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The Impact of Adolescents' Classroom and Neighborhood Ethnic Diversity on Same- and Cross-Ethnic Friendships Within Classrooms

Anke Munniksma and Peer Scheepers
Radboud University Nijmegen/ICS

Tobias H. Stark
ERCOMER, Utrecht University/ICS

Jochem Tolsma
Radboud University Nijmegen/ICS

This study examines how classroom and neighborhood ethnic diversity affect adolescents' tendency to form same- versus cross-ethnic friendships when they enter middle school. Hypotheses are derived from exposure, conflict, and constrict theory. Hypotheses are tested among 911 middle school students (43 classrooms, nine schools) in the Netherlands. Multilevel (p_2) social network analyses show that students were more likely to engage in same-ethnic rather than cross-ethnic friendships. In line with conflict theory, greater classroom and neighborhood diversity were related to stronger tendencies to choose same-ethnic rather than cross-ethnic friends, among both ethnic majority and minority students. Diversity did not hamper reciprocity, as students in more ethnically diverse classrooms were even more likely to reciprocate friendships.

The last decades have been marked by a growth in ethnic diversity in many societies (Statistics Netherlands, 2014; U.S. Census Bureau, 2011), resulting in a more ethnically diverse school-aged population than ever before (Logan & Stults, 2011; Statistics Netherlands, 2014). Many neighborhoods and schools are ethnically segregated and students form more same-ethnic rather than cross-ethnic friendships (see, e.g. Mouw & Entwisle, 2006; Smith, Maas, & van Tubergen, 2014). This is undesirable because cross-ethnic friendships reduce ethnic prejudice (Pettigrew & Tropp, 2006; Stark, Flache, & Veenstra, 2013), improve psychosocial well-being of ethnic minority students (Graham, Munniksma, & Juvonen, 2013), and foster the integration of ethnic minority groups in mainstream society, that is, the aims of national policies (Munniksma, Verkuyten, Flache, Stark, & Veenstra, 2015). Given the benefits of cross-ethnic friendships, a good understanding of how ethnic diversity of adolescents' daily environments affects the formation of same- and cross-ethnic friendships is warranted.

The literature offers different perspectives on the link between ethnic diversity and the prevalence of same- and cross-ethnic friendships at school. Ethnic diversity may promote cross-ethnic friendships (Wagner, Van Dick, Pettigrew, & Christ, 2003), may make students' choose same-ethnicity rather than cross-ethnicity friends (Vervoort, Scholte, & Scheepers, 2011), or may reduce cross-ethnic as well as same-ethnic friendships (Putnam, 2007). Whereas the link between school diversity and friendships at school has been studied extensively, few studies took diversity of contexts outside schools, like students' neighborhoods, into account. Also, many studies do not differentiate between same- and cross-ethnicity friendships, or between the formation and reciprocation of friendships. Hence, the current study answers the following research question: To what extent do classroom and neighborhood ethnic diversity affect the formation and reciprocation of same- and cross-ethnic friendships among students who enter middle school? Contrasting hypotheses regarding the relation between (classroom and neighborhood) diversity and the likelihood of friendships between same- and cross-ethnicity peers within classrooms will be examined. The goal of this contribution is to test these contrasting hypotheses rigorously in

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Requests for reprints should be sent to Anke Munniksma, Department of Child Development & Education, University of Amsterdam, Nieuwe Achtergracht 127, 1018 WS Amsterdam, The Netherlands. E-mail: a.munniksma@uva.nl

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order to gain insights into these complex relationships between diversity and friendships.

Preference for Same- Versus Cross-Ethnic Friends

Several aspects have been identified that affect whether students form friendships with ethnic in-group (i.e., same-ethnicity) or ethnic outgroup (i.e., cross-ethnicity) peers. Studies on social networks and friendship choices theorized and showed empirically that *availability* and preferences for *homophily* play an important role in social network formation (e.g., Echols & Graham, 2013; Vermeij, Van Duijn, & Baerveldt, 2009). The availability of ethnic in-group or ethnic outgroup members defines the opportunity structure, that is, with whom students have opportunities to affiliate (Blau, 1977, 1994; Blau & Schwartz, 1984; Festinger, Schachter, & Back, 1950). Research on homophily (McPherson, Smith-Lovin, & Cook, 2001) and similarity attraction (Byrne, 1971) consistently demonstrated that people prefer to affiliate with similar others. Not only have many studies indeed documented more cross-ethnic friendships in more ethnically diverse schools (e.g., Barth et al., 2013; Van Houtte & Stevens, 2009). There are also often more friendships between students of the same ethnicity than between students with different ethnic backgrounds (see, e.g., Quillian & Campbell, 2003; Smith et al., 2014) than can be expected based solely on the opportunity structure. In social network terms, the density of friendship relations is higher among same-ethnicity peers than among cross-ethnicity peers. In the current study, we examine how ethnic diversity (of classrooms and neighborhoods) affects the likelihood of friendship relations between students of the same ethnicity versus between students with different ethnic backgrounds.

The Effect of Classroom Diversity

According to the mere-exposure effect (Bornstein & Craver-Lemley, 2004; Zajonc, 1968, 2001), repeated exposure to stimuli (e.g., a person, a group, or an object) increases familiarity and hence the liking of it. People develop a preference for persons or objects that they are repeatedly exposed to. This phenomenon has been suggested to be one of the underlying mechanisms of contact theory (Allport, 1954; Pettigrew, Tropp, Wagner, & Christ, 2011). People who have contact with outgroup members develop positive intergroup relationships and subsequently generalize from these intergroup relationships to more positive intergroup attitudes (Stark et al., 2013). Thus, the mere-exposure effect suggests that having more cross-ethnic classmates increases the likelihood that at least some of the outgroup members are liked, which might induce cross-ethnic friendships, overriding—or at least weakening—the homophily effect. Based on exposure, we expect that the more ethnically diverse a classroom is, the more likely cross-ethnicity peers are to form friendships (*Hypothesis 1: Exposure*).

