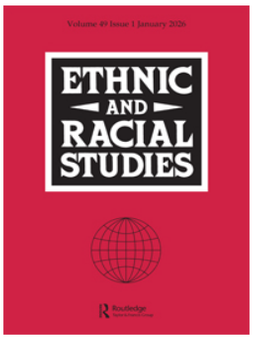

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Gender segregation in the friendship networks of Muslim youth in Germany: the role of chastity norms

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ABSTRACT

Western Muslim youth engage less in romantic relationships than their non-Muslim peers, an observation usually attributed to chastity norms that oppose Muslim youths' premarital sexual activity. In this study, I ask whether chastity norms also shape cross-gender interaction beyond romantic relationships and lead to fewer cross-gender friendships among Muslim than non-Muslim youth. To isolate the consequences of chastity norms from institutionalized practices of gender segregation in Muslim religious communities, I study friendship-making in German coeducational schools, which provide ample opportunities for cross-gender friendships. I apply multilevel exponential random graph models to large-scale data on adolescents' school-based friendship networks, finding cross-gender friendships to be generally infrequent but notably rarer among Muslim than non-Muslim youth. However, this lack of cross-gender friendships is limited to Muslim youth who hold strong chastity norms, while more liberal Muslim youth have as many cross-gender friends as non-Muslims. Among non-Muslims, chastity norms are unrelated to cross-gender friendships.

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KEYWORDS Muslim; gender; friendship; cross-gender; norms; religion

Introduction

Throughout childhood, the friendship networks of boys and girls are highly gender-segregated (Maccoby 1998). Gender homophily, the tendency to make same- rather than cross-gender friends, only starts to decrease in early adolescence, and friendship networks slowly become more gender-integrated as adolescence progresses (Mehta and Strough 2009; Strough and Covatto 2002). These emerging cross-gender friendships are important both for adolescents' individual development and for societal gender

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relations. Cross-gender friendships provide adolescents with social skills and perspective-taking essential for navigating adult life's mixed-gender social and work environments and for successfully engaging in romantic relationships (McDougall and Hymel 2007; Mehta and Strough 2009). They also are an important corrective to same-gender friendships, which can foster gender stereotypes, traditional gender ideologies, and sexist attitudes (Jenkins, Xiao, and Martin 2023; Keener, Mehta, and Strough 2013; Kretschmer 2024; Leaper 2022; Mehta and Strough 2009). Adolescent cross-gender friendships thus serve various developmental functions.

At the same time, cross-gender interaction comes under closer scrutiny in adolescence, making cross-gender friendships challenging for some adolescents. After the onset of puberty, many youth develop a romantic interest in the other gender so that cross-gender friendships can be perceived as a first step towards romantic partnerships (Furman and Rose 2015). These teenage romantic relationships have become a cornerstone of the transition to adulthood for many secular Western youth (Collins, Welsh, and Furman 2009). However, due to strong chastity norms that oppose premarital sexuality, teenage dating faces greater suspicion in highly religious families, particularly among ethno-religious minorities (Cense 2014; Saharso et al. 2023). The clearest evidence of strong and widespread chastity norms exists for Muslim communities in the West (Hennink, Diamond, and Cooper 1999; Kogan and Weißmann 2020; Saharso et al. 2023) and, in line with this finding, Western Muslim youth engage less in romantic relationships and sexual activity than their non-Muslim peers (de Graaf et al. 2017; Yahyaoui et al. 2013; Yip and Page 2016).

However, the influence of chastity norms is not necessarily restricted to romantic relationships, as these norms can also have spillover effects on cross-gender friendships. Again, evidence of the consequences of chastity norms on cross-gender interaction *beyond* romantic relationships is most robust in Muslim communities. In many Muslim-majority societies, chastity norms have traditionally inspired separation between the social lives of men and women to avoid risks of sexual temptation (Velayati 2016). In the West, many Muslim communities also practice gender separation in the mosque and during other religious activities, and some consider it an appropriate means to enforce chastity norms (Altinyelken, Akhtar, and Selim 2022; Scourfield et al. 2013; Williams, Irby, and Warner 2017). Within Muslim communities, chastity norms, therefore, regulate not only romantic relationships but also constrain cross-gender interaction more generally, interfering with Muslim youths' cross-gender friendship-making.

Outside of their religious community, however, Muslim youth are consistently exposed to cross-gender interaction in highly gender-integrated Western societies (Altinyelken 2022). This holds most clearly for Western schools, which are overwhelmingly coeducational and require cross-gender

interaction on a daily basis. Other than within gender-segregated religious communities, it is not obvious whether Muslim youth refrain from cross-gender friendships in these gender-integrated contexts as well.

In this study, I ask how frequently Muslim youth engage in cross-gender friendships in Western coeducational schools, how this compares to non-Muslim adolescents, and how cross-gender friendship-making is shaped by chastity norms.[1] So far, we know little about how Muslim youth make same- and cross-gender friendships in Western schools. None of the few previous studies on the cross-gender friendships of Muslim youth differentiate between different contexts of friendship-making (Basit 1997; Hennink, Diamond, and Cooper 1999; McGrath and McGarry 2014; Sarroub 2010). Their key finding – that same-gender friendships predominate over cross-gender friendship – is not surprising, as Muslim youths' opportunities to make cross-gender friends are limited in many out-of-school contexts. These studies also all are qualitative case studies that focus on single Muslim communities and do not provide a comparison between the cross-gender friendships of Muslim and non-Muslim youth. However, this comparison is vital to evaluating whether Muslim youths' cross-gender friendship-making is distinct from that of other adolescents. After all, even as their friendship networks become more gender-integrated over time, gender homophily persists and remains strong among Western non-Muslims as well (Poulin and Pedersen 2007; Strough and Covatto 2002).

I address these limitations of previous research by assessing Muslim and non-Muslim youths' same- and cross-gender friendships with large-scale network survey data from the CILS4EU project collected in German schools (Kalter, Kogan, and Dollmann 2019). With this data, I first establish how strong gender segregation in school-based friendship networks is among Muslim youth and how it compares to gender segregation in the friendships of non-Muslim youth. Then, I more directly investigate the spillover effects of chastity norms on both Muslim and non-Muslim youths' cross-gender friendships. Finally, I also assess the contribution of parental chastity norms to school-based cross-gender friendship-making.

Background

Religion, romance, and sexuality in adolescence

In most Western societies, romantic relationships have become a "hallmark of adolescence" (Collins, Welsh, and Furman 2009). By late adolescence, a vast majority of Western youth have been involved in at least one romantic relationship (Carver, Joyner, and Udry 2003). However, romantic relationships also trigger concerns, especially among parents, and particularly regarding

issues related to sexual activity. While, in principle, premarital sex is widely accepted in secular Western societies (Kalmijn and Kraaykamp 2018; Kogan and Weißmann 2020), parental worries about its appropriate timing and circumstances remain widespread (Longmore et al. 2009). However, concerns are much stronger in highly religious families (Kogan and Weißmann 2020). Most major religions condemn sex before marriage and instead promote premarital chastity, so adolescent romantic relationships and their potential for sexual activity are a fundamental threat to religious families (Beekers and Schrijvers 2020; Cense 2014; Saharso et al. 2023).

