		Majority students		Minority students		Majority students		Minority students	
	β	p-values	β	p-values	β	p-values	β	p-values	β	p-values	β	P-values
<u>Biased/unbiased inter-ethnic brokerage:</u>												
Number biased inter-ethnic open triads									-0.031 ^{***}	(0.000)	-0.015	(0.102)
Number unbiased inter-ethnic open triads									-0.026 [*]	(0.035)	-0.025 ^{***}	(0.000)
<u>School grade characteristics:</u>												
Total number of students	0.000	(0.947)	0.002 ⁺	(0.084)	0.000	(0.784)	0.002	(0.105)	0.000	(0.763)	0.002	(0.103)
% majority students	-0.021	(0.930)	0.113	(0.363)	0.015	(0.949)	-0.066	(0.615)	0.018	(0.941)	-0.071	(0.584)
Constant	3.406 ^{***}	(0.000)	3.381 ^{***}	(0.000)	3.379 ^{***}	(0.000)	3.440 ^{***}	(0.000)	3.378 ^{***}	(0.000)	3.438 ^{***}	(0.000)
R ²	0.060		0.088		0.063		0.093		0.063		0.094	
N	1,018		1,139		1,018		1,139		1,018		1,139	

Note: p-values in parentheses; ⁺ p < 0.10, ^{*} p < 0.05, ^{**} p < 0.01, ^{***} p < 0.001

Table A3. Results of linear regression analyses with wellbeing as dependent variable and interaction effects between minority status and (biased/unbiased) inter-ethnic brokerage (cluster-robust standard errors at school grade level); School grades with a participation rate below 70% are excluded (N=2157)

	Model 1		Model 2		Model 3	
	β	p-values	β	p-values	β	p-values
<u>Person characteristics:</u>						
Gender (ref.: boy)	-0.390***	(0.000)	-0.389***	(0.000)	-0.390***	(0.000)
<u>Educational background (ref.: Hauptschule)</u>						
Gymnasium	0.046	(0.582)	0.056	(0.501)	0.044	(0.582)
Realschule	0.003	(0.971)	0.012	(0.897)	0.007	(0.944)
Gesamtschule	-0.081	(0.337)	-0.077	(0.365)	-0.084	(0.311)
Minority status (ref.: majority status)	-0.105*	(0.038)	-0.148**	(0.004)	-0.078	(0.141)
<u>Friendship network characteristics:</u>						
Number of friends	0.073***	(0.000)	0.064***	(0.001)	0.069***	(0.000)
Number of friends with diff. ethnic origin	-0.005	(0.700)	0.009	(0.514)	0.002	(0.898)
<u>Brokerage:</u>						
Number of open triads						
<u>Intra- and inter-ethnic brokerage:</u>						
Number of intra-ethnic open triads	-0.006	(0.271)	-0.004	(0.483)	-0.006	(0.281)
Number of inter-ethnic open triads	-0.027***	(0.000)				
<u>Biased/unbiased inter-ethnic brokerage:</u>						
Number of biased inter-ethnic open triads			-0.029***	(0.000)	-0.022***	(0.000)
Number of unbiased inter-ethnic opentriads			-0.028***	(0.000)	-0.027**	(0.005)
Minority status x number of inter-ethnic open triads	0.004	(0.347)				
Minority status x number of biased inter-ethnic open triads			0.020 ⁺	(0.068)		
Minority status x number of unbiased inter-ethnic open triads					-0.001	(0.942)
<u>School grade characteristics:</u>						
Total number of students	0.001	(0.352)	0.001	(0.339)	0.001	(0.322)
% majority students	-0.032	(0.806)	-0.016	(0.900)	-0.022	(0.869)
Constant	3.456***	(0.000)	3.461***	(0.000)	3.433***	(0.000)
R ²	0.079		0.081		0.079	
N	2,157		2,157		2,157	

Note: p-values in parentheses; ⁺ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Appendix B. Full list of ethnic origins in the analysis sample

Table B1: Consecutively numbered, full list of ethnic origins in the analysis sample, with frequencies and percentages of students categorized into each group.

Consecutive numbering	Ethnic origin	Frequency	Percent
1	Germany	1,226	44.47
2	Turkey	321	11.64
3	Poland	147	5.33
4	Russia	112	4.06
5	Morocco	77	2.79
6	Italy	59	2.14
7	Iraq	56	2.03
8	Kosovo	55	1.99
9	Romania	46	1.67
10	Syria	39	1.41
11	Kazakhstan	30	1.09
12	Afghanistan	29	1.05
13	Bosnia and Herzegovina	26	0.94
14	Iran	24	0.87
15	Bulgaria	19	0.69
16	Greece	19	0.69
17	Ukraine	19	0.69
18	Kurdistan	17	0.62
19	Lebanon	17	0.62
20	Netherlands	17	0.62
21	Serbia and Montenegro	17	0.62
22	Congo	15	0.54
23	Spain	14	0.51
24	India	13	0.47
25	Albania	11	0.40
26	Portugal	11	0.40
27	Tunisia	11	0.40
28	Austria	11	0.40
29	Sri Lanka	10	0.36
30	USA	10	0.36
31	Hungary	10	0.36
32	France	9	0.33
33	Croatia	9	0.33
34	Macedonia	9	0.33

(Table continued on next page)

Consecutive numbering	Ethnic origin	Frequency	Percent
35	Nigeria	9	0.33
36	Pakistan	9	0.33
37	Vietnam	9	0.33
38	Brazil	8	0.29
39	Kyrgyzstan	8	0.29
40	Togo	8	0.29
41	Belgium	7	0.25
42	China	7	0.25
43	Serbia	7	0.25
44	Slovakia	7	0.25
45	Africa	6	0.22
46	Eritrea	6	0.22
47	Cameroon	6	0.22
48	Switzerland	6	0.22
49	Czech Republic	6	0.22
50	Dominica	5	0.18
51	Ghana	5	0.18
52	Peru	5	0.18
53	Algeria	4	0.15
54	Argentina	4	0.15
55	Azerbaijan	4	0.15
56	Ivory Coast	4	0.15
57	England	4	0.15
58	Cuba	4	0.15
59	Mexico	4	0.15
60	Thailand	4	0.15
61	Angola	3	0.11
62	Armenia	3	0.11
63	Chile	3	0.11
64	Georgia	3	0.11
65	Libya	3	0.11
66	Philippines	3	0.11
67	Senegal	3	0.11
68	Venezuela	3	0.11
69	Egypt	3	0.11
70	Ethiopia	3	0.11
71	Burkina Faso	2	0.07
72	Ecuador	2	0.07
73	Finland	2	0.07

(Table continued on next page)

Consecutive numbering	Ethnic origin	Frequency	Percent
74	Israel	2	0.07
75	Yemen	2	0.07
76	Kenya	2	0.07
77	Colombia	2	0.07
78	Korea	2	0.07
79	Latvia	2	0.07
80	Rwanda	2	0.07
81	Sweden	2	0.07
82	Somalia	2	0.07
83	South Africa	2	0.07
84	South Korea	2	0.07
85	Australia	1	0.04
86	Bangladesh	1	0.04
87	Brunei Darussalam	1	0.04
88	Burundi	1	0.04
89	Democratic Republic of the Congo	1	0.04
90	Dominican Republic	1	0.04
91	Denmark	1	0.04
92	Gambia	1	0.04
93	Heard and McDonald Islands	1	0.04
94	Ireland	1	0.04
95	Jamaica	1	0.04
96	Jordan	1	0.04
97	Cambodia	1	0.04
98	Canada	1	0.04
99	Laos	1	0.04
100	Lithuania	1	0.04
101	Maldives	1	0.04
102	Micronesia	1	0.04
103	Northern Iraq	1	0.04
104	Norway	1	0.04
105	Puerto Rico	1	0.04
106	Sudan	1	0.04
107	Tajikistan	1	0.04
108	Tuvalu	1	0.04
109	Uzbekistan	1	0.04
110	United Kingdom	1	0.04
111	Wales	1	0.04
112	Zambia	1	0.04
	Total	2,757	100.00

Appendix C. Sensitivity analysis using a broader definition of ethnic origin

I re-run the main analyses using a broader measure of ethnic origin (ethnic origin broad) which differentiates the most frequent ethnic origins and collapses the remaining into broader pan-ethnic groups (see Table C1). The results are in line with those in the main analyses, all substantive conclusions remain the same when using a broader measure of ethnic origin (see Tables C2, C3 and C4).

Table C1: Consecutively numbered, full list of broad ethnic origins in the analysis sample, with frequencies and percentages of students categorized into each group.

