Understanding the Selection Bias: Social Network Processes and the Effect of Prejudice on the Avoidance of Outgroup Friends

Tobias H. Stark[1,2]

Abstract

Research has found that prejudiced people avoid friendships with members of ethnic outgroups. Results of this study suggest that this effect is mediated by a social network process. Longitudinal network analysis of a three-wave panel study of 12- to 13-year-olds (N = 453) found that more prejudiced majority group members formed fewer intergroup friendships than less prejudiced majority group members. This was caused indirectly by the preference to become friends of one's friends' friends (triadic closure). More prejudiced majority members did not have a preference for actively avoiding minority group members. Rather, they had the tendency to avoid friends who already had minority group friends and thus could not be introduced to potential minority group friends. Instead they became friends with the majority group friends of their friends. This research shows how a social networks perspective can further our understanding of the processes underlying intergroup contact.

Keywords

social networks, friendships, dynamic processes, intergroup contact, prejudice

Research has established that intergroup contact and particularly intergroup friendships reduce prejudice toward other racial or ethnic groups (Davies et al. 2011; Pettigrew and Tropp 2006). It also has been demonstrated that prejudiced people avoid outgroup friends (Binder et al. 2009; Eller and Abrams 2003; Levin, van Laar, and Sidanius 2003; Sidanius et al. 2008). Those who already have more positive attitudes toward the outgroup form intergroup friendships, while those with less positive attitudes toward the outgroup tend to avoid members of the

outgroup (Pettigrew et al. 2011). This selection bias leads to a vicious circle: intergroup friendships reduce prejudice most effectively (Hodson 2011; Paluck and Green 2009), but prejudice prevents the development of intergroup friendships (Hewstone and Swart 2011).

[1]Utrecht University/ICS, the Netherlands
[2]Stanford University, Stanford, CA, USA

Corresponding Author:
Tobias Stark, ERCOMER, Utrecht University, Padualaan 14, CH Utrecht 3584, the Netherlands.
Email: t.h.stark@uu.nl

Most previous research had an individualistic theoretical perspective and considered friendships as being the result of individual attitudes and preferences. The development of intergroup friendships was examined as if friendships are independent from each other. However, friendships develop within larger social networks (Pettigrew et al. 2007). With whom we become friends is not only based on individual characteristics (e.g., ethnicity or prejudice) but is partly the result of who approaches us and to whom we are introduced by others (Goodreau, Kitts, and Morris 2009; Wimmer and Lewis 2010). Friendships form because people tend to return friendship invitations (*reciprocity*) and we are likely to become friends with the friends of our friends (*triadic closure*; see Cartwright and Harary 1956; Wasserman and Faust 1994). Ignoring network processes such as reciprocity and triadic closure in the formation of social networks, and thus the development of intergroup friendships, may let researchers wrongly attribute friendship formation to individual preferences (Wimmer and Lewis 2010).

In contrast to previous interpretations of the selection bias (e.g., Binder et al. 2009; Pettigrew et al. 2011; Sidanius et al. 2008), more prejudiced people may not actively avoid outgroup friends just as less prejudiced people may not actively approach outgroup friends. Rather, more prejudiced individuals may not receive friendship invitations from outgroup members, which they could reciprocate. Alternatively, more prejudiced individuals may select themselves into network positions where they have fewer opportunities to establish intergroup friendships. In contrast, less prejudiced people may form intergroup friendships because they receive friendship invitations from outgroup members or because they select themselves into network clusters where they are introduced to outgroup members.

The present research goes beyond the existing empirical and theoretical approaches by testing whether such network processes are involved in intergroup friendship dynamics.

Intergroup Contact and the Question of Causality

Decades of research on the contact hypothesis (Allport 1954) has established evidence for a correlation between more intergroup contact and less prejudice. Yet, contact with outgroup members might reduce prejudice and less prejudiced people might also engage more readily in intergroup contact. In recent years, longitudinal studies have started to examine these causal processes. All of these studies found that intergroup contact, particularly in the form of intergroup friendships, reduces prejudice and thus confirmed the main premises of the contact hypothesis (e.g., Brown et al. 2007; Feddes, Noack, and Rutland 2009).

Less consistent are the findings about the selection bias, the reversed causal process from prejudice to less contact over time. Some studies using relatively small samples (N < 110) found that contact reduces prejudice and that prejudice has no effect on contact (Brown et al. 2007; Feddes et al. 2009; Vezzali, Giovannini, and Capozza 2010). In contrast, research with larger samples found effects in both directions. For instance, among a sample of over 2,000 U.S. college students, having outgroup friends or roommates from other racial groups reduced prejudice, but prejudice also was associated with fewer friends from other racial groups a year later (Levin et al. 2003; Sidanius et al. 2008). Furthermore, in a sample of 465 minority group high school students in South Africa, intergroup anxiety led to fewer cross-group friendships (Swart et al. 2011). There was, however, no effect of another

measure of outgroup attitudes on subsequent contact. Additionally, a study with 1,655 school students in 3 European countries found that effects from prejudice to contact were either as strong as the effects from contact to prejudice or even stronger (Binder et al. 2009). Since studies with larger samples and thus more statistical power have produced evidence for the contact effect and the selection bias, I expect:

> *Hypothesis 1*: Having more outgroup friends reduces prejudice toward the outgroup (contact effect).
>
> *Hypothesis 2*: More prejudiced individuals tend to select fewer outgroup members as friends than less prejudiced individuals (selection bias).