According to conflict theory (Blalock, 1967), ethnic diversity increases perceptions of intergroup threat, which in turn induces exclusionary reactions (Esses, Dovidio, Jackson, & Armstrong, 2001; Quillian, 1995; Scheepers, Gijsberts, & Coenders, 2002). When people are more exclusionary toward outgroups, they are not only less likely to form friendships with outgroup members, they are also more likely to express favorable in-group bias and to mainly affiliate with in-group members. Intergroup threat experiences have been documented among adults (e.g., Scheepers et al., 2002) and among adolescents (e.g., Ethier & Deaux, 1994; Velasco González, Verkuyten, Weesie, & Poppe, 2008). Whereas for adults experiences of economic threat due to job market competition are relevant, adolescents in school classes are more likely to experience social identity threat, given their identity development at this stage of life (French, Seidman, Allen, & Aber, 2006; Phinney, 1993).

While adolescents try to find out who they are, they make the transition to middle school where they have to find their way within a new peer ecology, with new teachers, with new courses, and in a new school building. Not surprisingly, adolescents report more stress, lower self-esteem, and lower competence beliefs during the school transition (Rudolph, Lambert, Clark, & Kurlakowsky, 2001; Wigfield, Eccles, Mac Iver, Reuman, & Midgley, 1991). School diversity might pose an additional challenge, thereby eliciting feelings of (identity) threat and intergroup anxiety (Ethier & Deaux, 1994). As a result, it can be expected that particularly students who transit to an ethnically diverse middle school will be drawn toward the familiarity of same-ethnicity rather than cross-ethnicity peers.

In support of conflict theory, Goldsmith (2004) found in biracial schools that if the two groups were more equal in size, students would particularly avoid interracial contact. Also, Moody (2001) found that greater ethnic heterogeneity was related to more segregation within friendship networks. Therefore, we hypothesize based on conflict theory that the more ethnically diverse classrooms are, the

less likely cross-ethnicity peers are to form friendships, and the more likely same-ethnicity peers are to form friendships (*Hypothesis 2: Conflict*).

In contrast to the former two theories, Putnam's constrict claim (2007) suggests that ethnic diversity would hamper social cohesion in general. Ethnic diversity would induce people to "hunker down," that is, stay away from places where they would meet others. In contrast with intergroup contact in public spaces like neighborhoods, intergroup contact in school classes is harder to avoid, because students are in the same small context every weekday. Hunkering down in the school context might mean that students form fewer friendships with classmates, regardless of whether these classmates have a different- or same-ethnic background (i.e., they socially isolate themselves within the school class). Although people "tend to prefer associating with out-group members to not associating with anybody and remaining isolated" (Blau, 1974, p. 621), Demanet, Agirdag, and Van Houtte (2012) found ethnic diversity to reduce students' overall number of friendship nominations. Unfortunately, Demanet et al. (2012) did not assess whether this was solely due to fewer cross-ethnic friendships or also due to fewer same-ethnic friendships, as one would expect based on Putnam's constrict claim. Based on Putnam's constrict claim, we hypothesize that the more ethnically diverse classrooms are, the less likely cross-ethnicity peers are to form friendships and the less likely same-ethnicity peers are to form friendships (*Hypothesis 3: Constrict*).

Neighborhood Diversity

Whereas previous studies examined whether the likelihood of same- and cross-ethnic friendships depends on school ethnic diversity (e.g., Demanet et al., 2012; Goldsmith, 2004; Moody, 2001), there is a lack of studies that examined whether this is also affected by ethnic diversity of other contexts, such as the neighborhoods students live in (but see Patchen, 1982; Vermeij et al., 2009). In contrast to classroom diversity, which is the same for all classmates, neighborhood diversity differs among students. Dutch middle schools draw their student population from multiple neighborhoods, villages, and sometimes even different cities, which often vary in ethnic diversity. According to Putnam (2007), neighborhood diversity affects people's social relationships in different spheres of life (in terms of trust, voluntary participation in formal associations, giving to charity, participation in informal social relationships, etc.). Scholars examined the relation of neighborhood diversity with a multitude of outcomes in different spheres of life like formal organizations and informal networks (e.g., Putnam, 2007; Savelkoul, Gesthuizen, & Scheepers, 2014; and see for a review van der Meer & Tolsma, 2014). Surprisingly, hardly any scholar has investigated how neighborhood diversity is related to adolescents' friendships at school (cf. the review of Thijs & Verkuyten, 2014). One exception is the study of Vermeij et al. (2009), who examined the effects of neighborhood as well as classroom diversity on social behaviors between third- and fourth-grade middle school students in the Netherlands. They found that the proportion of ethnic minority members in the neighborhood (but not classroom) was related to fewer same-ethnic relationships among native Dutch students and more cross-ethnic relationships among minority students.

As opposed to classroom diversity, neighborhood diversity does not define the availability of same- and cross-ethnicity peers within classrooms. However, adolescents in ethnically diverse neighborhoods are more exposed to other ethnic groups. According to the principle of mere exposure, this will reduce unfamiliarity with ethnic outgroups, which might improve liking (or reduce disliking) of other outgroup members. This implies that adolescents who live in more ethnically diverse neighborhoods will be more likely to engage in cross-ethnic friendships, also within the classroom. Hence, based on the mere-exposure effect, one would expect Hypothesis 1 to hold for neighborhood ethnic diversity as well.

Predictions based on conflict and constrict theory (Hypotheses 2 and 3) are less clear about the relation between neighborhood diversity and same- and cross-ethnic friendship formation at school. On the one hand, perceptions of threat due to high ethnic diversity in the neighborhood may spill over to the classroom. Students who perceive threat from ethnic outgroups in their neighborhood may be less open to cross-ethnic friendships and turn more to same-ethnic peers in the classroom, just as in Hypothesis 2. Likewise, if ethnic diversity in the neighborhood makes students "hunker down" in the neighborhood context, they may also be less open to new friendships in school, both to same-ethnic and cross-ethnic friendships. On the other hand, the new school context (after transitioning to middle school) may dominate the perception of students. In this case, the ethnic composition of the neighborhood may be less relevant and students' perceptions of threat or their tendency to hunker

down may be affected mainly by the ethnic diversity of the new classroom.