Consecutive numbering	Ethnic origin (broad)	Frequency	Percent
1	Germany	1,226	44.47
2	Turkey	321	11.64
3	MENA	282	10.23
4	South Eastern Europe/Former Yugoslavia	196	7.11
5	Other Non-Western	179	6.49
6	Poland	147	5.33
7	Russia	112	4.06
8	Southern Europe	103	3.74
9	Former Sovjet Union	70	2.54
10	Other Western- and Northern Europe	65	2.36
11	Other Western	56	2.03
	Total	2,757	100.00

Table C2: Descriptive statistics: mean, standard deviation, minimum and maximum values for the full sample, majority student sample, and minority student sample; ethnic origin measure: *ethnic origin broad*.

	Full sample				Majority students				Minority students			
	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Mental wellbeing	3.52	(0.88)	0	5	3.59	(0.82)	1	5	3.47	(0.92)	0	5
<u>Person characteristics:</u>												
Gender: girl	0.47	(0.50)	0	1	0.47	(0.50)	0	1	0.48	(0.50)	0	1
<u>Educational background</u>												
Gymnasium	0.43	(0.50)	0	1	0.52	(0.50)	0	1	0.35	(0.48)	0	1
Realschule	0.23	(0.42)	0	1	0.19	(0.40)	0	1	0.26	(0.44)	0	1
Hauptschule	0.10	(0.31)	0	1	0.05	(0.23)	0	1	0.15	(0.35)	0	1
Gesamtschule	0.24	(0.43)	0	1	0.23	(0.42)	0	1	0.24	(0.43)	0	1
<u>Generational status</u>												
Native	0.44	(0.50)	0	1	1.00	(0.00)	1	1	0.00	(0.00)	0	0
1 st gen.	0.15	(0.36)	0	1	0.00	(0.00)	0	0	0.27	(0.44)	0	1
2 nd gen.	0.25	(0.43)	0	1	0.00	(0.00)	0	0	0.45	(0.50)	0	1
2 nd gen. inter-ethnic	0.16	(0.36)	0	1	0.00	(0.00)	0	0	0.28	(0.45)	0	1
<u>Friendship network characteristics:</u>												
Number of friends	6.21	(2.56)	0	10	6.20	(2.57)	0	10	6.22	(2.55)	0	10
Number of friends with diff. ethnic origin	4.12	(2.62)	0	10	2.68	(1.93)	0	10	5.27	(2.52)	0	10
<u>Brokerage:</u>												
Number of open triads	9.19	(8.39)	0	40	9.18	(8.60)	0	40	9.19	(8.22)	0	38
<u>Intra- and inter-ethnic brokerage</u>												
Number of intra-ethnic open triads	2.67	(3.76)	0	31	3.39	(4.42)	0	31	2.10	(3.01)	0	28
Number of inter-ethnic open triads	6.52	(6.47)	0	34	5.79	(6.16)	0	33	7.10	(6.66)	0	34

(Table continued on next page)

	Full sample				Majority students				Minority students			
	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
<u>Biased/unbiased inter-ethnic brokerage:</u>												
Number of biased inter-ethnic open triads	3.03	(4.03)	0	22	4.21	(4.52)	0	22	2.08	(3.30)	0	20
Number of unbiased inter-ethnic open triads	3.49	(4.75)	0	34	1.58	(2.74)	0	30	5.02	(5.41)	0	34
<u>School grade characteristics</u>												
Total number of students	91.95	(31.04)	21	158	97.79	(31.01)	21	158	87.27	(30.27)	21	158
% majority students	0.43	(0.19)	0	1	0.52	(0.17)	0	1	0.36	(0.19)	0	1
Observations	2,757				1,226				1,531			

Table C3. Results of linear regression analysis with mental wellbeing as dependent variable (cluster-robust standard errors at school grade level); N=2757; ethnic origin measure: *ethnic origin broad*.

	Model 1		Model 2		Model 3	
	β	P-values	β	P-values	β	P-values
<u>Person characteristics:</u>						
Gender (ref.: boy)	-0.408***	(0.000)	-0.406***	(0.000)	-0.405***	(0.000)
Educational background (ref.: Hauptschule)						
Gymnasium	0.012	(0.844)	0.021	(0.726)	0.020	(0.741)
Realschule	-0.028	(0.680)	-0.022	(0.740)	-0.020	(0.760)
Gesamtschule	-0.088	(0.226)	-0.078	(0.266)	-0.082	(0.247)
Generational Status (ref.: native)						
1 st gen.	-0.102	(0.106)	-0.121 ⁺	(0.062)	-0.118 ⁺	(0.070)
2 nd gen.	-0.007	(0.894)	-0.024	(0.662)	-0.024	(0.666)
2 nd gen. inter-ethnic	0.023	(0.701)	0.003	(0.966)	0.003	(0.956)
<u>Friendship network characteristics:</u>						
Number of friends	0.082***	(0.000)	0.076***	(0.000)	0.069***	(0.000)
Number of friends with diff. ethnic origin	-0.028*	(0.017)	-0.016	(0.185)	-0.006	(0.626)
<u>Brokerage:</u>						
Number of open triads	-0.018***	(0.000)				
<u>Intra- and inter-ethnic brokerage:</u>						
Number of intra-ethnic open triads			-0.007	(0.219)	-0.006	(0.236)
Number of inter-ethnic open triads			-0.022***	(0.000)		
<u>Biased/unbiased inter-ethnic brokerage:</u>						
Number of biased inter-ethnic open triads					-0.018***	(0.001)
Number of unbiased inter-ethnic open triads					-0.027***	(0.000)
<u>School grade characteristics:</u>						
Total number of students	0.001	(0.284)	0.001	(0.270)	0.001	(0.246)
% majority students	0.008	(0.945)	-0.058	(0.608)	-0.051	(0.655)
Constant	3.454***	(0.000)	3.484***	(0.000)	3.477***	(0.000)
R ²	0.078		0.080		0.080	
N	2,757		2,757		2,757	

Note: p-values in parentheses; ⁺ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Table C4. Results of linear regression analysis with mental wellbeing as dependent variable (cluster-robust standard errors at school grade level);

N_{Majority students}=1226, N_{Minority Students}=1531; ethnic origin measure: *ethnic origin broad*.

	Model 1a:		Model 1b:		Model 2a:		Model 2b:		Model 3a:		Model 3b:	
	Majority students		Minority students		Majority students		Minority students		Majority students		Minority students	
	β	P-values	β	P-values	β	P-values	β	P-values	β	P-values	β	P-values
<u>Person characteristics:</u>												
Gender (ref.: boy)	-0.352***	(0.000)	-0.462***	(0.000)	-0.348***	(0.000)	-0.459***	(0.000)	-0.348***	(0.000)	-0.458***	(0.000)
<u>Educational background (ref.: Hauptschule)</u>												
Gymnasium	-0.035	(0.716)	0.005	(0.956)	-0.015	(0.884)	0.019	(0.814)	-0.015	(0.884)	0.019	(0.812)
Realschule	-0.047	(0.667)	-0.044	(0.569)	-0.039	(0.729)	-0.033	(0.657)	-0.038	(0.735)	-0.032	(0.667)
Gesamtschule	-0.217*	(0.046)	-0.036	(0.748)	-0.201 ⁺	(0.074)	-0.020	(0.853)	-0.201 ⁺	(0.074)	-0.021	(0.844)
<u>Generational status (ref.: 2nd gen. inter-ethnic)</u>												
1 st gen.			-0.122 ⁺	(0.089)			-0.120 ⁺	(0.092)			-0.119 ⁺	(0.096)
2 nd gen.			-0.029	(0.639)			-0.025	(0.683)			-0.026	(0.670)
<u>Friendship network characteristics:</u>												
Number of friends	0.083***	(0.000)	0.085**	(0.001)	0.068**	(0.003)	0.085**	(0.001)	0.067**	(0.004)	0.071*	(0.010)
Number of friends with diff. ethnic origin	-0.015	(0.438)	-0.043 ⁺	(0.057)	0.017	(0.551)	-0.041 ⁺	(0.063)	0.018	(0.519)	-0.023	(0.363)
<u>Brokerage:</u>												
Number of open triads	-0.020***	(0.000)	-0.014**	(0.001)								
<u>Intra- and inter-ethnic brokerage:</u>												
Number of intra-ethnic open triads					-0.007	(0.416)	0.005	(0.510)	-0.007	(0.415)	0.005	(0.531)
Number inter-ethnic open triads					-0.027***	(0.000)	-0.021***	(0.000)				
<u>Biased/unbiased inter-ethnic brokerage:</u>												
Number of biased inter-ethnic open triads									-0.027***	(0.000)	-0.013	(0.178)
Number of unbiased inter-ethnic open triads									-0.029*	(0.012)	-0.024***	(0.000)