A Social Network Perspective

Social psychological research on the contact hypothesis predominantly focuses on individual attitudes and preferences: Outgroup contact, particularly in the form of a friendship, affects an individual's attitude and an individual's prejudicial attitude is responsible for not having outgroup friendships. Friendships, however, require at least two individuals: the ability of one person to develop an intergroup friendship depends on the willingness of an outgroup member to reciprocate this contact.

A social network perspective allows examining such dyadic processes and also theoretical considerations that go beyond two persons. Real-life contact between two individuals does not take place in a social vacuum but in social settings that involve other people (Pettigrew 2008; Pettigrew et al. 2007). Ingroup members may have already established contact with outgroup members, and this might facilitate the intergroup contact of an individual because existing contact of ingroup members implies prosocial ingroup norms (Dovidio, Eller, and Hewstone 2011) or simply because these ingroup members can introduce a person to outgroup members. In contrast, individuals might be discouraged from seeking intergroup contact if none of their ingroup friends have contact with outgroup members. Furthermore, driven by their attitudes toward the outgroup, some people may decide to join or avoid friendship cliques that already involve outgroup members, making it subsequently easier or more difficult to establish actual intergroup contact.

Ignoring such social network processes may lead to inadequate theoretical conclusions. For instance, friendships that actually form within an ethnic group in response to friendship invitations (reciprocity) or because people have a friend in common (triadic closure) can be wrongly attributed to individual preference for ingroup friends (ethnic homophily) if such network processes are overlooked (Wimmer and Lewis 2010). Likewise, the tendency of more prejudiced individuals to avoid friends from other ethnic groups may be weaker than previously assumed. More prejudiced individuals may receive fewer friendship invitations from outgroup members that they can reciprocate and they may not have friends who can introduce them to outgroup members. Although contact research has seen important theoretical and methodological improvements (Christ and Wagner 2013), cross-lagged models that have been used in research on the selection bias have not adequately considered these network processes in the formation of intergroup friendships (Steglich, Snijders, and Pearson 2010).

Reciprocity as Mediator

Figure 1 illustrates how the exact same intergroup friendship can develop through different processes. Imagine there are two white individuals A and B,
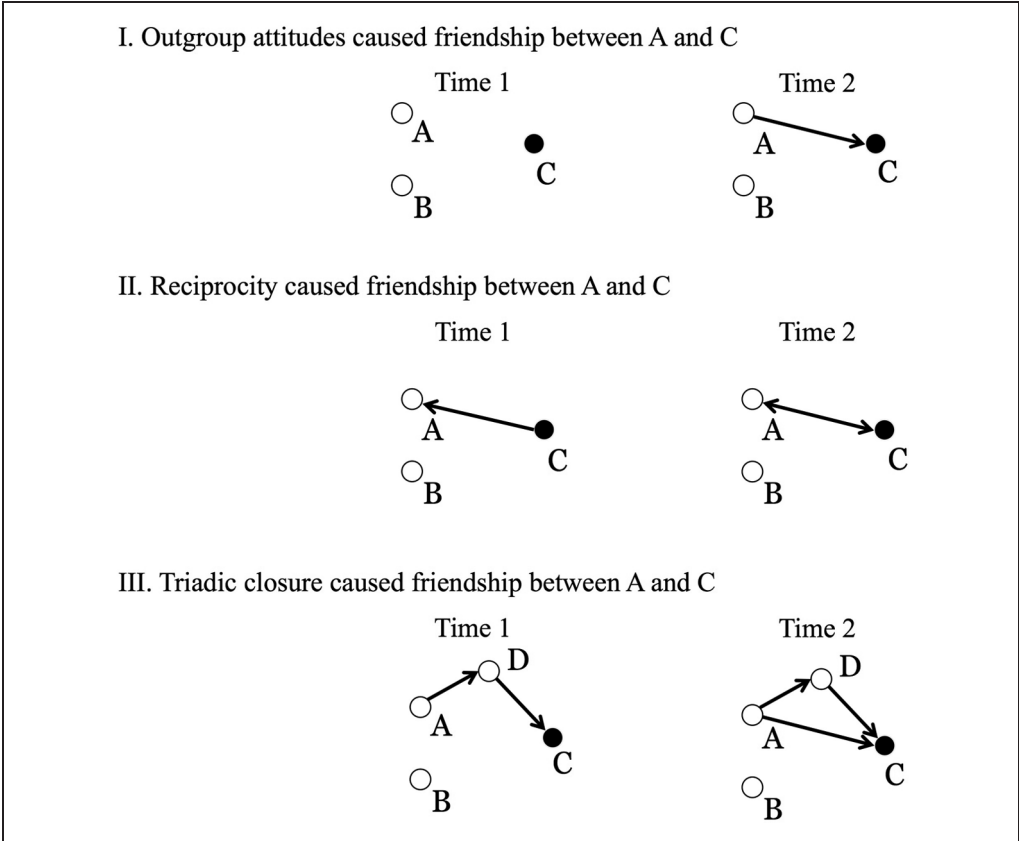
Figure 1. Three Different Processes That Could Lead to an Intergroup Friendship
Note: Arrows indicate friendship nominations.

of which person A has positive attitudes toward blacks whereas person B has negative attitudes. Panel I shows the development of a friendship between individual A and a black person C between Time 1 and Time 2. If social network processes are not considered, the more positive attitudes of A remain as the only explanation for the fact that there is a new friendship between A and C at Time 2 but not between B and C.