Reciprocation of Friendships

To get insight into the strength of the effects of diversity, we not only examine the role of diversity in the *formation* of friendships, but also examine whether ethnic diversity has an impact on whether friendships are *reciprocated.* This would indicate that diversity has such a strong impact on students' friendships that it would even hamper their decision to respond to a friendship invitation. Previous studies showed that same-ethnicity friendships were more likely to be reciprocated than cross-ethnicity friendships (Vaquera & Kao, 2008). This indicates that ethnic differences can indeed keep students from reciprocating a friendship. Reciprocity and trust are the two key indicators of social cohesion, and Putnam (2007) suggested that ethnic diversity would hamper all aspects of social cohesion. Surprisingly, to our knowledge, it has not been examined whether ethnic diversity affects the likelihood of students to reciprocate same- and cross-ethnic friendships. If ethnic diversity even affects whether students reciprocate friendships, then we would have to conclude that the ethnic diversity effect is quite strong when students reject friendship requests from classmates. We thus expect that the mechanisms by which classroom and neighborhood diversity affect the reciprocation of same- and cross-ethnic friendships will work the same as with the formation of a friendship, as formulated in Hypotheses 1, 2, and 3.

The Current Study

To summarize, the current study aims to test the contrasting effects of neighborhood and classroom ethnic diversity on the formation and reciprocation of same- and cross-ethnic friendships within middle school classrooms. Three hypotheses, derived from different theoretical insights, will be tested with regard to the consequences of classroom and neighborhood diversity. Based on exposure (Zajonc, 1968), we hypothesized that the more ethnically diverse a classroom/neighborhood is, the *more likely* cross-ethnicity peers are to form friendships (*Hypothesis 1: Exposure*). Based on conflict theory (Blalock, 1967), we hypothesized that the more diverse classrooms/neighborhoods are, the *less likely* cross-ethnicity peers are to form friendships, and the *more likely* same-ethnicity peers are to form friendships (*Hypothesis 2: Conflict*). Based on Putnam's constrict claim, we hypothesized that the more ethnically diverse classrooms/neighborhoods are, the *less likely* cross-ethnicity peers are to form friendships and the *less likely* same-ethnicity peers are to form friendships (*Hypothesis 3: Constrict*). Hypotheses will be tested using data from the Arnhem School Study (TASS), which offers data on complete friendship networks of students who just entered middle school in the Netherlands.

The current study controls for the availability of cross-ethnic classmates as well as for individual, dyadic, and classroom characteristics that may affect the likelihood of same- and cross-ethnicity friendships. Regarding individual characteristics, sex is taken into account because the number of friendships has been shown to differ by sex (e.g., Baerveldt, Van Duijn, Vermeij, & Van Hemert, 2004). Regarding dyadic characteristics, we control for pairs of students having the same sex, because next to ethnicity, sex has been shown to be an important characteristic based on which people select similar others (e.g., Lubbers, Snijders, & Van Der Werf, 2011). Friendships are more likely between schoolmates who live close to each other (Mouw & Entwisle, 2006), and we therefore control for residential proximity. We control for whether students were already classmates in primary school because friendships between students who already know each other when they enter middle school are more likely than friendships between students who meet for the first time. At the classroom level, we control for classroom size and classroom academic track.

METHOD

Participants and Procedure

Data for this study come from the Arnhem School Study (see for more information Stark & Flache, 2012; Stark et al., 2013). We investigate friendship networks of students at the beginning of their first middle school year. In the Netherlands, students enter middle school at (on average) the age of 12. In most Dutch middle schools (and all schools in our sample), the school system is tracked from the first year of middle school. Students are assigned to an academic track based on standardized test assessments by the end of primary school. Whereas primary schools in the Netherlands mainly draw from the surrounding neighborhood, middle schools are larger and draw students from a wider geographical area. Because there is a large variety in the diversity of neighborhoods where the

students in our sample are from, this sample is very suitable to examine the effects of neighborhood diversity over and above classroom diversity.

In September 2008, 1,219 students from 63 classrooms within 12 middle schools completed the TASS questionnaires (response rate = 90.3%). Three subsequent waves took place 3 months, 9 months, and one-and-a-half years after Wave 1. Of the total sample, 68.4% of the students were native Dutch, 6.9% had another Western ethnic background, 8.8% were Turkish, 2.8% were Moroccan, 4% were Surinamese and Dutch Antillean, and 9% had another non-Western ethnic background. The sex distribution was approximately equal (53.2% male).

After schools agreed to participate, parents were given the possibility to deny consent for their children to participate in the study. Participating students were assured confidentiality and were informed that they were free to discontinue participation. Per school class, students completed online questionnaires in their school's computer laboratory. Teachers read instructions to the students and supervised the completion of the questionnaires, which took 30 minutes on average.

Analyses Sample

Three school classes that did not participate, and four school classes in which less than 80% of the students participated were excluded from the current study (because this study relies on peer nominations). Two schools (13 school classes) were excluded because home addresses of the students (to determine neighborhood diversity) were not available. These selection criteria yielded a working sample of 911 students within 43 school classes of 9 schools. Individual students who did not complete the questionnaire at Wave 1 (n = 40, 4.4%) were included in the study with the data that were available for them (i.e., ethnicity from later waves, neighborhood data), and with their incoming peer nominations. Their outgoing nominations were coded as missing. Dyads in which data from one student was missing were not included in the estimation of the density and the reciprocity parameter (i.e., relationships in which data from one student was missing were not counted as "not reciprocated relations").

Attrition analysis on the dependent variable shows that the number of friendships did not significantly differ between students in included (m = 3.82) versus excluded classrooms (m = 4.09; F (1, 1217) = 1.79, p = .18).