(Table continued on next page)

	Model 1a: Majority students		Model 1b: Minority students		Model 2a: Majority students		Model 2b: Minority students		Model 3a: Majority students		Model 3b: Minority students	
	β	p-values	β	p-values	β	p-values	β	p-values	β	p-values	β	p-values
<u>School grade characteristics:</u>												
Total number of students	0.001	(0.380)	0.001	(0.387)	0.000	(0.477)	0.001	(0.335)	0.000	(0.479)	0.001	(0.344)
% majority students	0.032	(0.876)	0.033	(0.819)	0.067	(0.753)	-0.075	(0.593)	0.066	(0.762)	-0.082	(0.558)
Constant	3.468***	(0.000)	3.482***	(0.000)	3.446***	(0.000)	3.497***	(0.000)	3.446***	(0.000)	3.501***	(0.000)
R ²	0.073		0.081		0.075		0.084		0.075		0.085	
N	1,226		1,531		1,226		1,531		1,226		1,531	

Note: p-values in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Appendix D. School grade fixed-effects regression analysis

Table D1. Results of school grade-fixed effects regression analysis with mental wellbeing as dependent variable; N=2757.

	Model 1		Model 2		Model 3	
	β	P-values	β	P-values	β	P-values
<u>Person characteristics:</u>						
Gender (ref.: boy)	-0.409***	(0.000)	-0.407***	(0.000)	-0.407***	(0.000)
Educational background (ref.: Hauptschule)						
Gymnasium	—		—		—	
Realschule	—		—		—	
Gesamtschule	—		—		—	
Generational status (ref.: native)						
1 st gen.	-0.097	(0.108)	-0.116 ⁺	(0.058)	-0.114 ⁺	(0.062)
2 nd gen.	-0.011	(0.832)	-0.028	(0.591)	-0.028	(0.596)
2 nd gen. inter-ethnic	0.007	(0.900)	-0.013	(0.822)	-0.013	(0.826)
<u>Friendship network characteristics:</u>						
Number of friends	0.079***	(0.000)	0.073***	(0.000)	0.071***	(0.000)
Number of friends with diff. ethnic origin	-0.024*	(0.035)	-0.013	(0.281)	-0.009	(0.537)
<u>Brokerage:</u>						
Number of open triads	-0.017***	(0.000)				
<u>Intra- and inter-ethnic brokerage:</u>						
Number of intra-ethnic open triads			-0.008	(0.191)	-0.008	(0.199)
Number of inter-ethnic open triads			-0.022***	(0.000)		
<u>Biased/unbiased inter-ethnic brokerage:</u>						
Number of biased inter-ethnic open triads					-0.020***	(0.001)
Number of unbiased inter-ethnic open triads					-0.023***	(0.000)
<u>School grade characteristics:</u>						
Total number of students	—		—		—	
% majority students	—		—		—	
Constant	3.505***	(0.000)	3.511***	(0.000)	3.511***	(0.000)
R ² (within)	0.070		0.071		0.071	
N	2,757		2,757		2,757	
N _{school grades}	39		39		39	

Note: p-values in parentheses; ⁺ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Table D2. Results of school grade-fixed effects regression analysis with mental wellbeing as dependent variable; N_{Majority students}=1226, N_{Minority Students}=1531.

	Model 1a:		Model 1b:		Model 2a:		Model 2b:		Model 3a:		Model 3b:	
	Majority students		Minority students		Majority students		Minority students		Majority students		Minority students	
	β	p-values	β	p-values	β	p-values	β	p-values	β	p-values	β	p-values
<u>Person characteristics:</u>												
Gender (ref.: boy)	-0.354***	(0.000)	-0.458***	(0.000)	-0.350***	(0.000)	-0.458***	(0.000)	-0.350***	(0.000)	-0.457***	(0.000)
Educational background (ref.: Hauptschule)												
Gymnasium	—		—		—		—		—		—	
Realschule	—		—		—		—		—		—	
Gesamtschule	—		—		—		—		—		—	
Generational status (ref.: 2 nd gen. inter-ethnic)												
1 st gen.			-0.089	(0.165)			-0.087	(0.177)			-0.087	(0.175)
2 nd gen.			-0.012	(0.832)			-0.010	(0.854)			-0.010	(0.856)
<u>Friendship network characteristics:</u>												
Number of friends	0.081***	(0.000)	0.090***	(0.000)	0.064**	(0.003)	0.090***	(0.000)	0.063**	(0.005)	0.096**	(0.003)
Number of friends with diff. ethnic origin	-0.022	(0.236)	-0.041*	(0.049)	0.015	(0.574)	-0.040 ⁺	(0.058)	0.017	(0.541)	-0.047	(0.144)
<u>Brokerage:</u>												
Number of open triads	-0.019***	(0.000)	-0.015**	(0.003)								
<u>Intra- and inter-ethnic brokerage:</u>												
Number of intra-ethnic open triads					-0.005	(0.594)	-0.001	(0.898)	-0.005	(0.588)	-0.001	(0.905)
Number of inter-ethnic open triads					-0.027***	(0.000)	-0.019***	(0.001)				
<u>Biased/unbiased inter-ethnic brokerage:</u>												
Number of biased inter-ethnic open triads									-0.026**	(0.001)	-0.022 ⁺	(0.059)
Number of unbiased inter-ethnic open triads									-0.030*	(0.020)	-0.018**	(0.004)

(Table continued on next page)

	Model 1a:		Model 1b:		Model 2a:		Model 2b:		Model 3a:		Model 3b:	
	Majority students	Minority students	Majority students	Minority students	Majority students	Minority students	Majority students	Minority students	Majority students	Minority students	Majority students	Minority students
	β	p-values	β	p-values	β	p-values	β	p-values	β	p-values	β	p-values
<u>School grade characteristics:</u>												
Total number of students	—		—		—		—		—		—	
% majority students	—		—		—		—		—		—	
Constant	3.485***	(0.000)	3.533***	(0.000)	3.489***	(0.000)	3.525***	(0.000)	3.489***	(0.000)	3.525***	(0.000)
R ² (within)	0.057		0.077		0.059		0.079		0.059		0.079	
N	1,226		1,531		1,226		1,531		1,226		1,531	
N _{school grades}	39		39		39		39		39		39	

Note: p-values in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Appendix E. Correlations between demographic characteristics and relevant study variables

Table E1: Correlations between demographic characteristics and relevant study variables.

	Mental wellbeing	Number of friends	Number of friends with diff. ethnic origin	Number of open triads	Number of intra-ethnic open triads	Number of inter-ethnic open triads	Number of biased inter-ethnic open triads	Number of unbiased inter-ethnic open triads	N
Gender ^a	-0.234***	-0.038*	-0.027	-0.027	-0.023	-0.022	-0.014	-0.016	2757
Ethnic majority/ minority ^b	-0.064***	0.004	0.529***	0.001	-0.199***	0.114***	-0.336***	0.394***	2757
Generational status ^c	0.041	0.056*	0.031	0.062*	0.124***	0.025	0.051*	0.012	1531
Educational background ^d	0.032 ⁺	0.127***	-0.040*	0.136***	0.252***	0.058**	0.095***	-0.023	2757

Note: Point-biserial correlation coefficient indicated for dichotomous, spearman's correlation coefficient indicated for ordinal scaled demographic variables. + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001.

^aGender: Boy = 0, girl = 1.

^bEthnic majority (German ethnic origin) = 0, ethnic minority (non-German ethnic origin) = 1.

^cGenerational status: 1st generation = 0, 2nd generation = 1, 2nd generation inter-ethnic = 2. This variable does not include the "native" category in contrast to the generational status variable in the main analyses. It refers to ethnic minority students (N=1531) only.

^dEducational background: Hauptschule = 0, Realschule = 1, Gesamtschule = 2, Gymnasium = 3.

Appendix F. Standardised regression coefficients

Table F1. Results of linear regression analysis with mental wellbeing as dependent variable (XY standardised regression coefficients); N=2757.