However, in many Western Christian communities, norms against premarital sex have lost their urgency. Over time, mainline Christian churches have become less insistent on premarital chastity (Kogan and Weißmann 2020; Vignoli and Salvini 2014). At the same time, religiosity has declined substantially among many Christians in Western societies (Pew Research Center 2018). Germany, the context of this study, is a case in point: As of 2022, more than one-third of the population identifies as non-religious despite having largely been raised in Christian-heritage families (Müke et al. 2023). While 50% of the population still identify as Christian, only a minority actively practices their faith (Müke et al. 2023). With this decline in religiosity, many Christians have started to only selectively comply with religious rules, frequently shedding norms about sexuality (Kalmijn and Kraaykamp 2018; Kogan and Weißmann 2020).

By contrast, chastity norms continue to prevail among devout Christians and many ethnoreligious minorities (Beekers and Schrijvers 2020; Hawkey, Ussher, and Perz 2018; Saharso et al. 2023). Compared to other minorities, chastity norms are particularly widespread and strong among Western Muslims (Hennink, Diamond, and Cooper 1999; Saharso et al. 2023; Yip and Page 2016). On the one hand, this reflects persistently high levels of religiosity among Western Muslims (Jacob and Kalter 2013), also in the German context (Müke et al. 2023), as adherence to these norms rises with religiosity (Glas 2023; Saharso et al. 2023). On the other hand, family reputation is strongly linked to premarital sexual modesty in many Muslim immigrant-origin communities, so adolescent sexual activity can threaten family honor (Abo-Zena 2019; Cinthio 2015; Saharso et al. 2023). Of course, religiosity and adherence to chastity norms are far from universal among Western Muslims (Glas 2023; Kogan and Weißmann 2020) but still tend to be more prevalent than in other religious groups (Hennink, Diamond, and Cooper 1999; Saharso et al. 2023; Yip and Page 2016).

Although, in principle, chastity norms apply to male and female Muslim youth, they frequently are stricter for Muslim girls (Cense 2014; Hendrickx et al. 2002), as family reputation mostly depends on female chastity (Cinthio 2015; Saharso et al. 2023). Still, many Muslim boys also hold reservations against premarital sex (Saharso et al. 2023; Yip and Page 2016).

In line with the prevalence of strong chastity norms among both Muslim youth and their parents, romantic relationships have been reported to be rarer among Muslim adolescents than their Christian and non-religious Western peers (de Graaf et al. 2017; Yahyaoui et al. 2013). If they are involved in romantic relationships, Muslim youth are also less likely to engage in physical intimacy than their non-Muslim peers (Beekers and Schrijvers 2020; Saharso et al. 2023).

Beyond romantic relationships: chastity norms and cross-gender friendships among Muslim youth

The effects of chastity norms on Muslim youths' romantic relationships are hardly surprising, as chastity norms directly target these relationships. In some contexts, however, chastity norms may not only constrain romantic relationships but also other forms of cross-gender interaction.

Within Muslim communities, chastity norms have traditionally limited many forms of close cross-gender interaction outside of the immediate family (Velayati 2016; Williams, Irby, and Warner 2017) and thus have been consequential not only for romantic relationships. This is reflected most directly in the separation of men from women in social gatherings, a practice that tends to persist in many Muslim communities in the West (Altinyelken, Akhtar, and Selim 2022; Velayati 2016). Men and women do not only typically attend mosque separately; many of the religious activities Muslim youth are involved in, such as non-formal Islamic education or religious summer camps and excursions, are also gender-segregated (Altinyelken, Akhtar, and Selim 2022; Scourfield et al. 2013; Williams, Irby, and Warner 2017). While justifications for this maintenance of boundaries between the genders vary (Altinyelken 2022), they are often explicitly motivated by an attempt to avoid inappropriate cross-gender relations and sexual temptation (Altinyelken, Akhtar, and Selim 2022; Williams, Irby, and Warner 2017). By limiting opportunities for cross-gender interaction, chastity norms thus constrain cross-gender friendships within Western Muslim religious communities.

Outside of their religious communities, however, many Muslim youth have ample opportunities for cross-gender interaction. Most domains of Western societies are gender-integrated, and Muslim youth participate in these contexts on a daily basis, particularly in coeducational schools (Altinyelken 2022). Rather than of limited opportunities, the initiation of cross-gender friendships in these contexts becomes a question of *gender homophily*, youths' tendency towards and preference for same- over cross-gender friendships. This does not negate the influence of youths' own, their parents', peers', or the religious community's chastity norms on cross-gender friendship-making. However, rather than by restricting opportunities for cross-gender interaction, normative influence in these contexts operates by

limiting Muslim youths' openness to friendships across gender lines, amplifying their gender homophily.

According to past research, Western Muslim youth hold widely diverging opinions on how compatible close cross-gender interaction is with strong chastity norms. For many Muslim youth, cross-gender interaction is a normal part of everyday (school) life (Altinyelken 2022; Basit 1997), and many of them effortlessly "code-switch" (Altinyelken 2022) between different regulations on cross-gender interaction in religious communities and the school context. Some Muslim youth with strong chastity norms also explicitly speak up for cross-gender friendships (Maddanu 2016; Mir 2009), at least when boundaries are imposed that limit physical contact and other behavior that could be perceived as a signal of romantic or sexual interest. For these youth, strong chastity norms and cross-gender friendships are no contradiction, so their gender homophily is unlikely to be strongly shaped by chastity norms.

However, other Muslim youth have internalized family or community norms that favor more wide-ranging restrictions to cross-gender relations (Altinyelken 2022; Mir 2009). In line with traditional justifications of gender segregation, some of these youth consider close cross-gender interaction an unnecessary risk of sexual temptation (Giuliani, Olivari, and Alfieri 2017; Grønli Rosten and Smette 2023; Sarroub 2010). Therefore, they avoid close cross-gender interactions on more principle grounds and consider cross-gender friendships inappropriate (Cinthio 2015; Grønli Rosten and Smette 2023), suggesting stronger gender homophily. In past research, this link between chastity norms and a wide-ranging avoidance of cross-gender interaction has primarily been documented among Muslim *girls* (Basit 1997; Giuliani, Olivari, and Alfieri 2017; McGrath and McGarry 2014). This is in line with the greater strength of chastity norms among Muslim girls (Cense 2014; Hendrickx et al. 2002) and stronger family and community efforts to ensure that Muslim girls internalize these norms (Abo-Zena 2019; Giuliani, Olivari, and Alfieri 2017; Hennink, Diamond, and Cooper 1999).