Dependent Variable

To assess whether students were friends we asked "Which of your classmates are your best friends?" Students could make unlimited nominations on a list showing names of all their classmates. Students nominated on average 3.82 classmates as friends (SD = 3.12). Based on the friendship nominations, we constructed our dependent variable, the dyadic friendship variable which consists of four categories: (1) i befriends j, j does not befriend i; (2) i does not befriend j, j befriends i; (3) i and j befriend each other; and (4) i and j do not befriend each other.

Main Independent Ethnicity Variables

Students reported the country of birth of both of their parents. Following the definition of Statistics Netherlands (2013), students were classified as Dutch when both parents were born in the Netherlands. If at least one parent was born in another country than the Netherlands, the student was assigned the ethnicity of this parent. If both parents were born outside the Netherlands, the student was assigned the ethnicity of the mother. The following six ethnic groups were created to ensure that the different groups were sufficiently represented in the data: native Dutch (61.2%), students with other Western ethnic backgrounds (6.9%), Turks (12.5%), Moroccans (4.1%), Surinamese and Dutch Antilleans (4.6%), students with other non-Western ethnic backgrounds (10.9%). Although most ethnic minority students (78%) were second-generation immigrants, nearly all minority students in this sample identified highly with their ethnic background (see Munniksma et al., 2015). This indicates that country of birth of the parents is a valid indicator of what adolescents perceive as their ethnic background.

Ethnic background was included as an individual-level variable; that is, as a sender (i.e., nominator) and as a receiver (i.e., nominee) characteristic. It was also used to construct a dyadic variable *same ethnicity* indicating whether pairs of students (dyads) had the same ethnic background, coded as 1, or a different ethnic background, coded as 0.

Classroom and neighborhood ethnic diversity were operationalized as the Simpson (1949) Diversity Index ($D_{C;}$ also known as the reversed Herfindahl index or the fractionalization index). The Simpson Diversity Index is given by $D_c = 1 - \sum_{i=1}^{g} p_i^2$, where p_i refers to the proportion of

each ethnic group i, which is squared (p_i^2), summed across all groups g, and then subtracted from 1.

This diversity index can be interpreted as the chance that two randomly picked students have a different ethnicity. We used the same six ethnic categories to construct our diversity measures as we used with our individual- and dyad-level ethnicity variables. Classroom diversity was based on students' reported ethnic backgrounds. Neighborhood diversity was based on data from Statistics Netherlands (2013). Students' residential addresses were matched with information on the neighborhood ethnic composition as provided by Statistics Netherlands (2013). The diversity index with a maximum of six groups can range from 0 to .83, with higher scores indicating more diversity. In our sample, classroom diversity ranged from .08 to .77 (M = .53, SD = .18), and neighborhood diversity ranged from .10 to .76 (M = .41, SD = .19). The correlation between classroom and neighborhood diversity was r = .37.

Classroom and neighborhood ethnic diversity correlated strongly with the percentage of (non-Western) immigrants in the same context (classrooms: r = .92; and neighborhoods: r = .97). Our data included classes and neighborhoods with low (<0.2) and high diversity (>0.5). There were no mono-ethnic minority enclaves, indicated by the fact that there were no classes and neighborhoods with low diversity and a large ethnic minority group.

Control Variables

Sex was based on self-report and coded as 0 for boys and 1 for girls. Same-sex dyads were coded as 1 and different-sex dyads were coded 0.

Residential proximity was based on students' home addresses. Geodesic distances between students' homes were determined. The distance between home addresses of classmates was on average 3.7 km (SD = 3.8, i.e., 2.3 miles). Because the effect of distance is likely to decay when distances get larger, we log-transformed this measure (cf. Hipp & Perrin, 2009).

Whether students were primary school classmates was based on students' nominations of which classmates were also their classmates at primary school (coded as primary school classmates, 1, or not, 0). On average, students indicated that 1.94 (SD = 2.00) of their middle school classmates were also their classmates at primary school.

Classroom size was based on the number of students at the beginning of the school year. Classroom size ranged from 9 to 29 (M = 21.19, SD = 5.23). Classroom academic track was provided by the schools and coded as lower (58%: VMBO, preparatory secondary vocational education), middle (23%: HAVO, senior general secondary education), or higher (19%: VWO, preuniversity education) track.

Analysis Strategy

The analyses proceeded in two steps. First, preliminary analyses provide a basic description of the data. Next, hypotheses were tested using multilevel p_2 modeling (see Zijlstra, van Duijn, & Snijders, 2006; Zijlstra, Veenstra, & van Duijn, 2008). The multilevel p_2 model is suitable to test our hypotheses because the models explicitly control for the availability of same- versus cross-ethnic classmates and take dyadic as well as classroom dependencies into account. Additionally, the model allowed us to include individual, dyadic, as well as classroom level independent variables. Neighborhood characteristics are treated as sender/receiver-level variables because it is not possible to also take into account that pupils (as senders and receivers) are nested in neighborhoods with the multilevel p_2 model. Hence, we underestimate the SE of the estimates referring to neighborhood characteristics. However, given the large number of neighborhoods, this problem has not to be exaggerated but still we have to be cautious in interpreting the significance of neighborhood characteristics. (Excluding neighborhood diversity did not lead to different conclusions with respect to the impact of classroom diversity.)

Multilevel p_2 models estimate four possible outcomes referring to the presence of ties (e.g., friendships) between pairs of students (dyads): no ties between students i and j, a nonmutual tie from i to j, a nonmutual tie from j to i, and mutual ties between students i and j. To model this, multilevel p_2 models have two model parameters: a density parameter (the overall log-odds of a tie) and a reciprocity parameter (the log-odds of a symmetric outcome: mutual ties or no ties between students i and j). In other words, the density parameter models the probability of friendships being present in the network. The reciprocity parameter models the probability of friendships being reciprocated; that is, to what extent it is more likely that student i befriends student j when student j befriends

student i. For more information about the (formal) model and its application, see Zijlstra et al. (2008).