	Model 1		Model 2		Model 3	
	<i>B</i> *	<i>se</i>	<i>B</i> *	<i>se</i>	<i>B</i> *	<i>se</i>
<u>Person characteristics:</u>						
Gender (ref.: boy)	-0.233***	(0.032)	-0.232***	(0.032)	-0.232***	(0.032)
Educational background (ref.: Hauptschule)						
Gymnasium	0.005	(0.073)	0.007	(0.073)	0.007	(0.073)
Realschule	-0.014	(0.067)	-0.013	(0.067)	-0.012	(0.067)
Gesamtschule	-0.044	(0.077)	-0.042	(0.077)	-0.042	(0.077)
Generational status (ref.: native)						
1 st gen.	-0.040 ⁺	(0.060)	-0.049*	(0.060)	-0.048*	(0.061)
2 nd gen.	-0.004	(0.051)	-0.013	(0.052)	-0.013	(0.052)
2 nd gen. inter-ethnic	0.008	(0.057)	-0.001	(0.058)	-0.001	(0.058)
<u>Friendship network characteristics:</u>						
Number of friends	0.236***	(0.014)	0.217***	(0.014)	0.211***	(0.015)
Number of friends with diff. ethnic origin	-0.077*	(0.011)	-0.044	(0.012)	-0.034	(0.015)
<u>Brokerage:</u>						
Number of open triads	-0.168***	(0.003)				
<u>Intra- and inter-ethnic brokerage:</u>						
Number of intra-ethnic open triads			-0.034	(0.006)	-0.033	(0.006)
Number of inter-ethnic open triads			-0.164***	(0.004)		
<u>Biased/unbiased inter-ethnic brokerage:</u>						
Number of biased inter-ethnic open triads					-0.093***	(0.006)
Number of unbiased inter-ethnic open triads					-0.139***	(0.005)
<u>School grade characteristics:</u>						
Total number of students	0.024	(0.001)	0.023	(0.001)	0.023	(0.001)
% majority students	0.001	(0.112)	-0.012	(0.116)	-0.012	(0.116)
R ²	0.077		0.079		0.079	
N	2,757		2,757		2,757	

Note: *B**= Standardised beta coefficients; *se*= Standard errors in parentheses. ⁺ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Appendix G. Test for significant difference between minority and majority students

Interaction effects between minority status and inter-ethnic brokerage, biased inter-ethnic brokerage and unbiased inter-ethnic brokerage.

Table G1. Results of linear regression analyses with wellbeing as dependent variable and interaction effects between minority status and (biased/unbiased) inter-ethnic brokerage (cluster-robust standard errors at school grade level); N=2757

	Model 1		Model 2		Model 3	
	β	p-values	β	p-values	β	p-values
<u>Person characteristics:</u>						
Gender (ref.: boy)	-0.406***	(0.000)	-0.406***	(0.000)	-0.407***	(0.000)
Educational background (ref.: Hauptschule)						
Gymnasium	0.027	(0.649)	0.030	(0.614)	0.026	(0.660)
Realschule	-0.016	(0.811)	-0.015	(0.831)	-0.015	(0.825)
Gesamtschule	-0.073	(0.305)	-0.073	(0.310)	-0.075	(0.292)
Minority status (ref.: majority status)	-0.049	(0.430)	-0.073	(0.231)	-0.033	(0.585)
<u>Friendship network characteristics:</u>						
Number of friends	0.075***	(0.000)	0.070***	(0.000)	0.073***	(0.000)
Number of friends with diff. ethnic origin	-0.014	(0.219)	-0.007	(0.611)	-0.011	(0.367)
<u>Brokerage:</u>						
Number of open triads						
<u>Intra- and inter-ethnic brokerage:</u>						
Number of intra-ethnic open triads	-0.008	(0.143)	-0.007	(0.233)	-0.008	(0.155)
Number of inter-ethnic open triads	-0.023***	(0.000)				
<u>Biased/unbiased inter-ethnic brokerage:</u>						
Number of biased inter-ethnic open triads			-0.024***	(0.000)	-0.020***	(0.000)
Number of unbiased inter-ethnic open triads			-0.023***	(0.000)	-0.021*	(0.020)
Minority status	0.001	(0.715)				
x number of inter-ethnic open triads						
Minority status			0.011	(0.286)		
x number of biased inter-ethnic open triads						
Minority status					-0.002	(0.754)
x number of unbiased inter-ethnic open triads						
<u>School grade characteristics:</u>						
Total number of students	0.001	(0.292)	0.001	(0.296)	0.001	(0.277)
% majority students	-0.038	(0.737)	-0.029	(0.801)	-0.030	(0.797)
Constant	3.472***	(0.000)	3.480***	(0.000)	3.458***	(0.000)
R ²	0.077		0.078		0.077	
N	2,757		2,757		2,757	

Note: p-values in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Appendices Chapter 4 (Study 3)

Appendix A. Descriptive overview by wave and gender

Table A1: Descriptive statistics for Muslim youth of all variables included in our analyses by gender and wave (standard deviation (SD) and minimum and maximum values).

Variable	Wave	Boys			Girls		
		Mean	SD	n	Mean	SD	n
In-group bias	1	0.19	0.26	212	0.21	0.30	216
	2	0.17	0.26	261	0.23	0.27	267
	3	0.17	0.25	263	0.26	0.28	295
	4	0.20	0.27	135	0.27	0.31	161
	5	0.19	0.30	114	0.31	0.31	141
	6	0.18	0.26	76	0.28	0.32	98
Age	1	12.90	1.06	212	12.74	1.00	216
	2	13.51	1.13	261	13.47	1.12	267
	3	14.24	1.08	263	14.27	1.08	295
	4	15.05	1.02	135	14.96	0.97	161
	5	15.43	0.94	114	15.48	0.90	141
	6	15.70	0.75	76	15.74	0.69	98
Religiosity	1	2.92	1.74	212	2.59	1.74	216
	2	3.04	1.57	261	2.79	1.72	267
	3	2.95	1.51	263	2.82	1.77	295
	4	2.88	1.47	135	2.79	1.92	161
	5	2.60	1.55	114	3.01	1.87	141
	6	2.63	1.25	76	2.80	1.85	98
Parental control of friendships	1	2.83	0.96	212	2.84	0.96	216
	2	2.85	1.00	261	2.86	0.90	267
	3	2.89	0.89	263	2.89	1.02	295
	4	3.00	0.92	135	3.13	0.80	161
	5	3.00	0.78	114	3.09	0.80	141
	6	2.96	0.88	76	3.12	0.76	98
Leisure time: spending time in a club	1	2.92	1.88	212	1.53	1.93	216
	2	2.95	1.88	261	1.56	1.86	267
	3	3.05	1.88	263	1.32	1.79	295
	4	2.99	1.93	135	1.36	1.80	161
	5	3.02	1.91	114	1.30	1.78	141
	6	3.11	1.87	76	1.39	1.89	98
Leisure time: going to youth center	1	0.99	1.47	212	0.81	1.34	216
	2	1.13	1.54	261	0.72	1.38	267
	3	1.01	1.43	263	0.57	1.14	295

(Table continued on next page)

Variable	Wave	Boys Mean	SD	n	Girls Mean	SD	n
Leisure time: partying	4	0.67	1.18	135	0.48	1.03	161
	5	0.82	1.40	114	0.33	0.78	141
	6	0.68	1.22	76	0.23	0.76	98
	1	1.10	1.38	212	0.72	1.03	216
	2	1.05	1.46	261	0.85	1.23	267
	3	0.97	1.40	263	0.64	1.06	295
Perceived religious discrimination	4	1.00	1.44	135	0.86	1.33	161
	5	1.03	1.37	114	0.60	0.95	141
	6	1.09	1.52	76	0.57	1.01	98
	1	0.52	0.69	212	0.48	0.69	216
	2	0.48	0.66	261	0.47	0.66	267
	3	0.49	0.69	263	0.48	0.63	295
Perceived public rejection of Islam	4	0.54	0.72	135	0.55	0.75	161
	5	0.55	0.66	114	0.56	0.70	141
	6	0.54	0.73	76	0.52	0.71	98
	1	0.95	0.95	212	0.92	0.91	216
	2	1.01	0.92	261	0.97	0.85	267
	3	1.19	0.94	263	1.07	0.95	295
	4	1.25	1.03	135	1.30	1.02	161
	5	1.34	0.99	114	1.41	1.01	141
	6	1.54	1.05	76	1.4	1.02	98

Appendix B. Check for linear age trend

In order to test whether the relationship between age and in-group bias is indeed linear for girls and boys, we fit a model akin to the baseline Model M0, including a linear, squared, cubic and quartic age trend (Table B1). All age predictors are transformed into orthogonal predictors to avoid collinearity between them. For both boys and girls, only the linear age trend is significantly related to in-group bias. Figure B1 shows predicted values of in-group bias from this model and also supports a linear age trend. The only substantial nonlinearity is observed between age 11 and age 12 for Muslim boys, but these estimates are very imprecise due to the low number of observations. Accordingly, we rely on linear age effects in the main analyses.