However, the regulation of school-based cross-gender friendships need not only originate from youths' internalized norms but can also reflect the influence of third parties, such as parents, peers, or the religious community (Altinyelken 2022; Hennink, Diamond, and Cooper 1999; Saharso et al. 2023). Past research documents both instances of peer social control of Muslim youths' cross-gender interaction (Altinyelken 2022) and complications of cross-gender relations due to expectations of the religious community (Hennink, Diamond, and Cooper 1999; Mir 2009). Most clearly, however, disapproval of close cross-gender interaction is visible among some Muslim *parents*, and it again tends to be stronger for girls than for boys (Basit 1997; McGrath and McGarry 2014; Saharso et al. 2023). Accordingly, some Muslim girls report that their parents do not allow them to participate in

activities that provide cross-gender exposure, such as going out with friends or visiting discos and parties (Abo-Zena 2019; McGrath and McGarry 2014). In some cases, parents also explicitly prohibit friendships with cross-gender peers or even any closer interaction beyond the strictly necessary (Cinthio 2015; Hennink, Diamond, and Cooper 1999; McGrath and McGarry 2014).

Chastity norms and the cross-gender friendships of non-Muslim youth

Though more widespread among Muslim youth, some non-Muslims also hold strong chastity norms. This is rare among non-religious and secular Christian adolescents (Kogan and Weißmann 2020; La Roi and Mood 2023) but more frequent among devout Christians (Beekers and Schrijvers 2020; Williams, Irby, and Warner 2017). If Christian youth also interpret these norms to not only constrain romantic relationships but cross-gender relations more broadly, they may interfere with cross-gender friendship-making just like those of Muslim adolescents.

However, previous qualitative research suggests that, in Western Christian communities, chastity norms are less associated with broad restrictions to cross-gender interaction than in Muslim communities. In both the United States and Western Europe, conservative Christian communities frequently receive cross-gender friendships positively and even tolerate youths' romantic relationships as long as physical intimacy is postponed (Beekers and Schrijvers 2020; Williams, Irby, and Warner 2017). Practices of gender separation are rare in these communities, and they primarily uphold chastity norms by appeals to individual responsibility and peer surveillance (Beekers and Schrijvers 2020; Williams, Irby, and Warner 2017). Therefore, even when the chastity norms of devout Christian adolescents and their parents are as strong as those of Muslim youth, they are less likely to result in strong gender homophily.

Summary and hypotheses

Whether chastity norms constrain in-school cross-gender friendships or not depends on whether these norms are interpreted to only regulate romantic relationships or to affect cross-gender relations more broadly. Though past research suggests that many Muslim youth interpret chastity norms only in terms of their consequences for romantic relationships, some also ascribe to broader conceptualizations that disapprove of close cross-gender interaction more generally. This is further reinforced by restrictions some Muslim parents impose on their children's cross-gender interaction. Chastity norms are less widespread among non-Muslim youth, and those non-Muslims who hold them – mostly devout Christians – are more likely to interpret them

in terms of constraints to intimacy in romantic relationships only rather than in terms of restrictions to cross-gender friendship-making.

Therefore, I expect that *gender homophily, the tendency to make same- rather than cross-gender friends, is stronger among Muslim than non-Muslim youth (Hypothesis 1)*. As chastity norms apply more strongly to Muslim girls than boys, I also expect *stronger gender homophily among Muslim girls than Muslim boys (Hypothesis 2)*. With chastity norms more likely to broadly restrict cross-gender interaction among Muslim than non-Muslim youth, I hypothesize *chastity norms to come with stronger gender homophily among Muslim youth but less so, if at all, among non-Muslim youth (Hypothesis 3)*. Therefore, I expect that after *accounting for chastity norms and their group-specific effects, the gap between Muslim and non-Muslim youths' gender homophily shrinks (Hypothesis 4)*. Finally, at least some parents may retain an influence on their children's school-based friendships, so I also expect that, among Muslim youth, *parental chastity norms come with stronger gender homophily (Hypothesis 5)*.

Data and methods

Statement of ethics

To investigate the cross-gender friendships of Muslim and non-Muslim youth, I use data from the German part of the *Children of Immigrants Longitudinal Survey in Four European Countries* (CILS4EU; Kalter et al. 2016, 2019). Prior to data collection, ethical approval for the CILS4EU survey was obtained (see Regional Ethics Committee, Stockholm, 2010/1557-31/5), and respondents provided informed consent before participating.

Data

In 2010-2011, CILS4EU surveyed 14–15-year-old students in randomly selected German schools. Because CILS4EU oversampled schools with a high proportion of ethnic minority students, the data contains information on a substantial number of Muslim youth. In each school, all students in two randomly selected 9th-grade classrooms were surveyed. Next to a questionnaire on individual characteristics, CILS4EU also contained a sociometric questionnaire to assess students' friendships with classmates and a survey with one of the student's parents (in most cases, the mother).

In total, 5,013 students in 271 classrooms participated in the first wave of the German sample. In the analysis, I include all students who provide valid information on their religious affiliation and all classrooms containing both Muslim and non-Muslim youth. Given these inclusion criteria, the analytical sample consists of 3,913 students nested in 209 classrooms.

Variables

Friendship networks

Next to a survey on adolescents' characteristics, CILS4EU also contained a sociometric questionnaire that provides data on adolescents' classroom friends. Students could nominate up to five best friends from a list of all students in their classroom. As all students in a classroom were sampled, data on the complete classroom friendship network is available. On average, students nominated 3.73 friends.

Gender

Students could self-identify as male or female; 48% of the sample are girls, and 52% are boys.

Religion

Students could indicate their religious affiliation from a predefined list or as an open-ended answer. *Muslim* students constitute 30% of the sample and *non-Muslims* the remaining 70%. In some of the analyses, I further disaggregate non-Muslims into *Christian* respondents (78% of non-Muslim students), respondents with *no religious affiliation* (15% of non-Muslim students), and respondents with *other religious affiliations* (7% of non-Muslim students). Given the small number of students with another religious affiliation (204 in total), estimates for this group are very imprecise and can hardly be interpreted substantively. Therefore, I do not discuss them separately in the results section, but I return to this issue in more detail in the discussion.[2]

Chastity norms

Both adolescents and parents were asked whether they think it is acceptable for a *couple to live together without being married*. Respondents could indicate unmarried cohabitation to be "always OK" (0), "often OK" (1), "sometimes OK" (2), or "never OK" (3), and I use their response as a measure of chastity norms. Though this item does not refer to premarital sex explicitly, cohabitation without marriage is highly suggestive of premarital sexual activity (Kogan and Weißmann 2020). Accordingly, this measure has been used to capture sexual attitudes in previous research with the CILS4EU data (Kogan and Weißmann 2020), and other research also shows that attitudes towards cohabitation and premarital sex are strongly related and similarly predicted by various covariates (Ogland and Hinojosa 2012).

Ethnic background and socioeconomic status

I capture students' ethnic backgrounds with data on their own, their parents', and their grandparents' country of birth. I classify students with all ancestors born in Germany as native and other students as immigrant-origin according

to their own and their ancestors' country of birth, in line with standard procedures for the CILS4EU data (Dollmann, Jacob, and Kalter 2014). I capture socioeconomic status with information on parents' occupational status measured on the International Socio-Economic Index (ISEI) scale. If available, I use data from the parental survey; otherwise, I use the information adolescents provide. I capture socioeconomic status with the ISEI score for the parent with the higher occupational status.