We first modeled the density parameter to examine the effects of ethnicity and diversity on the probability that, within a dyad, one student befriends the other. Thereafter we modeled both the density and the reciprocity parameters to examine effects of ethnicity and diversity on whether friendships are reciprocated. For the multilevel p_2 analyses, all continuous measures were centered to the mean.

RESULTS

Descriptive statistics are summarized in Table 1. Preliminary analyses of the friendship networks showed that, overall, 49% of the friendships were cross-ethnic friendships. Native Dutch students had a lower percentage of cross-ethnic friendships (27%) than ethnic minority students (78%). To what extent this reflects the availability of outgroup classmates or students' preference for same-ethnic friendships will be examined with the multilevel p_2 analyses.

The results of the multilevel p_2 analyses are reported in Table 2 (density parameter) and Table 3 (reciprocity parameter). Because residential proximity between classmates and classroom educational track did not significantly affect the likelihood of friendships between students, these controls were left out of all final models in favor of parsimony.

Table 2 shows the multilevel p_2 coefficients on the likelihood of friendships between students. Model 1 includes the direct effects of classroom ethnic diversity, the sender and receivers' neighborhood ethnic diversity, and the control variables. The nonsignificant effects of classroom ethnic diversity and senders' neighborhood diversity indicate that the total density of friendships within school classes was not affected by the diversity of these contexts. However, we did find that students from more ethnically diverse neighborhoods were less often nominated as friends (e.g., receiver effect Model 1, *Coeff.* = −.64, *SE* = .31, p = .04).

To examine whether same-ethnicity peers were more likely to form friendships than cross-ethnicity peers, we added the dyad characteristic *same ethnicity* in Model 2 (Table 2). In this and in all subsequent models, the same-ethnicity parameter was positive and significant, indicating that friendships were more likely to occur between same-ethnicity rather than cross-ethnicity peers. Thus, there were more same-ethnic friendships within classrooms than what would be expected purely based on availability.

To test the hypotheses, in the following models (Models 3a, 3b, and 3c), we examined to what

TABLE 1
Descriptive Statistics of Study Variables

Variable	*Min*	*Max*	*Mean/Percentage*	*SD*	*N* Valid
Dyadic characteristics					
Friendship occurrence	0	1	19.32%		26,439
Already classmates at primary school	0	1	5.45%		26,439
Distance between homes (km)	0	54.77	3.70	3.76	19,914
Same-ethnicity dyads	0	1	44.19%		26,247
Same-sex dyads	0	1	54.39%		26,439
Individual characteristics					
Dutch (reference category)	0	1	61.20%		894
Turkish	0	1	12.50%		894
Moroccan	0	1	4.10%		894
Antillean or Surinamese	0	1	4.60%		894
Other non-Western	0	1	10.90%		894
Other Western	0	1	6.70%		894
Girl (reference category = boy)	0	1	45.20%		901
Friendship nominations	0	24	3.82	3.12	871
Neighborhood ethnic diversity	0.10	0.76	0.41	0.19	892
Classroom characteristics					
Classroom ethnic diversity	0.08	0.77	0.53	0.18	43
Classroom size	9	29	21.19	5.23	43
Educational track low	0	1	58%		43
Educational track middle	0	1	23%		43
Educational track high	0	1	19%		43

TABLE 2
Multilevel p_2 Results Predicting Friendship Relations

	Model 1		*Model 2*		*Model 3a*		*Model 3b*		*Model 3c*		*Model 4*	
	Coeff.	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*
Reciprocity parameter												
Intercept	**3.53**	0.12	**3.49**	0.12	**3.47**	0.11	**3.48**	0.12	**3.50**	0.11	**3.47**	0.12
Density parameters												
Intercept	**−4.62**	0.11	**−5.02**	0.11	**−4.93**	0.12	**−4.96**	0.14	**−4.98**	0.13	**−4.88**	0.12
Dyadic characteristics												
Same-sex	**1.99**	0.06	**2.02**	0.06	**2.03**	0.07	**2.03**	0.08	**2.02**	0.07	**2.02**	0.06
Same-ethnicity (*SE*)			**0.46**	0.06	**0.41**	0.07	**0.43**	0.07	**0.44**	0.07	**0.40**	0.07
Classmates primary school	**1.80**	0.09	**1.79**	0.09	**1.80**	0.07	**1.80**	0.09	**1.79**	0.09	**1.79**	0.09
Sender characteristics												
Female	−0.16	0.13	−0.16	0.13	−0.18	0.12	−0.19	0.14	*−0.19*	0.11	**−0.20**	0.10
Turkish (ref Dutch)	−0.07	0.21	0.06	0.21	0.03	0.21	0.07	0.20	0.02	0.20	0.16	0.21
Moroccan	0.22	0.30	0.43	0.31	0.45	0.29	0.41	0.31	0.37	0.29	0.57	0.27
Surinamese or Antillean	0.24	0.30	**0.56**	0.26	0.42	0.28	0.41	0.27	0.42	0.28	**0.55**	0.29
Other non-Western	0.15	0.20	0.32	0.22	0.26	0.23	0.29	0.21	0.26	0.23	*0.40*	0.21
Other Western	**0.52**	0.20	**0.82**	0.24	**0.72**	0.22	**0.75**	0.23	**0.76**	0.24	**0.70**	0.23
Neighborhood diversity (NBHD)	0.61	0.47	*0.63*	0.38	*0.63*	0.37	0.23	0.41	0.61	0.40	0.07	0.44
Receiver characteristics												
Female	**0.44**	0.09	**0.45**	0.10	**0.47**	0.08	**0.47**	0.09	**0.47**	0.08	**0.47**	0.08
Turkish (ref Dutch)	−0.01	0.15	0.15	0.15	0.09	0.16	0.06	0.15	0.13	0.15	−0.01	0.16
Moroccan	−0.19	0.23	0.05	0.20	0.01	0.24	0.03	0.23	0.09	0.23	−0.12	0.22
Surinamese or Antillean	0.14	0.20	*0.38*	0.20	**0.44**	0.19	**0.44**	0.19	**0.45**	0.19	0.33	0.21
Other non-Western	−0.27	0.15	−0.08	0.15	−0.10	0.16	−0.12	0.16	−0.06	0.15	−0.21	0.16
Other Western	−0.04	0.16	0.18	0.18	0.12	0.17	0.15	0.16	0.19	0.18	0.08	0.18
Neighborhood diversity (NBHD)	**−0.64**	0.31	**−0.70**	0.25	**−0.61**	0.29	**−0.68**	0.28	**−0.83**	0.32	−0.34	0.40
Classroom characteristics												
Size	**−0.03**	0.01	**−0.03**	0.01	**−0.03**	0.01	**−0.03**	0.01	**−0.03**	0.01	**−0.03**	0.01
Ethnic diversity (D)	0.20	0.35	0.30	0.36	−0.49	0.39	0.31	0.30	0.33	0.34	−0.33	0.40
Interactions												
Classroom D**SE*					**1.25**	0.30					**1.21**	0.39
Sender NBHD**SE*							**0.85**	0.34			*0.82*	0.49
Receiver NBHD**SE*									0.42	0.33	−0.45	0.48
Variance components												
Sender variance	1.98	0.15	2.00	0.16	1.99	0.15	2.01	0.16	2.01	0.15	1.98	0.15
Receiver variance	0.67	0.08	0.67	0.08	0.68	0.08	0.67	0.08	0.67	0.08	0.68	0.08
Covariance sender–receiver	−0.93	0.09	−0.92	0.10	−0.91	0.09	−0.91	0.09	−0.91	0.09	−0.91	0.09
Classroom variance	0.08	0.02	0.08	0.02	0.08	0.03	0.08	0.03	0.08	0.02	0.08	0.02