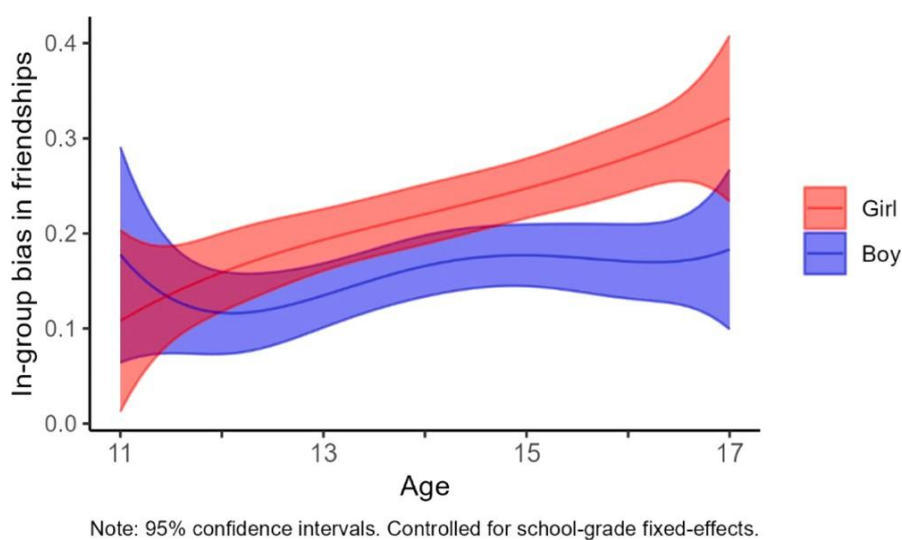


Fig. B1 Predicted in-group bias over age for Muslim girls and boys from random-effects GCM accounting for different age trends.

Table B1: Results of random growth curve analyses with in-group bias as dependent variable and different trends of age among Muslim youth by gender.

	Model
Girl ref.: Boy	0.067 (0.017)***
Age orthogonal (linear)	
Boys	0.803 (0.383)*
Girls	2.042 (0.347)***
Age orthogonal squared	
Boys	-0.188 (0.328)
Girls	-0.028 (0.300)
Age orthogonal cubic	
Boys	-0.373 (0.314)
Girls	0.171 (0.292)
Age orthogonal quartic	
Boys	0.372 (0.305)
Girls	-0.023 (0.294)
Constant	0.166 (0.044)***
N person-waves	2239
N students	737

Notes: school grade fixed effects (grade dummies included -not shown).

Appendix C. Robustness Check: Including sociodemographic controls

As a robustness check, we include the time-stable sociodemographic characteristics socioeconomic background, ethnic origin, and migrant generation as control variables in our analyses. To capture socio-economic background, we use information on parents' socioeconomic status measured on the international socio-economic index (ISEI; Ganzeboom, Graaf, and Treiman 1992) scale, based on the occupations students indicated their parents to have in the survey. We averaged the ISEI score across both parents. Our measures of ethnic origin and migrant generation are based on the information students report on their own as well as their parents' and grandparents' countries of birth, following the classification approach by Dollmann et al. (2014). Regarding ethnic origin, we differentiate between students from Turkey, Lebanon, Southern Europe, Northern Africa, Former Yugoslavia and Other contexts. In terms of migrant generation, we distinguish between students born outside of Germany (1st generation), students born in Germany with at least one parent born abroad (2nd generation) and students born in Germany, with parents also born in Germany but at least one grandparent born abroad (3rd generation). Table C1 shows that the results are very similar to the results without sociodemographic controls (cf. Table 2 and full results in Table D1).

Table C1: The emerging gender gap in in-group bias (M0) and the contribution of gender-specific trajectories (M1) and gender-specific effects (M2) of religiosity, parental control of friendships, and spending time in club among Muslim youth. Sociodemographic control variables included.

	M0: Baseline	M1: Gender-specific trajectories	M2: Gender-specific effects
Emerging gender gap	0.128 (0.047)**	0.110 (0.047)*	0.089 (0.048)†
% change relative to M0	-	-14%	-30%
<i>Factors</i>			
Religiosity		0.015 (0.004)***	
Boys			0.010 (0.006)
Girls			0.019 (0.005)***
Gender difference			0.009 (0.008)
Parental control of friendships		0.013 (0.007)†	
Boys			-0.004 (0.009)
Girls			0.031 (0.009)***
Gender difference			0.034 (0.013)**
Spending time in a club		-0.001 (0.003)	
Boys			0.005 (0.005)
Girls			-0.007 (0.004)†
Gender difference			-0.012 (0.006)†
<i>Controls</i>			
Socio-economic background	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)
Ethnic origin			
Southern Europe ref.: Turkey	-0.036 (0.042)	-0.031 (0.041)	-0.036 (0.041)
Lebanon	0.059 (0.048)	0.040 (0.047)	0.038 (0.047)
Northern Africa	-0.081 (0.043)†	-0.096 (0.043)*	-0.098 (0.043)*
Former Yugoslavia	-0.111 (0.048)*	-0.105 (0.048)*	-0.102 (0.048)*
Other	-0.053 (0.036)	-0.049 (0.036)	-0.047 (0.036)
Migrant generation			
2nd ref.: 1st	-0.017 (0.028)	-0.009 (0.027)	-0.008 (0.027)
3rd	-0.107 (0.059)†	-0.100 (0.058)†	-0.095 (0.058)
N person-waves	1966	1966	1966
N students	610	610	610

Notes: All results from random-effects growth curve models. School grade fixed effects (grade dummies included - not shown). Emerging gender gap: difference in in-group bias emerging between girls and boys between age 11 and age 17. Satterthwaite-method used for computing the degrees of freedom and t-statistics. † p < .10; *p < .05; **p < .01; ***p < .001. Standard errors in parentheses.

Appendix D. Full results combined models

Table D1: Results of random growth curve analyses with in-group bias as dependent variable and the effect of religiosity, parental control of friendships, and spending time in a club among Muslim youth.

	M0: Baseline	M1: Gender-specific trajectories	M2: Gender-specific effects
Age	0.074 (0.034)*	0.078 (0.034)*	0.083 (0.034)*
Girl (ref.: Boy)	0.009 (0.029)	0.018 (0.029)	-0.067 (0.050)
Girl*Age	0.109 (0.045)*	0.094 (0.045)*	0.072 (0.045)
Religiosity		0.015 (0.004)***	0.009 (0.006)
Girl*Religiosity			0.011 (0.007)
Parental control of friendships		0.010 (0.006)	-0.007 (0.009)
Girl*Parental control of friendships			0.034 (0.012)**
Spending time in a club		0.000 (0.003)	0.007 (0.004)
Girl*Spending time in a club			-0.014 (0.006)*
Constant	0.127 (0.048)**	0.052 (0.052)	0.097 (0.057)†
N person-waves	2239	2239	2239
N students	737	737	737

Notes: school grade fixed effects (grade dummies included - not shown). Age transformed to range from 0 (age 11) to 1 (age 17). Satterthwaite-method used for computing the degrees of freedom and t-statistics. † p < .10; *p < .05; **p < .01; ***p < .001. Standard errors in parentheses.

Appendix E. Non-Muslim in-group bias by age and gender

To check whether the gender gap only emerges among Muslim or also among non-Muslim youth, we also ran the baseline GCM (M0) for non-Muslim youth. Figure E1 compares the development of in-group bias between non-Muslim youth (panel A) and Muslim youth (panel B, see also Figure 4.1 in the main text). As shown in panel A, the in-group bias of non-Muslim youth also increases marginally during the adolescent years. However, unlike for Muslims, this increase is only slightly stronger among non-Muslim girls. The difference between girls and boys is only statistically significant at the 10% level, even though the non-Muslim sample is much larger than the Muslim sample (1455 adolescents relative to 737 adolescents in the Muslim sample). Furthermore, Figure E1 shows that no gender gap emerges due to this increase in in-group bias among non-Muslim girls. Instead, as non-Muslim girls had slightly lower in-group bias than boys at age 11, this minor gender gap closes across the adolescent years as non-Muslim girls' in-group bias rises. In additional analyses, we also verified that none of the factors related to religious norms that contribute to the gender gap among Muslim youth (religiosity, parental control of friendships, and spending time in clubs) is associated with in-group bias among non-Muslims. Both the emerging gender gap in-group bias and the influence of gendered religious norms thus are specific to Muslim youth in our sample.