Missing values

I use multiple imputation with chained equations to impute missing values for all covariates.[3] This primarily affects the measure of parental chastity norms because 18% of parents did not participate in the survey. All analyses are based on a total of 30 imputed data sets, and results are combined across these 30 imputations using Rubin's rules (White, Royston, and Wood 2011).

Method: multilevel exponential random graph models

I use *multilevel exponential random graph models* to analyze Muslim and non-Muslim adolescents' cross-gender friendships. Exponential random graph models (ERGMs, Lusher, Koskinen, and Robins 2013) model the structure of cross-sectional social networks and estimate the probability of friendship ties as a function of covariates while keeping the remainder of the friendship network constant. ERGMs can account for the effects of individual characteristics (e.g. being male or female), dyadic characteristics (e.g. sharing the same gender), and other network configurations (e.g. receiving someone else's friendship nomination) on friendship-making. Multilevel ERGMs are a recent extension to ERGMs that model the structure of multiple networks to obtain a joint set of estimates across networks (Stewart et al. 2019). The classrooms in the CILS4EU data are too small to estimate complex ERGMs on single networks, particularly for rare events like cross-gender friendships. Multilevel ERGMs solve this problem by combining estimates across multiple smaller classroom networks.

Like regular ERGMs, multilevel ERGMs are estimated with Markov chain Monte Carlo simulation; all reported models have converged. To facilitate interpretation, I report average marginal effects (AMEs) on the probability of a friendship tie for all ERGM coefficients, which have recently been introduced into the ERGM framework (Duxbury 2023). Other than ERGM logit coefficients, AMEs can be interpreted in terms of their substantive size.

Model specification

The substantive focus of the multilevel ERGMs is on gender homophily, i.e. adolescents' tendency to make same- vs. cross-gender friends. I capture gender homophily with the *nodematch gender* effect, which estimates the

likelihood of same- vs. cross-gender friendships net of all other effects in the model. To investigate whether gender homophily varies by religion and chastity norms, I include interaction effects of the *nodematch gender* effect with these covariates.

All models account for a series of additional effects. The *edges* parameter captures the baseline probability of friendships and is akin to a regression constant. I also account for *reciprocity* and *transitive closure*, two structural network effects. Reciprocity (modeled with the *mutual* effect) accounts for adolescents' tendency to reciprocate incoming friendship nominations. Transitive closure (modeled with the *GWESP* effect*)* accounts for the tendency to become friends with one's friends' friends. Not accounting for these structural network effects risks overestimating gender homophily. In addition, I account for the tendency to befriend classmates with the same religious background, ethnic background, and similar socio-economic status by including the *nodematch religious background*, *nodematch ethnic background,* and *absdiff socio-economic status* effect. These friendship selection processes based on shared sociodemographics are critical additional forces determining the structure of adolescent friendship networks.

Results

Chastity norms and cross-gender friendships among Muslim and non-Muslim youth

Previous research suggests chastity norms to be more widespread among Muslim than non-Muslim youth in the West. Figure 1, which displays attitudes toward cohabitation among Muslim, Christian, and non-religious adolescents, supports this observation. 38% of Muslim youth consider cohabitation to be

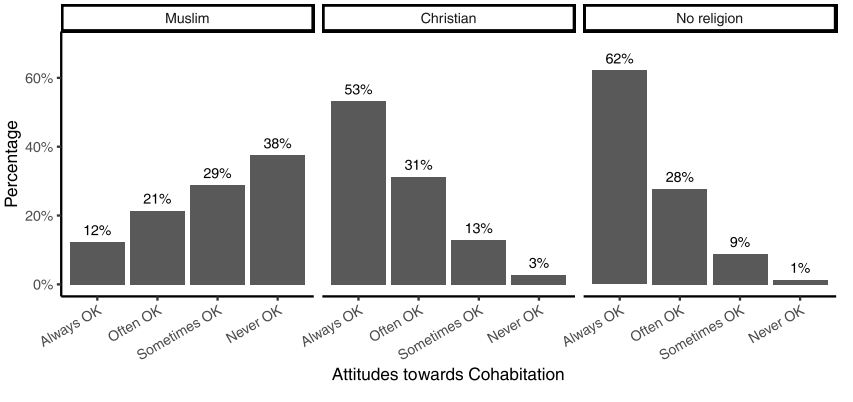

Figure 1. Attitudes towards cohabitation among Muslim, Christian, and non-religious youth.

never OK. By contrast, the proportion of non-Muslim youth who consider cohabitation never OK is negligible, with only 3% of Christian and 1% of non-religious youth holding this opinion. Conversely, only 12% of Muslim youth consider cohabitation always OK, while a majority of Christian (53%) and non-religious youth (62%) hold no reservations about cohabitation at all.

Are differences in chastity norms also reflected in differences in cross-gender friendships? To investigate this, Figure 2 provides descriptive information based on two measures: the average proportion of cross-gender friends in adolescents' friendship networks (top row) and the proportion of adolescents with any cross-gender friends (bottom row).

The left panel depicts the prevalence of cross-gender friendships in the overall sample. Cross-gender friendships are generally rare in adolescents' classroom networks: Only 34% of all adolescents nominate *any* cross-gender friends in class, and, on average, only 13% of adolescents' friendships cross gender lines.

According to the middle panel, gender segregation prevails among both Muslim and non-Muslim youth but also differs between both groups. While 36% of non-Muslim youth nominate at least one cross-gender friend, only 29% of Muslim adolescents do so, a difference of seven percentage points ($p < .001$). Similarly, an average of 14% of non-Muslims' friendships cross gender lines, but this is only 10% for Muslims' friendships. Given the overall paucity of cross-gender friendships, this difference is not only statistically ($p < .001$) but also substantively significant: For every two cross-gender

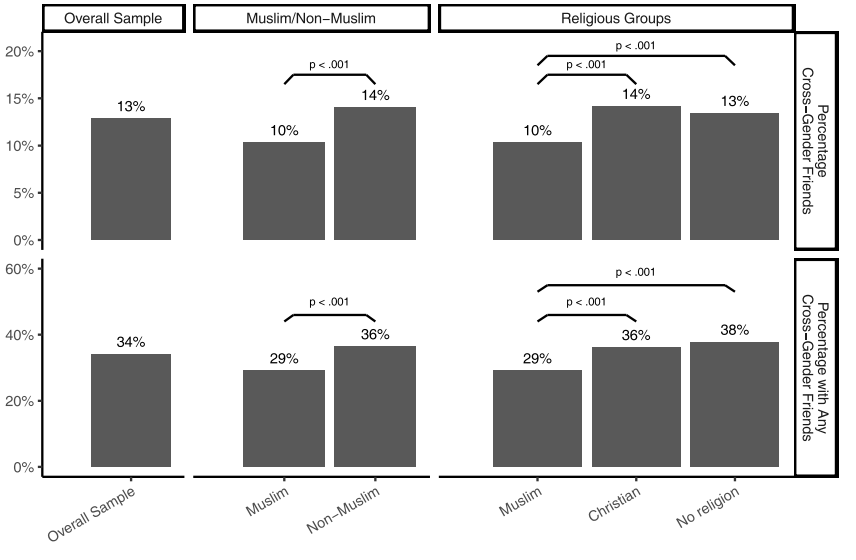

Figure 2. Percentage of cross-gender friendships and percentage of adolescents with any-cross-gender friends.

friendships among Muslim youth, there are almost three cross-gender friendships among non-Muslim youth.