Panel II of Figure 1 shows how the same friendship could have developed without being directly caused by A's or B's attitude toward blacks. At Time 1, individual C sends a friendship invitation to person A because of A's positive outgroup attitudes

but does not send an invitation to person B because of B's more negative outgroup attitudes. Person A then forms the intergroup friendship because he or she reciprocated the friendship invitation, whereas individual B never received a friendship invitation that could have been reciprocated. Accordingly, I expect that:

> *Hypothesis 3*: Reciprocation of friendships leads to fewer intergroup friendships for more prejudiced individuals than for less prejudiced individuals.

What mechanism could bring more prejudiced individuals into network positions where reciprocation of friendships leads to fewer intergroup friendships?
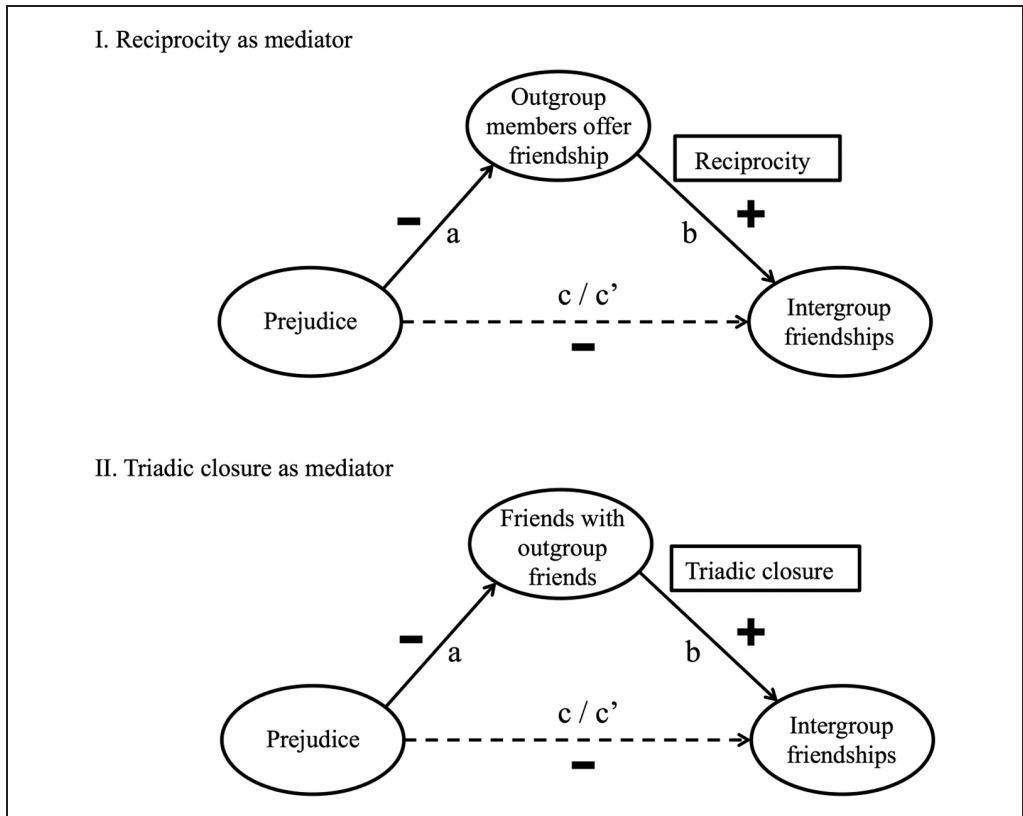
Figure 2. Network Processes May Mediate the Seemingly Direct Effect from Prejudice to Fewer Intergroup Friendships (path c to c')
Note: Arrows indicate causal paths.

According to the Information Search Model (Vorauer 2006), people in intergroup contact situations often have concerns about how they are evaluated by outgroup members. This is particularly true for members of the lower-status minority group because they attach higher importance to the opinions held by the majority group (Vorauer 2013). People who experience such evaluative concerns pay close attention to the outgroup member's expressions and behaviors in order to detect cues about how they are being perceived. Consequently, minority group members are likely to take a majority group member's comments more personally than they are actually intended (Vorauer 2013).