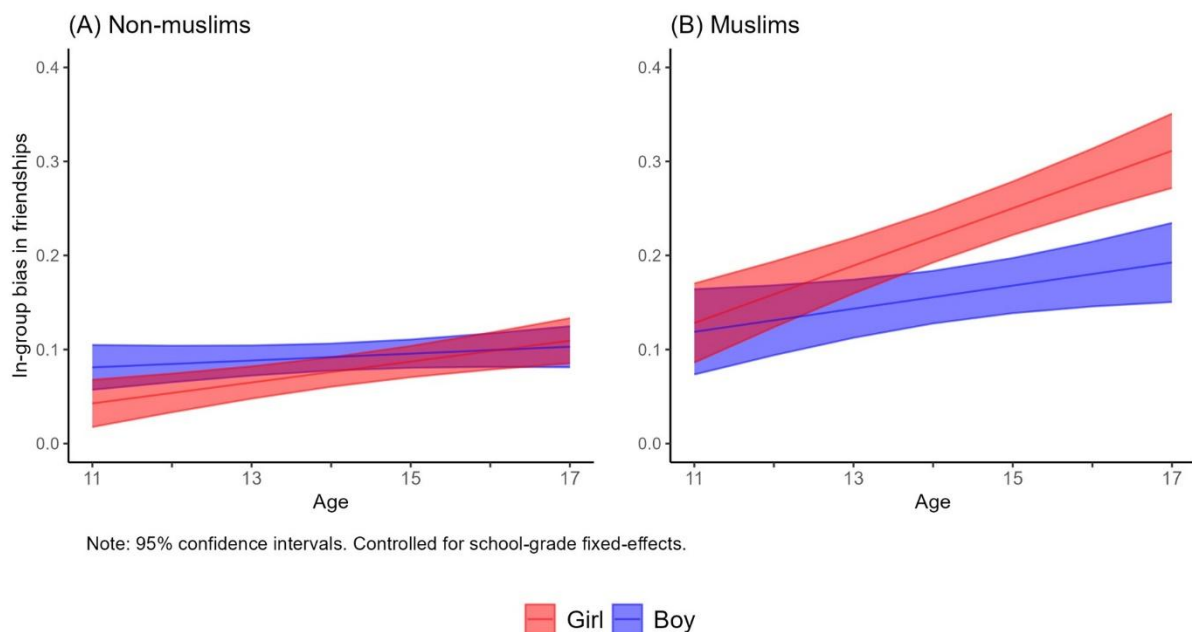


Fig. E1: Predicted in-group bias over age for non-Muslim girls and boys (panel A) and Muslim girls and boys (panel B) from random effects GCM (M0).

Appendix F. Separate growth curve analyses for religiosity, parental control of friendships, leisure time activities, religious discrimination, and perceived public rejection of Islam

Table F1: Results of random growth curve analysis with in-group bias as dependent variable and the effect of religiosity among Muslim youth, as displayed in Figure 4.2.

	M0: Baseline	M1: Gender-specific trajectories	M2: Gender-specific effects
Age	0.074 (0.034)*	0.081 (0.034)*	0.078 (0.034)*
Girl ref.: Boy	0.009 (0.029)	0.018 (0.029)	-0.014 (0.036)
Girl*Age	0.109 (0.045)*	0.096 (0.045)*	0.098 (0.045)*
Religiosity		0.015 (0.004)***	0.009 (0.006)
Girl* Religiosity			0.011 (0.007)
Constant	0.127 (0.048)**	0.076 (0.049)	0.096 (0.051)†
N person-waves	2239	2239	2239
N students	737	737	737

Notes: school grade fixed effects (grade dummies included - not shown). Age transformed to range from 0 (age 11) to 1 (age 17). Satterthwaite-method used for computing the degrees of freedom and t-statistics. † p < .10; *p < .05; **p < .01; ***p < .001. Standard errors in parentheses.

Table F2: Results of random growth curve analysis with in-group bias as dependent variable and the effect of parental control of friendships among Muslim youth, as displayed in Fig 4.3.

	M0: Baseline	M1: Gender-specific trajectories	M2: Gender-specific effects
Age	0.074 (0.034)*	0.070 (0.034)*	0.078 (0.034)*
Girl ref.: Boy	0.009 (0.029)	0.010 (0.029)	-0.079 (0.043)†
Girl*Age	0.109 (0.045)*	0.107 (0.045)*	0.089 (0.045)*
Parental control of friendships		0.010 (0.006)†	-0.006 (0.009)
Girl* Parental control of friendships			0.034 (0.012)**
Constant	0.127 (0.048)**	0.099 (0.050)*	0.147 (0.053)**
N person-waves	2239	2239	2239
N students	737	737	737

Notes: school grade fixed effects (grade dummies included - not shown). Age transformed to range from 0 (age 11) to 1 (age 17). Satterthwaite-method used for computing the degrees of freedom and t-statistics. † p < .10; *p < .05; **p < .01; ***p < .001. Standard errors in parentheses.

Table F3: Results of random growth curve analysis with in-group bias as dependent variable and the effect of spending time in a club among Muslim youth, as displayed in Figure 4.4.

	M0: Baseline	M1: Gender-specific trajectories	M2: Gender-specific effects
Age	0.074 (0.034)*	0.074 (0.034)*	0.074 (0.034)*
Girl ref.: Boy	0.009 (0.029)	0.009 (0.029)	0.042 (0.033)
Girl*Age	0.109 (0.045)*	0.109 (0.045)*	0.104 (0.045)*
spending time in a club		0.000 (0.003)	0.007 (0.004)
Girl* spending time in a club			-0.014 (0.006)*
Constant	0.127 (0.048)**	0.128 (0.049)**	0.106 (0.049)*
N person-waves	2239	2239	2239
N students	737	737	737

Notes: school grade fixed effects (grade dummies included - not shown). Age transformed to range from 0 (age 11) to 1 (age 17). Satterthwaite-method used for computing the degrees of freedom and t-statistics. † p < .10; *p < .05; * *p < .01; * **p < .001. Standard errors in parentheses.

Table F4: Results of random growth curve analysis with in-group bias as dependent variable and the effect of going to youth center among Muslim youth, as displayed in Figure 4.4.

	M0: Baseline	M1: Gender-specific trajectories	M2: Gender-specific effects
Age	0.074 (0.034)*	0.076 (0.034)*	0.076 (0.034)*
Girl ref.: Boy	0.009 (0.029)	0.010 (0.029)	0.012 (0.031)
Girl*Age	0.109 (0.045)*	0.116 (0.045)*	0.115 (0.045)*
going to youth center		0.009 (0.004)*	0.010 (0.006)†
Girl* going to youth center			-0.001 (0.009)
Constant	0.127 (0.048)**	0.109 (0.048)*	0.109 (0.049)*
N person-waves	2239	2239	2239
N students	737	737	737

Notes: school grade fixed effects (grade dummies included - not shown). Age transformed to range from 0 (age 11) to 1 (age 17). Satterthwaite-method used for computing the degrees of freedom and t-statistics. † p < .10; *p < .05; * *p < .01; * **p < .001. Standard errors in parentheses.

Table F5: Results of random growth curve analysis with in-group bias as dependent variable and the effect of partying among Muslim youth, as displayed in Figure 4.4.

	M0: Baseline	M1: Gender-specific trajectories	M2: Gender-specific effects
Age	0.074 (0.034)*	0.074 (0.034)*	0.073 (0.034)*
Girl ref.: Boy	0.009 (0.029)	0.010 (0.029)	0.022 (0.030)
Girl*Age	0.109 (0.045)*	0.110 (0.045)*	0.109 (0.045)*
partying		0.002 (0.004)	0.007 (0.006)
Girl* partying			-0.013 (0.009)
Constant	0.127 (0.048)**	0.125 (0.048)**	0.119 (0.048)*
N person-waves	2239	2239	2239
N students	737	737	737

Notes: school grade fixed effects (grade dummies included - not shown). Age transformed to range from 0 (age 11) to 1 (age 17). Satterthwaite-method used for computing the degrees of freedom and t-statistics. † p < .10; *p < .05; * *p < .01; * **p < .001. Standard errors in parentheses.

Table F6: Results of random growth curve analysis with in-group bias as dependent variable and the effect of religious discrimination among Muslim youth, as displayed in Figure 4.5.