The right panel further differentiates non-Muslims into *Christian* and *non-religious* youth, but differences between both groups are negligible: 14% of the friendships of Christian and 13% of the friendships of non-religious youth are with cross-gender peers. 38% of non-religious adolescents indicate to have cross-gender friends, slightly more than the 36% among Christians. However, none of these differences is statistically significant. While Christian and non-religious youth thus have very similar patterns of gender segregation, they markedly differ from Muslim youth, who have fewer cross-gender friends.

Multilevel ERGM analysis: gender homophily among Muslim and non-Muslim youth

In Figure 3, I investigate whether these differences persist in multilevel ERGM analyses (full model results in Table A1 in Appendix A). The ERGMs account for adolescents' opportunities for cross-gender friendships, structural network processes, and the contribution of ethnic, religious, and socio-economic background to friendship-making. Rather than descriptive patterns of gender segregation, the ERGMs thus capture *gender homophily*, adolescents' tendency to make same- rather than cross-gender friends, adjusted for all the other processes considered in the model.

The key conclusions from the descriptive analysis also hold up in the multilevel ERGM results: For the overall sample, the top panel of Figure 3 shows

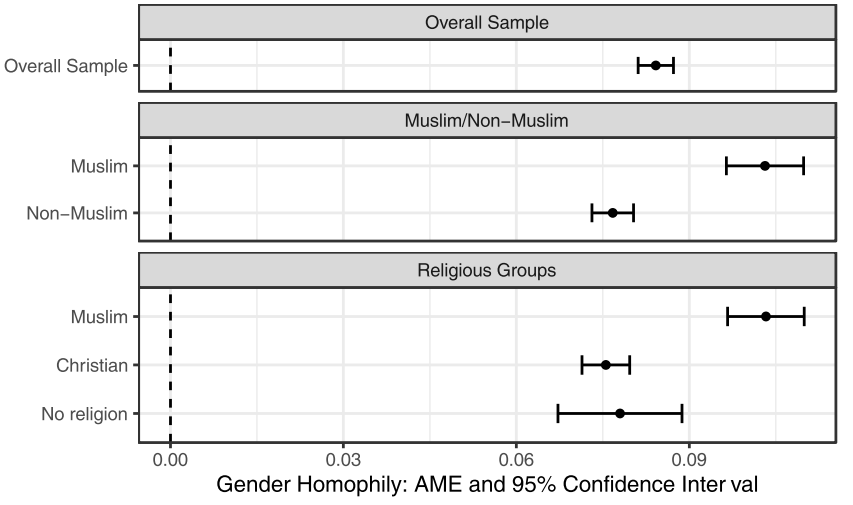

Figure 3. Multilevel ERGM estimates of gender homophily in the overall sample and by religious group (full results in Appendix A, Table A1).

substantial gender homophily: Students with the same gender are 8.4 percentage points more likely to be friends than students of different gender ($p < .001$). The baseline probability of a friendship is about 21%.[4] Accordingly, having the same gender increases the average probability of a friendship by 40%, attesting to the prime importance of gender in adolescent friendship networks. Gender homophily is much stronger than the tendency to make same-ethnic or same-religious friends (1.0 and 1.1 percentage points each, about 5%; see Appendix A, Table A1) or to make friends with peers who have similar socio-economic status (1.5 percentage points when comparing maximum similarity to maximum dissimilarity, about 7%).

The middle panel shows that gender homophily is stronger among Muslim than non-Muslim youth. While non-Muslim youth are 7.7 percentage points more likely to make same- than cross-gender friends, this difference is 10.3 percentage points among Muslim youth. With 2.6 percentage points, the difference in gender homophily between Muslim and non-Muslim youth is statistically significant ($p < .001$) and more sizable than the consequences of sharing an ethnic, religious, or socioeconomic background for friendship-making. The lower panel shows gender homophily to be very similar among Christian and non-religious youth and notably weaker than among Muslim youth ($p < .001$ for both differences).

Supporting Hypothesis 1, these results show that gender homophily is stronger among Muslim than non-Muslim youth. Unlike previous studies, the analysis controls for adolescents' opportunities to engage in cross-gender friendships. Therefore, differences are not a consequence of Muslim youths' limited access to cross-gender peers but instead driven by their individual tendency to engage in same- rather than cross-gender friendships.

Gendered gender homophily?

In line with previous research, chastity norms are stronger among Muslim girls than Muslim boys in this study. While only 28% of Muslim boys consider unmarried cohabitation never OK, 48% of Muslim girls share this conviction. Conversely, only 26% of Muslim girls consider cohabitation always or often OK, while the corresponding proportion is 42% among Muslim boys. Accordingly, if strong chastity norms prevent cross-gender friendships, the gender homophily of Muslim girls may exceed that of Muslim boys (*Hypothesis 2*). To investigate this, Figure 4 displays separate estimates of gender homophily for Muslim girls, Muslim boys, non-Muslim girls, and non-Muslim boys (full model results in Table A2 in Appendix A).

In contrast to expectations from Hypothesis 2, gender homophily is stronger among Muslim boys than Muslim girls ($p < .05$). However, this gender difference is not specific to Muslim youth. Non-Muslim boys also have stronger gender homophily than non-Muslim girls ($p < .05$), meaning that across

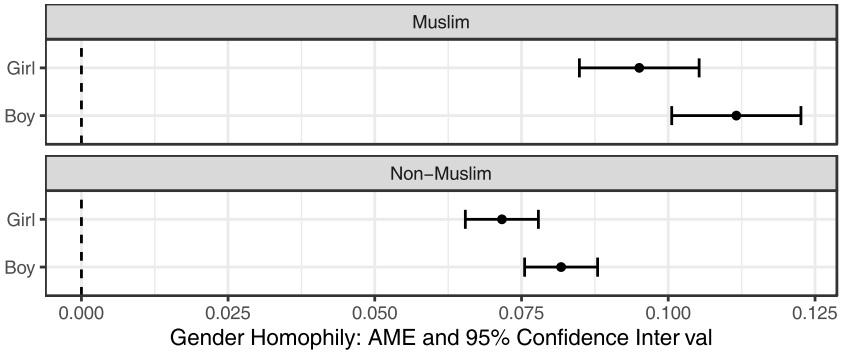

Figure 4. Gender homophily among Muslim and non-Muslim boys and girls from multilevel ERGMs (full results in Appendix A, Table A2).

religious boundaries, girls tend to be more open to cross-gender friendships. Still, because the gender difference is very similar among Muslim and non-Muslim youth, the results do not indicate that Muslim girls face specific constraints to cross-gender friendships; in the presence of such constraints, the gender gap in homophily would be expected to be smaller among Muslim than non-Muslim youth.