Thus, a more prejudiced person may not actively avoid a certain individual of another ethnic group as it was previously suggested (e.g., Binder et al. 2009; Pettigrew et al. 2011; Sidanius et al. 2008). Instead, the more prejudiced person's remarks about the other group in general may fuel feelings of being rejected in the outgroup member. Vorauer and Sakamoto (2006) have shown that people who think that they are rejected by a member of another group respond with an actual rejection of that person as a friend. Thus, outgroup members may not offer friendships to more prejudiced individuals (path a in Panel I of Figure 2). This leads to the following hypothesis:

Hypothesis 4a: Outgroup members are less likely to select more prejudiced individuals as friends than less prejudiced individuals.

As a consequence, more prejudiced individuals cannot form intergroup friendships in response to friendship invitations from outgroup members (path b).[1] Instead, reciprocation of friendship invitations will only lead to new ingroup friendships for more prejudiced individuals. In this case, the selection bias may be better described as a *being-selected bias*.

Hypothesis 4b: More prejudiced individuals receiving fewer friendship invitations from outgroup members than less prejudiced individuals mediates the selection bias.

Triadic Closure as Mediator

Another way in which network processes may indirectly cause and prevent intergroup friendships is shown in Panel III of Figure 1. At Time 1, individual A may already have a friendship with a third person D, who in turn is a friend of the black person C. Structural balance theory states that people tend to close such open friendship triangles to avoid an unbalanced state of their friendship network, in which person A is a friend of D but not of C (Cartwright and Harary 1956; Davis 1963). This notion builds on balance theory in which unbalanced states lead to cognitive dissonance (Heider 1946, 1958). To avoid cognitive dissonance, people strive for situations in

---

[1]The reciprocity mechanism also implies that more prejudiced individuals would reciprocate a friendship invitation if they had been selected by an outgroup member. This is in line with contact theory's premise that more prejudiced individuals are open to contact and even friendships with outgroup members (Brown and Hewstone 2005).

which they are friends with their friends' friends, or foes with the foes of their friends, or friends with the foes of their foes. Thus, individual A may have formed a friendship with C at Time 2 because of triadic closure. In contrast, the more prejudiced individual B was not a friend of person D at Time 1. Person B is then not introduced to the black person C and thus never experienced an unbalanced state in the friendship network that could have been resolved by forming an intergroup friendship. Based on this reasoning, I expect that:

Hypothesis 5: Triadic closure leads to fewer intergroup friendships for more prejudiced individuals than for less prejudiced individuals.

This can, however, only happen if more prejudiced individuals do not have friends in common with outgroup members.

Hypothesis 6a: More prejudiced individuals are more likely than less prejudiced individuals to be in network positions where their friends have fewer outgroup friends.

The question then arises as to what mechanism brings more prejudiced individuals in network positions where they are less likely to be introduced to outgroup members. According to the homophily principle, people prefer to befriend similar others (McPherson, Smith-Lovin, and Cook 2001; Wimmer and Lewis 2010). More prejudiced individuals may draw conclusions about potential friends' outgroup attitudes from these potential friends willingness to engage with outgroup members. More prejudiced individuals may thus infer that others who already have outgroup friends must have positive outgroup attitudes. Because of the apparent dissimilarity in their attitudes, they may then avoid those who already have outgroup friends (see path

a in Panel II of Figure 2). The same prediction follows from balance theory (Heider 1946, 1958). According to this theory, more prejudiced individuals do not want friends who have outgroup friends and are therefore less prejudiced because this would lead to cognitive dissonance; they would like their new friends but they would disagree on their attitudes toward the outgroup.

> *Hypothesis 6b*: More prejudiced individuals are more likely than less prejudiced individuals to actively avoid friends who have outgroup friends.

If people subsequently become friends with their friends' friends, more prejudiced individuals can only form additional ingroup friendships, while less prejudiced individuals can form intergroup friendships with the outgroup friends of their new friends (path b in Figure 2).

> *Hypothesis 7*: More prejudiced individuals' avoidance of friends who have outgroup friends mediates the selection bias.

THE PRESENT STUDY

The present study makes use of sociometric data collected in the Netherlands to test whether the selection bias is due to underlying network processes. Dutch majority group students in twenty classes from eight middle schools nominated their best friends among their classmates and indicated their attitudes toward the ethnic minority groups of Turkish and Moroccan people (outgroup prejudice). These groups represent the largest minority groups in the city in which the data were collected. Supplementary analyses, which are shown in the material associated with this article online, found no selection bias among ethnic minority students.

Stochastic actor-based longitudinal network analysis (Snijders, Van de Bunt, and Steglich 2010; Steglich et al. 2010) was used to test how lagged outgroup attitudes and preexisting friendships affected the development of intergroup friendships. This approach allows taking the interrelatedness of friendships in a network into account and reduces the risk of wrong conclusions due to reversed causality (Schaefer, Kornienko, and Fox 2011; Snijders et al. 2010).

METHOD

Participants

Data were drawn from the secondary-school module of the Arnhem School Study (Stark and Flache 2012), a longitudinal study of students' social networks and interethnic attitudes in their first years of secondary education (age 12–13). The first wave took place in the second and third weeks after the start of secondary education (September 2008). Wave 2 was conducted about three months later (December 2008), and Wave 3 took place about six additional months later (June 2009). In Arnhem, a midsized city in the Netherlands, 61 (88 percent) of all first-year classes in secondary schools took part in this study. Response rates of the remaining students were 95 percent at Wave 1, 93 percent at Wave 2, and 88 percent at Wave 3.