	M0: Baseline	M1: Gender-specific trajectories	M2: Gender-specific effects
Age	0.074 (0.034)*	0.073 (0.034)*	0.073 (0.034)*
Girl ref.: Boy	0.009 (0.029)	0.010 (0.029)	0.012 (0.030)
Girl*Age	0.109 (0.045)*	0.109 (0.045)*	0.109 (0.045)*
Religious discrimination		0.008 (0.008)	0.010 (0.011)
Girl* Religious discrimination			-0.004 (0.016)
Constant	0.127 (0.048)**	0.124 (0.048)**	0.123 (0.048)*
N person-waves	2239	2239	2239
N students	737	737	737

Notes: school grade fixed effects (grade dummies included - not shown). Age transformed to range from 0 (age 11) to 1 (age 17). Satterthwaite-method used for computing the degrees of freedom and t-statistics. † p < .10; *p < .05; * *p < .01; * **p < .001. Standard errors in parentheses.

Table F7: Results of random growth curve analysis with in-group bias as dependent variable and the effect of public rejection of Islam among Muslim youth, as displayed in Figure 4.5.

	M0: Baseline	M1: Gender-specific trajectories	M2: Gender-specific effects
Age	0.074 (0.034)*	0.070 (0.035)*	0.053 (0.035)
Girl ref.: Boy	0.009 (0.029)	0.009 (0.029)	0.032 (0.030)
Girl*Age	0.109 (0.045)*	0.110 (0.045)*	0.141 (0.046)**
Public rejection of Islam		0.004 (0.006)	0.022 (0.008)**
Girl* Public rejection of Islam			-0.035 (0.012)**
Constant	0.127 (0.048)**	0.125 (0.048)**	0.114 (0.048)*
N person-waves	2239	2239	2239
N students	737	737	737

Notes: school grade fixed effects (grade dummies included - not shown). Age transformed to range from 0 (age 11) to 1 (age 17). Satterthwaite-method used for computing the degrees of freedom and t-statistics. † p < .10; *p < .05; * *p < .01; * **p < .001. Standard errors in parentheses.

Appendix Chapter 5

Mixed-ethnic parentage, ethnic brokerage and mental wellbeing: The case of 2nd generation minority youth with one foreign-born and one German-born parent

According to Love and Levy (2019), individuals of mixed-ethnic parentage combine different ethnic groups and therefore have the potential to serve as social bridges between these groups through shared heritage and affiliations.

There are several reasons why children of mixed ethnic parentage could be particularly well-equipped to cope with the cross-pressures related to inter-ethnic brokerage: The family serves as a shared interaction context where different role obligations coincide and must be managed on a regular basis. Children growing up in mixed ethnic families may experience diverse, sometimes conflicting behavioural expectations from family members due to their different ethnic group memberships. Therefore, these adolescents may have already practised the role as inter-ethnic bridges within their families or have witnessed their parents navigate cultural differences in this context. These adolescents are likely to have learned to manage diverse expectations in their immediate environment, reconciling discrepancies or coping with strain from multiple role-obligations, possibly facilitated by parental example.

In the context of Study 2, the question arises whether the negative association between inter-ethnic brokerage and mental wellbeing is weaker for second-generation minority adolescents with one parent born abroad and the other born in Germany, compared to second-generation minority adolescents with two foreign-born parents or first-generation adolescents who immigrated themselves. Therefore, to explore whether the association between inter-ethnic brokerage and mental wellbeing differs between these groups of ethnic minority students, I conduct subsample analyses for each of these groups in a preliminary fashion.⁴⁹

The following analyses will not only differentiate between inter-ethnic and intra-ethnic brokerage, that is, whether the broker's friends have different ethnic origins or share the same ethnic origin. Additionally, ethnic brokerage will be differentiated as to whether one or both of the broker's friends are ethnic minority or majority members (minority/majority brokerage).

⁴⁹ As a reminder, the measure of generational status traces the point of arrival in the host country until the parental generation. It differentiates between students who immigrated themselves (first generation) and German-born students whose parents were born abroad (second generation). I furthermore treat adolescents with one parent born abroad and the other born in Germany as a special case of second-generation individuals (second-generation inter-ethnic) (Lämmermann 2025:11)

As in the main analyses of Study 2, students with non-German ethnic origin were defined as ethnic minority and students with German ethnic origin as ethnic majority individuals. Inter-ethnic brokerage is thus further differentiated as to whether the brokered friends are of different ethnic origins but both ethnic minority (non-German ethnic origin) members or whether one of the brokered friends is an ethnic minority member and the other is an ethnic majority member (German ethnic origin).

Identical to the operationalisation of ethnic brokerage in the main analyses, brokerage was measured by the number of open triads in an individual's immediate friendship network, which are further differentiated by the ethnic origin of each of the broker's friends and their migrant status (ethnic minority or ethnic majority member).

Table A1 shows the descriptive results. For second-generation minority youth with one foreign-born and one German-born parent, the average number of inter-ethnic open triads with an ethnic majority and minority friend is higher than the average number of inter-ethnic open triads with two ethnic minority friends of different foreign backgrounds. This pattern does not apply to second-generation minority youth with two foreign-born parents or first-generation minority students – for these groups, the reverse is true: the average number of inter-ethnic open triads with ethnic minority friends of different foreign backgrounds is higher than the number of inter-ethnic open triads that include an ethnic majority and a minority friend.

Table A1 Descriptive statistics: Mean, standard deviation, minimum and maximum values for ethnic minority students differentiated by generational status (1st generation, 2nd with two foreign-born parents, 2nd with one foreign-born and one German-born parent).

	1st generation minority students				2nd generation minority students with two foreign-born parents				2nd generation minority students with one foreign-born and one German-born parent			
	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Mental wellbeing	3.39	(0.95)	0	5	3.51	(0.90)	0	5	3.50	(0.92)	0	5
<u>Person characteristics:</u>												
Gender: girl	0.46	(0.50)	0	1	0.47	(0.50)	0	1	0.52	(0.50)	0	1
Educational background												
Gymnasium	0.25	(0.43)	0	1	0.38	(0.49)	0	1	0.42	(0.49)	0	1
Realschule	0.27	(0.44)	0	1	0.28	(0.45)	0	1	0.21	(0.41)	0	1
Hauptschule	0.24	(0.43)	0	1	0.11	(0.32)	0	1	0.10	(0.31)	0	1
Gesamtschule	0.25	(0.43)	0	1	0.23	(0.42)	0	1	0.27	(0.44)	0	1
<u>Friendship network characteristics:</u>												
Number of friends	5.90	(2.61)	0	10	6.35	(2.51)	0	10	6.31	(2.52)	0	10
Number of triads (triad census)	17.84	(13.50)	0	45	20.17	(13.78)	0	45	19.90	(13.71)	0	45
Number of friends with diff. ethnic origin	5.42	(2.65)	0	10	5.58	(2.54)	0	10	5.67	(2.52)	0	10
<u>Brokerage:</u>												
Number of open triads	8.37	(7.93)	0	38	9.35	(8.23)	0	37	9.73	(8.46)	0	37
<u>Intra- and inter-ethnic brokerage:</u>												
Number of intra-ethnic open triads	1.36	(2.38)	0	17	1.72	(2.94)	0	25	2.30	(3.41)	0	28
Number of inter-ethnic open triads	7.00	(6.70)	0	30	7.63	(6.96)	0	34	7.43	(6.89)	0	31

(Table continued on next page)

	1 st generation minority students				2 nd generation minority students with two foreign-born parents				2 nd generation minority students with one foreign-born and one German-born parent			
	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
<u>Minority/majority brokerage: Intra-ethnic brokerage:</u>												
Number of intra-ethnic minority open triads (both friends ethnic minority, same ethnic origin)	0.47	(1.04)	0	6	0.49	(1.25)	0	13	0.41	(1.11)	0	14
Number of intra-ethnic majority open triads (both friends ethnic majority)	0.89	(2.23)	0	17	1.23	(2.77)	0	25	1.88	(3.33)	0	28
<u>Minority/majority brokerage: Inter-ethnic brokerage:</u>												
Number of <i>inter</i> -ethnic open triads (one ethnic minority and one ethnic majority friend)	3.16	(4.04)	0	20	3.53	(4.18)	0	20	4.10	(4.50)	0	21
Number of <i>inter</i> -ethnic minority open triads (both friends ethnic minority, different ethnic origins)	3.85	(4.68)	0	29	4.10	(4.99)	0	27	3.34	(4.44)	0	26
<u>School grade characteristics:</u>												
Total number of students	81.07	(31.20)	21	158	88.09	(29.14)	21	158	91.82	(30.27)	21	158
% majority students	0.31	(0.18)	0	1	0.35	(0.18)	0	1	0.43	(0.19)	0	1
Observations	408				693				430			

Table A2 shows separate analyses for first-generation minority students, second-generation minority students with two foreign-born parents and second-generation minority students with one foreign-born and one German-born parent, using linear regression models with cluster-robust standard errors at the grade level and mental wellbeing as dependent variable, as in the main analyses of Study 2.