Chastity norms and gender homophily among Muslim and non-Muslim youth

Figure 5 turns to the question of whether cross-gender friendship-making varies by Muslim and non-Muslim youths' chastity norms (*Hypothesis 3)*. It provides estimates for variation in gender homophily according to adolescents' attitudes towards unmarried cohabitation, showing coefficients separately for Muslim and non-Muslim youth (full model results in Table A3 in Appendix A). Among non-Muslim youth, gender homophily is independent

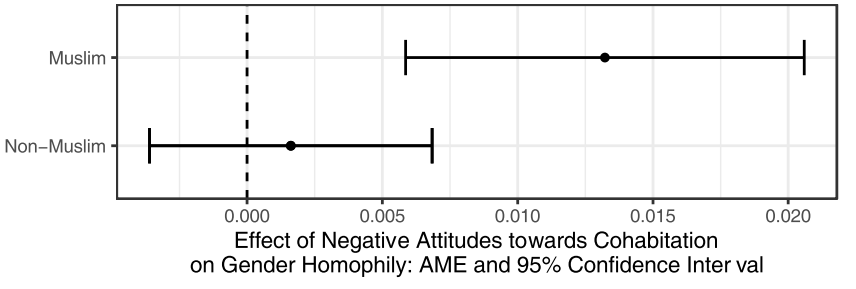

Figure 5. Variation in gender homophily by attitudes towards cohabitation among Muslim and non-Muslim youth from multilevel ERGMs (full results in Appendix A, Table A3).

of attitudes towards cohabitation, with a point estimate close to zero that is far from statistically significant ($p > .1$).[5] By contrast, more negative attitudes towards unmarried cohabitation are associated with stronger gender homophily among Muslim youth. The estimate is statistically significant ($p < .01$), as is the difference compared to non-Muslim youth ($p < .05$). Jointly, these results support *Hypothesis 3*, which expected gender homophily to vary by Muslim youths' chastity norms, but less so by non-Muslim youths' chastity norms.[6]

To illustrate the variation in gender homophily by chastity norms, Figure 6 displays predicted homophily at different attitudes towards cohabitation, separately for Muslim and non-Muslim youth. In line with the negligible coefficient for non-Muslims, Figure 6 shows that the tendency to make cross-gender friends does not vary with non-Muslim youths' attitudes towards cohabitation. By contrast, Muslim youth with more negative attitudes towards cohabitation, on average, have stronger gender homophily. Among Muslim youth who consider cohabitation always OK and thus show no sign of chastity norms, differences compared to non-Muslims disappear. However, Muslim youth who consider cohabitation never OK have substantially stronger gender homophily than their non-Muslim peers, with an estimated difference of 3.8 percentage points ($p < .001$). In line with Hypothesis 4, stronger chastity norms and their stronger consequences for cross-gender friendships can explain the difference in gender homophily between Muslim and non-Muslim youth.

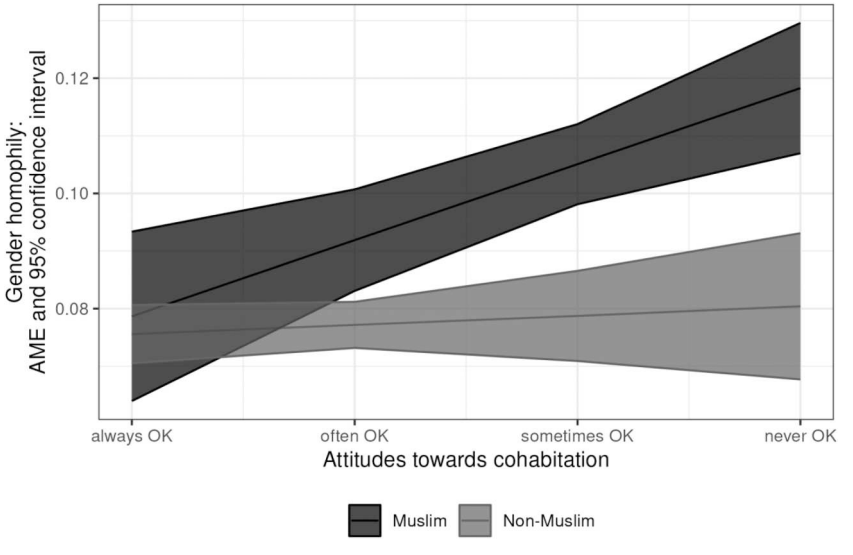

Figure 6. Predicted gender homophily by attitudes towards cohabitation among Muslim and non-Muslim youth from multilevel ERGMs (full results in Appendix A, Table A3).

With adolescents' chastity norms explaining much of the gap in cross-gender friendships between Muslim and non-Muslim youth, a strong effect of *parental* norms on top of adolescents' norms appears less likely. Indeed, Figure 7 shows that estimates for variation by adolescents' attitudes towards cohabitation remain largely unchanged when accounting for parental attitudes, while parental attitudes themselves are unrelated to cross-gender friendships among both Muslim and non-Muslim youth. Parental norms thus do not appear to be decisive for Muslim youths' in-school cross-gender friendships, rejecting *Hypothesis 5*.[7]

Chastity or religiosity? Testing the robustness of norm effects

Chastity norms tend to be part of a broader cluster of religious norms. Within this cluster, chastity norms are most clearly connected to cross-gender friendships. Still, it is possible that rather than chastity norms specifically, religious norms more generally are responsible for the observed variation in gender homophily by attitudes towards cohabitation. To differentiate this, Figure 8 assesses variation in gender homophily for different indicators of *religiosity*, which track the relevance of religious norms more generally rather than of chastity norms only (see Appendix A, Table A4 for full model results).

Figure 8 considers three indicators of religiosity: the subjective importance of religion, the frequency of prayer, and the frequency of mosque attendance. For each indicator, Figure 8 shows results from two models: in black, results from a baseline model that only assesses variation in gender homophily by the religiosity indicator, and, in grey, results from a model that estimates variation by religiosity when also controlling for attitudes towards cohabitation.

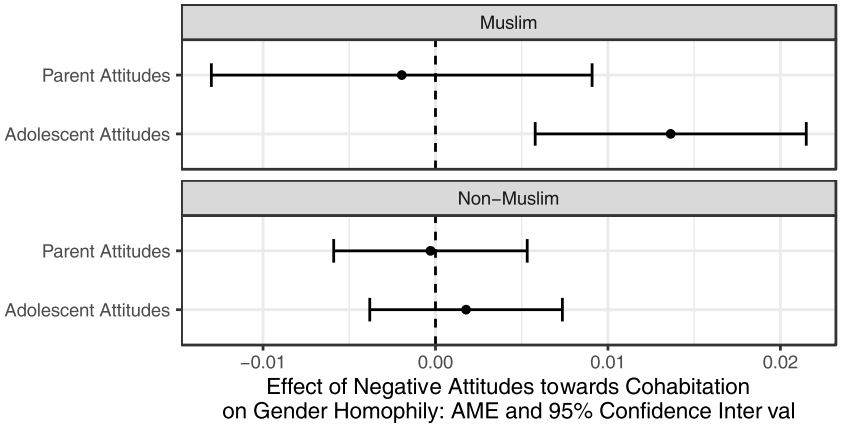

Figure 7. Variation in gender homophily by parents' attitudes towards cohabitation among Muslim and non-Muslim youth from multilevel ERGMs (full results in Appendix A, Table A3).