The present research focuses only on those Dutch majority group students who had at least one Turkish or Moroccan classmate of each gender.[2] A well-known preference for same-gender friends (e.g., Schaefer et al. 2011; Vermeij, Van Duijn, and Baerveldt 2009) may otherwise distort the results. That is, if all Turkish or

---

[2]Most ethnic minority students were born in the Netherlands and will have the Dutch citizenship. The label *Turks* or *Moroccans* hence indicates an ancestral connection to Turkey or Morocco.

Moroccan students in a class were females, one might observe Dutch boys without interethnic friendships. This could be mistaken for the selection bias when in fact it is due to the boys' preference for male friends. I excluded from the analyses four classes with Turkish or Moroccan students of both genders because little change in the social network or students' outgroup attitudes led to convergence problems. Accordingly, the final sample size was 453 students in 20 school classes. A replication of results for 241 students in the 10 classes with at least two boys and two girls from a Turkish or Moroccan background can be found in Appendix C in the online supplemental material.

Procedure

Parents received an information letter that offered them the opportunity to refuse their child's participation in the study. Students were informed that their answers would be treated confidentially and that they were free to discontinue participation at any time. Per school class, all students simultaneously completed the questionnaire online on separate computers. A teacher read instructions to the students and supervised completion of the questionnaires, which took 30 minutes on average.

Variables

Outgroup attitudes (prejudice). Students' attitudes toward Turkish, Moroccan, and Dutch people were measured using four questions. Participants indicated on seven-point scales how much they agreed with the four propositions—that "all [ethnic groups] are" (a) honest, (b) friendly, (c) smart, and (d) helpful (1 = *totally disagree* to 7 = *totally agree*) (Vervoort, Scholte, and Scheepers 2011).

Only positive traits were included because developmental research indicates that children older than seven years are less willing to discriminate between social groups in terms of negative dimensions, whereas they will do so in terms of positive traits (e.g., Rutland et al. 2007). All items were relatively normally distributed around the midpoint of the answer scale and the interitem correlations were below .90 with a few exceptions. Descriptive statistics for the individual items are presented in Appendix A in the online supplemental material.

To generate scales of prejudice, I reversed the directions of the four items per ethnic group so that higher values indicated more negative outgroup attitudes. The items showed high internal consistencies for attitudes toward the Dutch, with Cronbach's alphas of .95 or higher. Exploratory factor analysis revealed that the eight items for attitudes toward Turkish and Moroccan people loaded on one factor. A combined scale showed high internal consistencies (alpha = .96 at all waves). Because of this and because people tend to generalize from their attitudes toward one minority group to another (Schmid et al. 2012), I analyzed majority group students' attitudes toward both minority groups together. Accordingly, the final measures of outgroup prejudice were an additive index of attitudes toward Turks and Moroccans for all Dutch students and an additive index of attitudes toward the Dutch for all non-Dutch students. The values of these indexes were rounded to the nearest integer because this was a prerequisite of the statistical model. Values ranged from 1 to 7 with higher scores indicating more negative outgroup attitudes (stronger prejudice). Descriptive statistics for the additive indexes can be found in Table 1.

Table 1. Means, Standard Deviations, and Correlations of All Variables (N = 453)

Variables	Mean	SD				Correlations				
			1	2	3	4	5	6	7	8	9
1. Negative outgroup attitudes Wave 1	3.80	1.36	1.00								
2. Negative outgroup attitudes Wave 2	3.96	1.40	.38***	1.00							
3. Negative outgroup attitudes Wave 3	3.97	1.43	.35***	.42***	1.00						
4. Number of outgroup friends Wave 1	.97	1.86	.11*	.11*	.14**	1.00					
5. Number of outgroup friends Wave 2	1.25	2.04	.09+	−.17***	−.13**	.58***	1.00				
6. Number of outgroup friends Wave 3	1.14	1.79	−.14**	−.11*	−.23***	.48***	.58***	1.00			
7. Ethnicity Dutch	.55		.15**	.07	.09+	−.33***	−.39***	−.41***	1.00		
8. Ethnicity Turkish/Moroccan	.23		.01	.07	.03	.10+	.10*	.10*	−.62***	1.00	
9. Ethnicity other	.21		−.19***	−.16**	−.15**	.31***	.37***	.38***	−.58***	−.29***	1.00
10. Gender (male)	.54		.11*	.09†	.05	−.10	−.01	−.02	.04	.04	−.09+

Note: Pairwise deletion of missing values.
+*p* < .10. **p* < .05. ***p* < .01. ****p* < .001 (two-tailed tests).