Note. Bold $p < .05$; italics $p < .10$. Model settings: 200 iterations; convergence at $p < .0001$, 16,000 burn-in simulations; simulation sample size of 32,000. Nonsignificant control variables omitted in favor of parsimony: educational track, residential proximity. All coefficient acceptance rates were satisfactory (range: .57 to .61). Random effects (i.e., variance) at the sender, receiver, and classroom level are reported in the bottom.

extent the likelihood of same-ethnic and cross-ethnic friendships was affected by ethnic diversity. Interaction effects between the diversity measures and the dyadic variable *same ethnicity* were included in Models 3a (classroom diversity), 3b (senders' neighborhood diversity), and 3c (receivers' neighborhood diversity). The interactions with classroom diversity (Model 3a) and senders' neighborhood diversity (Model 3b) were positive and significant. The interaction with receivers' neighborhood diversity (Model 3c) was not significant. To facilitate the interpretation of the interaction coefficients, the results were plotted in Figure 1. Figure 1 shows that students' tendencies to form same-ethnic rather than cross-ethnic friendships were intensified by ethnic diversity. In particular, students in more (than average) ethnically diverse classrooms and from more (than average) ethnically diverse neighborhoods were significantly more likely to form same-ethnic friendships (simple slope classroom diversity: *Coeff.* = .77, *SE* = .40, $p = .06$; simple slope senders' neighborhood diversity: *Coeff.* = 1.14, *SE* = .51, $p = .03$).

TABLE 3
Modeling the Friendship Reciprocity Parameter, Summary of Relevant Effects

	Model 2		*Model 3a*		*Model 3b*		*Model 3c*	
	Coeff.	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*	*Coeff.*	*SE*
Reciprocity parameters								
Same-ethnicity (*SE*) dyads	−0.17	0.19	−0.15	0.16	−0.11	0.16	−0.06	0.22
Neighborhood diversity sender	0.65	0.47	0.69	0.40	**1.04**	0.43	0.29	0.40
Neighborhood diversity receiver	0.19	0.43	0.25	0.42	0.25	0.38	−0.72	0.56
Classroom ethnic diversity	1.55	1.21	**2.57**	0.91	**1.84**	0.76	**1.89**	0.59
Classroom div*SE			−0.29	1.00				
Sender NBHD div*SE					−0.64	0.53		
Receiver NBHD div*SE							**1.17**	0.58

Note. Bold $p < .05$. Model settings: 200 iterations; convergence at $p < .0001$, 16,000 burn-in simulations; simulation sample size of 32,000. Nonsignificant control variables omitted in favor of parsimony: educational track, residential proximity. The exact same variables were used to model the reciprocity parameter as the density parameter (in Table 2). Only the main effects are reported in this table. Further modeling the reciprocity parameter did not substantially affect the effects of our variables on the density parameter, except for the classroom diversity parameter in Model 3a and 3b as discussed in the text, which turned (negative and) significant.

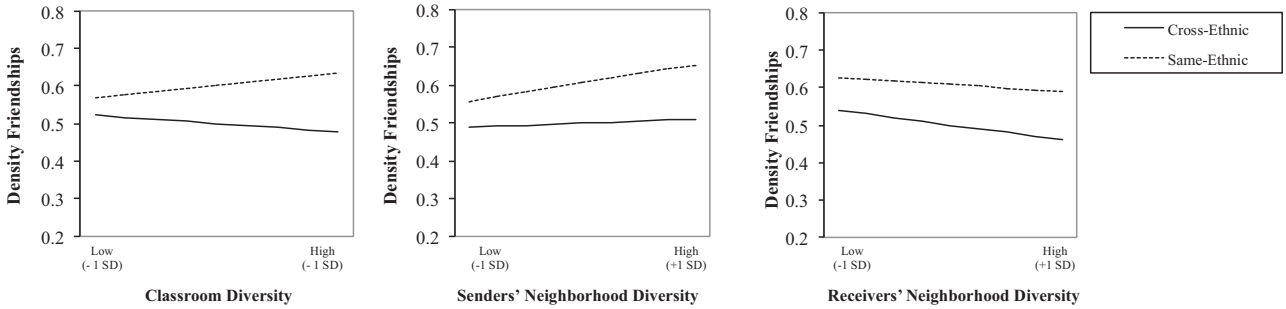

FIGURE 1 Predicted values (simple slopes analysis) for the effects of diversity on density of same-ethnic and cross-ethnic friendships. The graph displays the change in density due to low diversity (−1 *SD*) to high diversity (+1 *SD*).