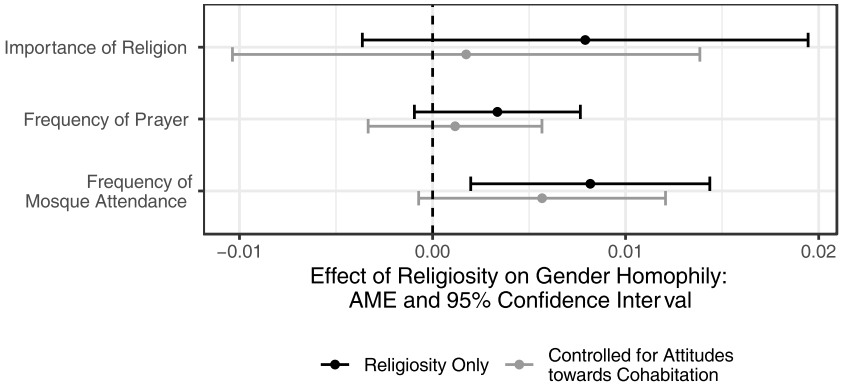

Figure 8. Variation in gender homophily by religiosity among Muslim youth from multilevel ERGMs (full results in Appendix A, Table A4).

In the baseline model, there is a tendency towards stronger gender homophily at higher religiosity for all three indicators, though it is only statistically significant for the frequency of mosque attendance ($p < .01$). However, all coefficients shrink notably when accounting for attitudes towards cohabitation. Once these attitudes are controlled for, coefficients for the frequency of prayer and the subjective importance of religion are close to zero. Furthermore, the coefficient for the frequency of mosque attendance remains only marginally significant ($p < .1$). By contrast, the coefficient for attitudes towards cohabitation remains largely unchanged and statistically significant in all models (see Appendix A, Table A4). These results suggest that chastity norms rather than broader religious norms shape cross-gender friendship-making.

Discussion

In Western societies, many Muslim youth are confronted with both gender-segregated activities in their religious communities and an everyday life embedded in gender-integrated Western schools (Altinyelken, Akhtar, and Selim 2022). In the context of religious activities, close cross-gender interaction is hardly possible for Muslim youth, in line with a key motivation for gender segregation – avoiding sexual temptation and enforcing chastity norms (Altinyelken 2022; Williams, Irby, and Warner 2017). This is very different in coeducational schools, raising the question of how Muslim youth engage in close cross-gender interaction once the constraints of segregated contexts are lifted.

Past research shows that many Muslim youth continue to hold strong chastity norms (Saharso et al. 2023; Yip and Page 2016), so it is no surprise that they engage less in adolescent romantic relationships than their non-Muslim peers (de Graaf et al. 2017; Yahyaoui et al. 2013). In this study, I

turned to Muslim youths' *cross-gender friendships*, asking whether chastity norms also constrain cross-gender interaction beyond romantic relationships. I focused on friendships in the school context, which provides Muslim youth ample opportunities for cross-gender interaction, ensuring that the tendency to engage in same- rather than cross-gender friendships reflects an individual decision rather than reproduces the opportunity structure of gender-separated religious contexts.

Investigating the classroom friendships of Muslim and non-Muslim adolescents in German schools, I found cross-gender friendships to be rare among adolescents in general but even rarer among Muslim than among non-Muslim youth. 36% of non-Muslims indicated at least one cross-gender friend, and on average, 14% of their friendships crossed gender lines, with negligible differences between Christian and non-religious youth. By contrast, only 29% of Muslim youth nominated at least one cross-gender friend, and only 10% of their friendships crossed gender lines. These differences also persisted in multivariate analyses using multilevel network models.

Among Muslim youth, those with stronger chastity norms were more likely to abstain from cross-gender friendships, while chastity norms were unrelated to cross-gender friendships among non-Muslim youth. Accordingly, Muslim youth who did not ascribe to chastity norms were just as likely to make cross-gender friends as their non-Muslim peers, while Muslim youth with strong chastity norms engaged in cross-gender friendships less frequently. These spillover effects of chastity norms on friendship-making suggest that a substantial proportion of Muslim youth interpret chastity norms to broadly restrict cross-gender interaction rather than to only narrowly regulate romantic relationships. By contrast, narrow interpretations of chastity norms that do not interfere with cross-gender friendships seem to predominate among non-Muslim youth.

Other than their own chastity norms, the norms of Muslim adolescents' parents were not associated with cross-gender friendship-making in school. Furthermore, an unexpected finding was that, though chastity norms were stronger for Muslim girls than for Muslim boys, girls were slightly more open to cross-gender friendships than boys. Muslim girls' cross-gender friendships also did not appear to be constrained by parental chastity norms, though past research suggests that Muslim parents tend to restrict Muslim girls' social interaction in particular (Hawkey, Ussher, and Perz 2018; McGrath and McGarry 2014). This may reflect that in school, where parental control is limited, Muslim girls can compensate for the restrictions to cross-gender interaction they face in other contexts. At the same time, the finding of greater openness to cross-gender friendships among girls was not specific to Muslim youth but applied to non-Muslims as well. Thus, this gender difference may also represent that, at the same age, adolescent girls are more advanced developmentally and, therefore, may be more

open to cross-gender interaction (Poulin and Pedersen 2007; Strough and Covatto 2002). Either way, this unexpected finding highlights the importance of studying not only the cross-gender friendships of Muslim girls but also Muslim boys, which has not been done in previous research.

Limitations

While these findings suggest that chastity norms complicate Muslim youths' cross-gender relations even beyond romantic relationships, some limitations must be acknowledged. To estimate variation by chastity norms, I relied on a measure referring to adolescents' attitudes towards unmarried *cohabitation* rather than towards premarital sex itself. While both types of attitudes have been shown to be closely related (Ogland and Hinojosa 2012), a direct measure of chastity norms would still be preferable.

Usually, the proxy nature of the measure should increase noise and impede finding systematic variation, so the clear association of cross-gender friends with attitudes towards cohabitation among Muslim youth is reassuring. However, one risk associated with the measure is that skeptical attitudes towards cohabitation may not, in all cases, capture a rejection of premarital sex per se, but particularly of making a sexual relationship *public* through cohabitation. Previous research suggests that, in some Muslim families, premarital sexual activity may be tacitly tolerated as long as it is not discussed in public (Saharso et al. 2023). Premarital cohabitation breaks this rule.

Throughout this study, I have also suggested that the observed link between chastity norms and cross-gender friendships emerges because chastity norms limit cross-gender friendships. However, it is also possible that cross-gender friendships change sexual attitudes, and an influence like this is conceivable particularly in friendships that entail some romantic interest. While it is not clear why the association between chastity norms and cross-gender friendships should only be observed for *Muslim* youth if friends' influence on sexual attitudes was the main force behind it, it would still be preferable to account for this mechanism directly. Unfortunately, separating both effects requires longitudinal information on both friendship networks and chastity norms, which is not available in the CILS4EU data.