Ethnicity. Students indicated the countries of birth of their parents. In the first step, a participant was classified as Dutch when both parents were born in the Netherlands. If at least one parent was born outside the Netherlands, the student was assigned the ethnicity of that parent. In the second step, I tried reducing misclassification of students with foreign-born parents who actually identified as being Dutch. All students were asked to answer the questions, "Do you feel Dutch?" and, if they had a foreign-born parent, "Do you feel [ethnicity of parent]?" Answers were given on five-point scales ranging from 1 = *not at all* to 5 = *very strongly*. If students with a foreign-born parent scored higher on the feeling-Dutch scale than on the other scale, they were recoded as being Dutch. Thirty-nine students who scored equally high on both scales could not be excluded from the sample because the statistical model can only be applied to complete networks. I assumed that students who identified equally strongly with an ethnic minority group as with the majority group would also be perceived as a member of the minority group by their friends from the majority group—at least some of the time. This assumption seems reasonable because 27 of the 39 students did not identify strongly as being Dutch. These students probably did not consider themselves Dutch and were also not perceived as Dutch by their classmates. Accordingly, those students were assigned to the ethnic minority group of their parents.

There were 243 students in the Dutch ethnic majority group, 103 Turkish or Moroccan students, 93 students who belonged to another ethnic minority group, and 14 students who did not indicate their ethnicity. The percentage of Dutch students in each class varied between 13 and 86 (M = 55.35). Between 7 and 58 percent of the students in the

classes were of Turkish or Moroccan origin (M = 23.55) and between 7 and 52 percent of students were from other ethnic groups (M = 21.20). The ethnic composition per class is presented in Appendix B in the online supplemental material.

Friendship networks. To assess all friendship relationships within a school class, students were asked to indicate whether they considered a particular classmate a "best friend." A list with the names of all classmates was displayed in the online questionnaire, and the students could check off the names of their best friends. Without limiting the number of friends, information on the entire friendship network was obtained. On average, students nominated 3.91 classmates (17 percent of all available classmates) as best friends in Wave 1, 4.85 (21 percent) in Wave 2, and 4.73 (21 percent) in Wave 3.

Outgroup friends. The number of students' outgroup friends was calculated by counting the number of friends they nominated who belonged to the ethnic outgroup. Friends' ethnicities were derived from their own answers to the ethnicity questions. Dutch students' numbers of outgroup friends were the numbers of Turkish and Moroccan classmates they nominated as best friends. For non-Dutch students, the number of outgroup friends related to the number of Dutch classmates nominated.

Control variables. Throughout all analyses, I controlled for students' gender (1 = *boy*, 0 = *girl*). A dummy variable of time (0 for the period between Wave 1 and Wave 2 and 1 for the second period) was included. This accounted for the expectation that more friendships would be created at the beginning of the school year than between the later two waves.

Analytic Strategy

To study the coevolution of social networks and covariates, Snijders and colleagues developed the stochastic actor-based model (Snijders et al. 2010; Steglich et al. 2010). Analysis can be done in the statistical software SIENA 4.0 in R (Ripley, Snijders, and Preciado 2011). The model can comprise two parts. The *attitude function* estimates effects of lagged covariates on attitude change. The *network function* allows for simultaneous modeling of changes in the friendship network.

Attitude function. Several parameters can be included in the attitude function of the model to study the changes in students' attitudes and to determine on what effects these changes may depend. The current investigation focused on main effects of lagged covariates, modeling the effects that these covariates had on attitude change. Among these, the effect of the number of outgroup friends represented the effect of intergroup contact. A so-called "average similarity" effect tested for social influence among friends. This effect is positive and significant if students adjust their outgroup attitude at a later wave to the attitudes of their friends at the previous wave.

Network function. Only tie formation (creation of a new friendship) but not tie maintenance was modeled in the analyses because the theoretical models all reason about forming new friendships with outgroup members. This was done with SIENA's so-called "creation function."[3]

Both network processes and actor characteristics can be included in the model to simultaneously estimate their effects on the creation of ties. In the initial analyses, no network effects were included in order to estimate direct effects

---

[3]The effects presented in this study replicated when tie formation and tie maintenance were modeled simultaneously (which is the default in SIENA), but they were not if only tie maintenance was modeled with the so-called "endowment function."

of outgroup attitudes without taking the potential mediation of such processes into account. I included only an outdegree effect, which represents the log-odds for creating a tie and models the overall density of the network. In the next steps of the analysis, I included the two network processes, reciprocity and triadic closure, that may potentially mediate the effect of prejudice on friendship selection. Reciprocity corresponds to a dummy variable that indicates for each potential friend whether he or she already sent out a friendship nomination. Triadic closure indicates the number of friends that are already shared with each potential friend. Mathematical formulas for all effects are given in Ripley et al. (2011).

Effects of actor characteristics such as students' gender or outgroup attitudes can be added to the network function to account for the fact that actors with certain characteristics are more likely than others to select friends, are more likely to be selected as friends, or are more likely to choose each other. For instance, gender differences in friendship selection that were found repeatedly in school networks (e.g., Schaefer et al. 2011; Vermeij et al. 2009) were modeled with the following effects: boy ego (are boys more likely to nominate friends than girls?), boy alter (are boys more likely than girls to be nominated as friends?), and same gender (are students more likely to nominate same-sex classmates as friends than classmates of the other sex?).