The likelihood that cross-ethnicity students formed friendships was not significantly affected by classroom and senders' neighborhood diversity, as indicated by the more or less horizontal slopes in Figure 1 (simple slopes: $p > .10$). This explains why there was no main effect of ethnic diversity on the likelihood of friendships in general: the positive and the zero to negative effect of ethnic diversity on respectively same- versus cross-ethnic friendships balanced each other out (or at least the average of the two effects did not significantly differ from zero).

In sum, we found that classroom and neighborhood diversity was related to same-ethnic friendships being more likely than cross-ethnic friendships. We thus find evidence in favor of the conflict hypothesis (Hypothesis 2) but not for the exposure hypothesis (Hypothesis 1), nor for the constrict hypothesis (Hypothesis 3). To hammer the point home, in Hypothesis 3, derived from the constrict proposition, we formulated the expectation that diversity would reduce the likelihood of friendships between cross-ethnicity peers and between same-ethnicity peers. If the data would support this hypothesis, we would expect to see a negative effect of diversity on the number of friendship nominations (in Model 1)—which we did not—and no significant interaction effects of diversity with *same ethnicity* (in Models 3)—which we did find. We thus clearly have to refute Hypothesis 3 based on constrict theory.

Model 4 includes all three interaction effects simultaneously. Overall, findings in Model 4 substantially resemble those of Models 3, although only the interaction effect of classroom diversity with same ethnicity stayed significant at $p < .05$.

Reciprocation of Friendships

In Table 3, we summarize our results with respect to the likelihood of friendships being reciprocated. For these analyses, the exact same variables were

used to model the reciprocity parameter as were used to model the density parameter. The dyad characteristic *same ethnicity* did not significantly affect whether students reciprocated friendships. Students tended to reciprocate same-ethnic and cross-ethnic friendships to the same extent. This means that homophily plays a role in initiating friendships but not in reciprocating friendships.

Further modeling the reciprocity parameter strengthened the classroom diversity effect. In Models 3a and 3b, the main effect of classroom diversity density parameter turned significant (Model 3a *coeff.* = −1.96, *SE* = .54; Model 3b *coeff.* −.95, *SE* = .35). That is, when also modeling reciprocity, the effect of classroom diversity was more pronounced: classroom diversity was more clearly related to fewer cross-ethnic friendships (i.e., stronger ethnic segregation). Additionally, the related reciprocity findings show that in ethnically diverse classrooms the existing friendships are more often reciprocated. In sum, in more ethnically diverse classroom students were more selective and chose same-ethnic rather than cross-ethnic friends, and from the friendships that were chosen in more ethnically diverse classrooms more friendships were reciprocated.

Replication

To examine the reliability of our results, we performed the exact same analyses on emotional helping networks, which yielded the same conclusions (available online). We also examined whether the main findings were the same for minority versus majority group members (available online). These results did not clearly support that mechanisms work differently between native Dutch and ethnic minority students, with one exception regarding the role of receiver's neighborhood diversity: increasing diversity reduces the likelihood of being chosen as a friend by native Dutch. But because this observation is limited to receiver's neighborhood diversity and to friendships we do not want to attach too much weight to this finding.

DISCUSSION

With increasing ethnic diversity in neighborhoods and schools, it is important to understand how this affects adolescents' social lives. Much of the past research on same- and cross-ethnic relationships within school classes examined how this was affected by school or classroom diversity (see for an overview: Thijs & Verkuyten, 2014). Few studies examined whether diversity outside the school context also affects social relationships at schools (see, for a notable exception, Vermeij et al., 2009). The current study adds to these studies that examine the effects of ethnic diversity on same- and cross-ethnic friendships. The overall goal of this study was to test three hypotheses, derived from contrasting theoretical propositions, regarding the relation between (classroom and neighborhood) diversity and the likelihood of friendships between same- and cross-ethnic peers within classrooms.

Our first hypothesis, based on exposure, stated that the more ethnically diverse a classroom is, the more likely cross-ethnicity classmates would be to form friendships. Our analyses did not support this hypothesis. That is, students in more ethnically diverse classrooms might have more cross-ethnic friendships in absolute numbers, but, not in proportional terms, when we control for the availability of cross-ethnic classmates (i.e., ethnic diversity of the classroom).

In line with our second hypothesis, based on conflict theory (Blalock, 1967), we found that when students are confronted with greater classroom or neighborhood ethnic diversity they are more likely to form friendships with same- rather than cross-ethnicity peers, and thus more ethnically segregated. This indicates that particularly in school classes that are more ethnically diverse, social subgroups are likely to be formed based on the ethnic backgrounds of students. This is in line with earlier findings in U.S. schools (e.g., Goldsmith, 2004; Moody, 2001). Adding to previous studies, our study showed that not only classroom diversity but also neighborhood diversity affects the likelihood that students will engage in same- rather than cross-ethnic friendships. Thus, students from more ethnically diverse neighborhoods are more likely to choose same-ethnic rather than cross-ethnic friends.

In contrast to our study, Vermeij et al. (2009) did not find that ethnic classroom composition (proportion of minority students) was related to stronger tendencies to socialize with same-ethnicity peers among third- and fourth-year middle school students, that is, students who had already progressed in middle school. It may be that ethnic diversity particularly affects students' tendencies to befriend same-ethnicity peers early in middle school in new contact settings such as in the present study. In line with this argument, Jugert, Noack, and Rutland (2011) documented decreasing in-group preference over the course of students' first year in German middle schools. Ethnicity seems to be an important similarity marker in the beginning of the school

year; however, when students get more familiar with students around them, other characteristics may become more important for friendship choices. As a consequence, over time, when students get to know each other better, the initial effect of ethnic diversity on the prevalence of same- and cross-ethnic friendships might disappear. Over time, with persistent cross-ethnic contact opportunities on a daily basis, prejudices about other ethnic groups may be reduced (Pettigrew & Tropp, 2006), eventually fostering cross-ethnic friendships. Studies on samples where students have spent more time together, might find support for the exposure effect (Hypothesis 1) rather than support for the conflict effect (Hypothesis 2) when students have just made the transition to middle school (like in the current study).