The results of these preliminary analyses support the expectation stated above – negative association between inter-ethnic brokerage and mental wellbeing is weaker for second-generation minority adolescents with one parent born abroad and the other born in Germany, compared to second generation minority adolescents with two foreign-born parents or first-generation minority adolescents: For second generation minority youth with one foreign-born and one German-born parent, the number of inter-ethnic open triads with an ethnic majority and an ethnic minority friend does show a negative but not statistically significant association with mental wellbeing ($b=-0.016$, $p=0.207$). For first-generation minority students and second-generation minority students with two foreign parents, this association is, however, negative and significant ($b=-0.039$, $p < 0.05$ and $b=-0.033$, $p < 0.001$ respectively).

And for the number of inter-ethnic minority open triads where both friends are ethnic minority members but have different ethnic origins, the association with mental wellbeing is comparably small, positive and insignificant for second-generation minority youth with one foreign-born and one German-born parent ($b=0.004$, $p=0.703$). Similar results are evident for first-generation minority students ($b=0.003$, $p=0.850$) but for second-generation minority students with two foreign-born parents the association is negative and significant ($b=-0.031$, $p < 0.001$)

Intra-ethnic brokerage, where both friends are ethnic majority members, is not significantly related to mental wellbeing across all investigated generational status groups, in line with the general hypothesis on intra-ethnic vs. inter-ethnic brokerage.⁵⁰ However, for second second-generation minority adolescents with one parent born abroad and the other born in Germany, the association between intra-ethnic brokerage where both friends are ethnic minority members

⁵⁰ As a reminder, the respective hypothesis (hypothesis 2) in the main analyses of Study 2 was: The negative association between brokerage and mental wellbeing is stronger for brokerage between friends with different ethnic backgrounds (inter-ethnic brokerage) than for brokerage between friends with the same ethnic background (intra-ethnic brokerage) (see Chapter 3.3.3)

and have the same ethnic origin and mental wellbeing is negative and statistically significant ($b=-0.070$, $p < 0.01$).

This preliminary examination indicates that, in contrast to other ethnic minority groups, for ethnic minority adolescents with one foreign and one native (German) born parent, inter-ethnic brokerage is not statistically significantly related to lower mental wellbeing. This supports the notion that mixed ethnic parentage might be an individual trait that could buffer the negative effect of inter-ethnic brokerage on mental wellbeing and, thereby, potentially, make it easier for inter-ethnic brokers with a mixed-ethnic background to weave formerly unconnected friends together and promote social integration. Yet, further investigations are necessary. It is for example an open question whether mixed-ethnic parentage is a general mechanism. In principle, the assumed mechanism should work similarly for ethnic minority students with two foreign-born parents that have different ethnic origins. However, this preliminary analysis only identifies mixed-ethnic parentage where one parent born abroad and the other born in Germany.

Table A2. Results of linear regression analysis with mental wellbeing as dependent variable (cluster-robust standard errors at school grade level); N_{1st gen. minority students} = 408, N_{2nd gen. minority student, two foreign-born parents} = 693, N_{2nd gen. minority student, foreign-native born parents} = 430

	1st generation minority students		2nd generation minority students with two foreign-born parents		2nd generation minority students with one foreign-born and one German-born parent	
	β	p-value	β	p-value	β	p-value
<i>Person characteristics:</i>						
Gender (ref.: boy)	-0.407***	(0.000)	-0.408***	(0.000)	-0.581***	(0.000)
Educational Status (ref.: Hauptschule)						
Gymnasium	-0.206	(0.186)	-0.237	(0.123)	0.454**	(0.005)
Realschule	-0.055	(0.595)	-0.242 ⁺	(0.072)	0.252 ⁺	(0.075)
Gesamtschule	-0.090	(0.683)	-0.212	(0.196)	0.189	(0.278)
<i>Friendship network characteristics:</i>						
Number of friends	0.121*	(0.044)	0.082**	(0.007)	0.074*	(0.034)
Number of friends with diff. ethnic origin	-0.075	(0.163)	0.003	(0.910)	-0.081*	(0.026)
<i>Minority/majority brokerage: Intra-ethnic brokerage</i>						
Number of intra-ethnic minority open triads (both friends ethnic minority, same ethnic origin)	-0.010	(0.806)	0.038	(0.248)	-0.070**	(0.006)
Number of intra-ethnic majority open triads (both friends ethnic majority)	0.033	(0.216)	-0.003	(0.817)	0.023	(0.144)
<i>Minority/majority brokerage: Inter-ethnic brokerage</i>						
Number of <i>inter-ethnic</i> open triads (one ethnic minority and one ethnic majority friend)	-0.039*	(0.043)	-0.033***	(0.001)	-0.016	(0.207)
Number of <i>inter-ethnic</i> minority open triads (both friends ethnic minority, different ethnic origins)	0.003	(0.850)	-0.031***	(0.000)	0.004	(0.703)
<i>School grade characteristics:</i>						
Total number of students	0.002	(0.411)	0.003 ⁺	(0.056)	-0.002	(0.199)
% majority students	0.451	(0.180)	-0.047	(0.831)	-0.374	(0.200)
Constant	3.184	(0.185)	3.324	(0.154)	3.886	(0.184)
R ²	0.076		0.095		0.137	
N	408		693		430	

Note: p-values in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001.

Declaration on the use of generative AI and AI-assisted technologies

The author used *ChatGPT-3.5*, *ChatGPT-4o/4o mini*, *ChatGPT-5* (versions from February 2023 to September 2025); *Claude 3.5 Sonnet*, *Claude Sonnet 4* (version from May 2025 to September 2025); *DeepL Pro* and *Grammarly Pro* during the preparation of this work to improve codes for statistical analyses and to improve the readability and language of the writing of this work.

After using these AI tools, the author reviewed and edited the content as needed manually and takes full responsibility.

Overview AI and AI-assisted technologies used:

AI tools used	Purpose of use	Parts of the work affected
Anthropic's Claude Sonnet 3.5 and Claude Sonnet 4; last accessed: 17.09.2025 Open AI's ChatGPT GPT-3.5, GPT-4o/4o mini, GPT-5 ; last accessed: 21.09.2025 DeepL, DeepL Pro; last accessed: 21.09.2025	To improve writing: Proofreading text to refine language and readability (conciseness, grammar and spelling, academic writing style, citation style)	Entire work except Chapter 2
Open AI's ChatGPT GPT 3.5; last accessed: 05.06.2023	To improve codes for statistical analyses in R	Analyses of Chapter 4
Grammarly Pro, last accessed: 21.09.2025	Correction of grammatical and stylistic errors	Entire work except Chapter 2

Declaration on oath

Affidavit

according to § 8 paragraph 3 of the doctoral degree regulations of

February 17, 2015

I hereby affirm in lieu of oath that I have prepared the submitted work independently and without using any other than the specified aids. Statements, data and concepts taken directly or indirectly from other sources are identified with reference to the source. In the selection and evaluation of the following material, the persons listed below helped me in the manner described, for a fee / free of charge (underline as appropriate):

Other people, in addition to the co-authors listed in the introduction to the work, were not involved in the content-related preparation of the present work. In particular, I did not make use of the paid help from mediation or advisory services. Nobody has received direct or indirect monetary benefits from me for work that is related to the content of the submitted dissertation.

The thesis has not yet been submitted to another examination authority in the same or a similar form, either in Germany or abroad.

I assure you that to the best of my knowledge, I have told the pure truth and have not concealed anything.

I confirm that the submitted electronic version corresponds in full to the submitted printed version.

I am aware of the criminal liability of a false affidavit, namely the threat of punishment according to § 156 StGB with an imprisonment of up to three years or with a fine in the case of intentional commission of the act or according to § 161 Paragraph 1 StGB up to one year imprisonment or fine in the case of negligent commission.

Köln, 22.09.2025

Place, Date

Signature

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- 11/2013 – 03/2015 *Student Assistant* in the DFG-funded project „Violence and suicide in juvenile detention“, Prof. Dr. Frank Neubacher, Institute of Criminology, University of Cologne
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- 10/2010 – 09/2011 *Student Assistant* in the project „Ethnic Inequalities in Educational Success“, project leader: Prof. Dr. Hartmut Esser, MZES, University of Mannheim

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Bachelor thesis: *„Similar Challenge - Different Approaches: How do Integration Policies targeted at Immigrants differ between Denmark and Sweden?“* (Grade: 1,0)

Cologne, 22.09.2025