Interactions between such actor characteristics were used to test for a selection bias. A three-way interaction between the variables *Dutch ego, negative attitudes ego*, and *Turkish/Moroccan alter* modeled the *lower* likelihood for Dutch students (Dutch ego) with more negative outgroup attitudes (negative attitudes ego) to select Turkish or Moroccan friends (Turkish/Moroccan alter) in the next wave.

The stochastic actor-based model requires data on complete social networks. This means that all students in the classes were represented in the networks. Data for students who entered the class in a later wave or left the class before the end of the school year were treated as structurally missing. Missing values for individual attributes and network ties for students who did not answer although they were part of the classes in a given wave were imputed and treated as noninformative in the estimation process (Huisman and Steglich 2008). To estimate effects in 20 classes, I applied the multigroup option of SIENA (Ripley et al. 2011). This estimated the effects in each class and combined the results under the assumption that the parameter values were the same.

SIENA automatically centers effects for actor characteristics, but not network effects, before they are included in the analyses (Ripley et al. 2011). This makes it difficult to compare estimated coefficients, which are the log-odds for forming a friendship or adopting more negative outgroup attitudes. I present odds ratios (OR) wherever these seem to add insight beyond the direction and significance level of a parameter.

RESULTS

Tests for selective attrition showed very few differences between respondents in the twenty classes included in the sample and those in the four classes that were excluded. There were more interethnic friendships in excluded classes at Wave 2, $t(473) = 2.34$, $p = .02$, and the outgroup attitudes were significantly more positive in the same wave, $t(485) = 2.02$, $p = .04$. All other characteristics were not statistically different.

Table 1 presents the means, standard deviations, and correlations of all variables in the study. Students' negative

outgroup attitudes were highly correlated between all waves, as were the numbers of outgroup friends. Dutch students had significantly more negative attitudes toward the ethnic outgroup of Turkish/Moroccan people (M = 3.98) than had students from other ethnic groups toward the Dutch (M = 3.57) at Wave 1, $t(402)$ = 2.34, p = .002. This attitude difference was no longer significant at Wave 2, $t(404)$ = 1.49, p = .14, or Wave 3, $t(387)$ = 1.86, p = .06.

Intergroup Contact and Ethnic Homophily

Results of the stochastic actor-based analysis predicting attitude change and change in the friendship network over time are presented in Model 1 of Table 2. This model excluded network processes and thus closely resembles a classical cross-lagged approach, in which dependencies between friendships in a network are ignored. The first seven parameters in the table present results for the attitude function in which change of negative outgroup attitudes between the three consecutive waves is modeled. The marginally significant linear shape parameter shows that students' attitudes on average developed toward higher values. The significant quadratic shape effect indicates a positive feedback effect (estimate = .06, SE = .03, p = .04). Students with very negative or very positive attitudes developed even more extreme attitudes.

There was no support for the contact hypothesis in the subsample under study. Having more outgroup friends was not significantly related to the development of less negative attitudes toward the outgroup (est = −.02, SE = .02, p = .24). Moreover, none of the control variables were significant predictors of attitude change. There were also no significant interactions between the ethnicity variables and students' number of outgroup friends

(not shown), indicating that the insignificant intergroup contact effect was the same for all ethnic groups. There was, however, a statistically significant indication of social influence. Students adjusted their attitudes toward the ethnic outgroup in a later wave to the attitudes of their friends (est = 5.24, SE = .89, p < .001).

The predicted change in the friendship networks over time is shown in the lower part of Model 1 in Table 2. The outdegree effect represents the overall tendency to form ties. The negative coefficient indicates that the networks were sparse with students selecting far less than half of their classmates as friends (est = −2.53, SE = .10, p < .001). The time dummy variable's positive effect (est = .31, SE = .09, p = .001) indicates that students were forming ties on a more exploratory basis between Wave 1 and Wave 2. Later in the school year, when students knew their classmates better, friendship selection was more strongly driven by the factors represented in the model such as ethnicity. Boys were significantly more likely than girls to select friends over time (boys ego: est = .42, SE = .10, p < .001), but they were significantly less likely to be chosen as friends (boys alter: est = −.36, SE = .07, p < .001). Not surprisingly, there was a strong tendency to select friends of the same gender (est = 1.63, SE = .06, p < .001). There was also evidence that students with negative outgroup attitudes formed more friendships than students with less negative outgroup attitudes (negative attitudes ego: est = .23, SE = .05, p < .001).