Our third hypothesis was based on Putnam's (2007) constrict claim. According to Putnam (2007), people would engage in fewer cross-ethnic *and* fewer ethnic same-ethnic friendships when confronted with greater ethnic diversity. Our study, among middle school students, does not support Putnam's claim. Students' classroom and neighborhood diversity were not related to a smaller number of friendships. In line with our findings, Demanet et al. (2012) also found that middle school diversity was not related to the number of friendships in Belgian schools, once they controlled for the schools' socioeconomic composition. Our study adds to the study of Demanet et al. (2012) in two ways. First, we distinguished between same- and cross-ethnic friendships. Second, next to classroom diversity, we showed that students' neighborhood diversity did not affect the total number of friendships in school either. Demanet et al. (2012) and our study focus on European middle schools only (Belgian and Dutch), so more studies are warranted, but so far we find no evidence for Putnam's constrict hypothesis in these European middle schools.

A potential explanation for the lack of support for the constrict hypothesis may be found in the age/ developmental stage of our sample. During early adolescence, peers and the peer group become increasingly important for adolescents' individual well-being (Brechwald & Prinstein, 2011). Friendships foster companionship, validation, and emotional security (for a review, see Bukowski, Motzoi, & Meyer, 2009). Positive social relationships offer status and affection, which is related to adolescents' social well-being (Oldehinkel, Rosmalen, Veenstra, Dijkstra, & Ormel, 2007). The importance of friendships during adolescence might explain why students do not settle for fewer friendships, even when a large share of their school class consists of cross-ethnic peers. Or, in the words of Peter Blau (1974, p. 621), they "prefer associating with outgroup members to not associating with anybody and remaining isolated."

We, moreover, examined the role of ethnic diversity in the *reciprocation* of friendships. Vaquera and Kao (2008) found that same-race friendships were more likely to be reciprocated than cross-race friendships in the United States. We did not find such a difference among adolescents in the Netherlands. Once friendships were formed, same- and cross-ethnic friendships were equally likely to be reciprocated. Ethnic diversity did not keep students from reciprocating such cross-ethnic friendships. In fact, friendships were *more* likely to be reciprocated in more ethnically diverse classrooms. This may suggest that students in a more threatening setting (with fewer same-ethnic classmates) more strongly rely on the comfort of a mutually valued friendship. The density and reciprocity findings together indicate that diversity makes students more selective in whom they choose as friends, resulting in stronger ethnic segregation; in more diverse school classes, and thus often in more segregated friendship networks, friendships are more likely to be reciprocated.

Despite its contributions, the current study also has limitations. First, we were not able to examine the significance of all diversity effects on same-ethnic friendships at the same time. The current study was based on the analyses of 43 classrooms (911 students). Whereas this gives enough statistical power to examine individual and dyadic effects, the power to detect group level effects, of classroom ethnic diversity, is relatively low. Second, we did not take into account higher order network structures such as transitive closure (friends of my friends are also my friends) and this may have led to an overestimation of the similarity effects in our multilevel p_2 models. That is, some same-ethnic friendships that developed because two students have a friend in common may have been attributed to students' preference for same-ethnic friends. Hence, our findings regarding students' tendency to form same-ethnic friendships might be somewhat smaller when we would control for transitivity effects. However, this problem is most likely small because transitive closure is strongly associated with reciprocity and we found that same-ethnic friendships were not more likely to be reciprocated than cross-ethnic friendships. Third, the cross-sectional design of present study does not

allow for strong claims about causality. It seems unrealistic, however, to consider that students' tendency to select same-ethnic friends affects classroom or neighborhood diversity. It thus seems more likely that neighborhood and classroom diversity affect homophily in friendship networks within the classroom than vice versa. Fourth, socioeconomic status (SES) is often related to ethnic background, just as classroom and neighborhood SES are associated with the level of ethnic diversity of the class and neighborhood. It is thus likely that the impact of ethnicity (of sender/receiver), ethnic similarity (of dyad), and diversity (of class and neighborhood) pick up a SES effect. Unfortunately, at the individual dyad and class level, we cannot control for SES, because this information is not available for the (full) TASS sample. Analyses including SES of the neighborhood (provided online) do not alter the results of the current study. However, neighborhood SES is in part determined by the ethnic composition (mean level of SES declines when more immigrants move in) and vice versa (poor neighborhoods attract immigrants and may induce "white flight"). Taking this into account, neighborhood SES may thus also be a case of overcontrolling (cf. Portes & Vickstrom, 2011). Fifth, whereas many previous studies that we refer to focus on school diversity, the current study focused on classroom diversity. However, our sample consists of too few schools to also examine school diversity effects.

In sum, this study contributes to research on same- and cross-ethnic friendships in ethnically diverse school contexts. The findings of this study indicate that students who just entered middle school tend to form same-ethnic rather than cross-ethnic friendships. Neighborhood and classroom diversity strengthen this tendency.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's website:

Appendix S1. Replication of the Main Findings.
Table S1. Multi-level p_2 results predicting helping relations
Table S2. Modeling the reciprocity parameter for helping, summary of relevant effects.
Table S3. Multi-level p_2 results examining majority-minority group differences.
Table S4. Multi-level p_2 results of the friendship Models 3a, 3b, and 3c including neighborhood SES.
Figure S1. Predicted values (simple slopes analysis) for the effects of diversity on density of same-ethnic and cross-ethnic helping relations.