The role of romantic interest in cross-gender friendships is also relevant beyond friends' potential influence on sexual attitudes. After all, whether cross-gender friendships are platonic or entail romantic interest is likely to affect how adolescents approach these friendships. While Muslim youth with strong chastity norms may consider close cross-gender interaction with a romantic interest in conflict with their norms, this is less likely for platonic friendships. Due to the different developmental statuses of same-aged adolescent boys and girls, there is usually an age gap in romantic interests and relationships (Poulin and Pedersen 2007). Therefore, many of the cross-

gender friendships observed among classmates will indeed be platonic. Still, to see whether chastity norms primarily constrain cross-gender friendships with a romantic interest or apply to all kinds of cross-gender friendships similarly, it would be desirable to further differentiate between these different types of relationships.

Finally, in the domain of norms on boundary maintenance between the genders (Altinyelken 2022), chastity norms are only one type of norm that can complicate cross-gender friendship-making. While the maintenance of gender boundaries has frequently been linked to concerns with sexuality and chastity (Beekers and Schrijvers 2020; Williams, Irby, and Warner 2017), it can also be motivated by tradition (e.g. Altinyelken 2022; Williams, Irby, and Warner 2017), broader conceptions of modesty (e.g. Zine 2001), or worries that cross-gender interaction causes distraction in the school context (e.g. Shah and Conchar 2009). Similarly, norm internalization by adolescents and the influence of parents are not the only channels through which norms can affect cross-gender friendship-making. Past research also suggests that peers may monitor Muslim youths' cross-gender relations (Altinyelken 2022) and that disapproval in the extended religious community can shape Muslim youths' social interaction (Hennink, Diamond, and Cooper 1999; Mir 2009). While adolescents' own chastity norms proved powerful in explaining cross-gender friendship-making in this study, a more fine-grained differentiation of both the different reasons for boundary maintenance between the genders and the potential enforcers of norms in further assessments is desirable.

Directions for future research

Next to addressing these limitations, this study suggests two key directions for future research. The first concerns the different contexts in which youth make same- and cross-gender friends. To ensure identical opportunities for cross-gender friendships among Muslim and non-Muslim youth, I focused on friendships in the *school context* in this study. However, adolescents also make friends outside of school. Therefore, fully capturing the extent of and the limitations to cross-gender friendship-making requires going beyond this single context. Separately considering friendships outside of schools may provide additional insights into the conditions under which parents shape cross-gender interaction, whose norms proved to have little direct influence on in-school friendships. It may also be instructive to see whether the greater openness to cross-gender friends among Muslim girls than Muslim boys documented here persists or reverses in contexts with more outside control.

A second extension relates to an analysis of a broader range of ethnoreligious groups. In the German CILS4EU data, samples were too small to

differentiate cross-gender friendships beyond Muslim, Christian, and non-religious youth. However, investigating other ethnoreligious minorities is essential to determine whether stronger gender segregation, relative to Christian and non-religious youth, is specific to Muslim adolescents or concerns ethnoreligious minorities more broadly. While the tendency to enforce chastity norms through gender separation has traditionally been documented in many Muslim communities, this may not be the only reason for the association of chastity norms and cross-gender friendships. Instead, broad interpretations of chastity norms may also be a reaction to the ubiquitous display of sexuality and permissive sexual attitudes among secular Westerners, which is not only a concern among Muslims but in various religious groups (Beekers and Schrijvers 2020; Le Espiritu 2001). In this cultural climate, broadening chastity norms may be a strategy that minorities rely on more generally to distance themselves from a sexual culture they reject. These considerations also highlight the importance of studying ethnoreligious groups in various contexts. In Germany, advanced secularization means that a large majority of non-Muslims identify as either non-religious or secular Christian and have largely shed chastity norms, while religiosity and norm adherence remain stronger among Muslims (Müke et al. 2023). In other societal contexts, the prevalence of religiosity and chastity norms may differ across these religious groups, suggesting different patterns of cross-gender friendship-making. Investigating further ethnoreligious groups and societal contexts thus will not only provide a broader perspective on gender segregation but also a better understanding of the mechanisms linking chastity norms to cross-gender friendships.

Implications and potentials for cross-gender friendship-making

Cross-gender friendships fulfill a variety of developmental functions in adolescence, providing the cross-gender experiences and perspective-taking necessary to engage in fulfilling romantic relationships and successfully navigate the gender-integrated spheres of adult life that characterize Western societies (McDougall and Hymel 2007; Mehta and Strough 2009; Poulin and Pedersen 2007). They can also help reduce gender stereotypes, sexist attitudes, and traditional gender ideologies (Jenkins, Xiao, and Martin 2023; Keener, Mehta, and Strough 2013; Kretschmer 2024; Leaper 2022). Therefore, independent of the exact processes responsible for gender segregation, its prevalence among Muslim youth, but also their non-Muslim peers, is likely to have practical consequences.

This raises the question of how cross-gender friendships can be facilitated, particularly in the school context, and particularly when chastity norms complicate interaction across gender boundaries. Schools provide educators with various opportunities to foster cross-gender interaction and friendship-

making. For example, by assigning tasks to mixed-gender groups, teachers can support cooperative cross-gender interaction. By more generally honing students' social and communication skills, they can forge awareness of both gender- and culture-specific preferences for interaction and communication. This may prove useful especially in diverse schools in which some students hold strict chastity norms while others have a more liberal stance on sexuality. If youth feel comfortable articulating their norms in these contexts, this may even help lower barriers to cross-gender friendship-making. For example, if Muslim youth with strong chastity norms feel free to state concerns about cross-gender friendships turning romantic over time and expect them to be taken seriously by others, this may partially assuage their worries and result in a greater openness to cross-gender interaction. Accordingly, a more open discussion of the different types of norms youth hold and the boundaries they impose on interaction may facilitate interactions within the limits of these boundaries.

Notes

1. This study is based on Chapter 5 of my doctoral dissertation (Kretschmer 2023).
2. I still include these students in the analyses to not distort friendships networks by excluding a subset of the students.
3. To account for systematic differences between religious groups (in chastity norms, for example), I impute separately for each religious group. Before imputation, I replace missing covariate data with data from the second or third wave of the CILS4EU survey if available.
4. On average, adolescents nominate 3.73 friends in classroom networks consisting of an average of 18.72 students, so the average proportion of friends is 3.73/(18.72–1) = 20.93%.
5. This independence of cross-gender friendships from attitudes towards cohabitation holds among both Christian and non-religious youth, as shown in Appendix B, Figure B1.
6. In models that differentiate between Muslim boys and girls, the estimate for variation by attitudes towards cohabitation is somewhat stronger for Muslim girls than Muslim boys. However, this gender difference is not statistically significant (see Appendix B, Figure B2).
7. Figure B3 in Appendix B also shows that the estimates from Figure 7 do not mask a gender-specific pattern: Among both Muslim boys and girls, gender homophily is invariant to parental norms.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

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