Results for the ethnicity variables indicated that Dutch and Turkish/Moroccan students tended to avoid interethnic friendships. Dutch students tended to nominate more friends from their own ethnic group than they should have by chance alone (same Dutch: est = .41, SE = .07, p < .001). Also, students from the Turkish or Moroccan minority group had

Table 2. Selection Bias and Underlying Mechanisms: Stochastic Actor-Based Multigroup Analyses of the Co-Evolution of Twenty Classroom Friendship Networks and Students' Outgroup Attitudes (N = 453)

	Model 1		Model 2		Model 3		Model 4	
	Est	SE	Est	SE	Est	SE	Est	SE
Attitude function								
Data tendency: linear shape	.06+	.03	.06+	.03	.05+	.03	.06+	.03
Data tendency: quadratic shape	.06*	.03	.06*	.03	.05+	.03	.05+	.03
Number of outgroup friends	−.02	.02	−.02	.02	−.02	.02	−.02	.02
Gender (boys)	.01	.07	.01	.06	.02	.06	.02	.06
Ethnicity Dutch[a]	.07	.09	.07	.09	.07	.09	.07	.10
Ethnicity Turk/Moroccan[a]	.16	.10	.16	.10	.16	.10	.16	.10
Social influence (average similarity)	5.24***	.89	5.24***	.89	5.11***	.84	5.35***	.93
Network function								
Network effects								
Outdegree	−2.53***	.10	−2.55***	.10	−2.81***	.11	−3.58***	.12
Reciprocity	—		—		1.72***	.11	1.00***	.12
Triadic closure	—		—		—		.38***	.02
Time: first period	.31***	.09	.32***	.09	.33***	.08	.53***	.08
Gender								
Boys ego	.42***	.10	.40***	.10	.47***	.10	.31**	.09
Boys alter	−.36***	.07	−.36***	.06	−.39***	.07	−.41***	.07
Same gender	1.63***	.06	1.63***	.06	1.28***	.10	.96***	.07
Negative outgroup attitude								
Negative attitude ego	.23***	.05	.17**	.06	.17**	.06	.13**	.05
Negative attitude alter	−.002	.03	−.004	.03	−.004	.03	−.0004	.04
Attitude similarity	.09	.30	.12	.30	.16	.32	.30	.33
Ethnicity Dutch								
Dutch ego	−.64***	.13	−.59***	.14	−.62***	.14	−.43***	.12
Dutch alter	.16+	.09	.20*	.10	.30**	.10	.30**	.10
Same Dutch	.41***	.07	.48***	.09	.43***	.09	.40***	.10

(continued)

139

Table 2. (continued)

	Model 1		Model 2		Model 3		Model 4	
	Est	SE	Est	SE	Est	SE	Est	SE
Ethnicity Turks/Moroccans								
Turks/Moroccans ego	Reference		Reference		Reference		Reference	
Turks/Moroccans alter	.19+	.11	.26+	.14	.23	.15	.18	.15
Same Turks/Moroccans	.53***	.08	.60***	.11	.52***	.12	.47***	.12
Ethnicity other								
Ethnicity other ego	−.30+	.16	−.24	.19	−.24	.19	−.15	.16
Ethnicity other alter	Reference		Reference		Reference		Reference	
Same other ethnicity	−.36***	.09	−.43***	.11	−.37***	.11	−.35***	.09
Selection bias of Dutch								
Dutch ego × negative attitude ego	—		−.48***	.12	−.47***	.11	−.35***	.09
Dutch ego × Turks/Moroccans alter	—		.27	.26	.35	.29	.33	.29
Negative attitude ego × Turks/Moroccans alter	—		−.20*	.09	−.19+	.10	−.20+	.11
Dutch ego × negative attitude ego × Turks/ Moroccans alter	—		−.41*	.17	−.36*	.18	−.23	.21

Note: Unstandardized effects.
[a]Reference category is ethnicity other.
+p < .10. *p < .05. **p < .01. ***p < .001 (two-tailed tests).

140

a preference for friends from their own ethnic group (same Turks/Moroccans: est = .53, SE = .08, p < .001). This was different for students who belonged to any of the other ethnic minority groups. Taking the opportunity structure into account, these students were less likely to form friendships with students who were also from other minority groups than they should have by chance alone (same other ethnicity: est = −.36, SE = .09, p < .001).

Selection Bias

Just like in earlier research, there was evidence for a selection bias according to which negative outgroup attitudes prevented the formation of intergroup friendships among the Dutch majority group. This was tested with a three-way interaction that was added in Model 2 along with the conditional two-way interactions. This three-way interaction was negative and significant (est = −.41, SE = .17, p = .02), indicating that Dutch students (Dutch ego) with more negative attitudes (negative attitudes ego) were less likely to select Turkish or Moroccan classmates (Turkish/Moroccan alter) as friends than Dutch students with more positive attitudes. The odds for Dutch students with unfavorable outgroup attitudes (M + 1 SD) to form friendships with arbitrary Turkish or Moroccan classmates was only .03.[4] In contrast, the odds for Dutch students with favorable outgroup attitudes (M − 1 SD) to do so was .15, which means that unfavorable outgroup attitudes made intergroup friendships more than 5 times less likely (OR = 5.15). This supports Hypothesis 2, indicating a direct effect from negative outgroup attitudes to

---

[4]To calculate predicted values, each variable has to take some value. Odds ratio calculations are based on a Dutch boy selecting a Turkish or Moroccan boy with average outgroup attitudes between Waves 1 and 2.

fewer intergroup friendships (path c in Figure 2).

Network Processes

There was no evidence that the network process reciprocity could underlie the selection bias. Reciprocity, which was added in Model 3 of Table 2, was a strong and highly significant predictor of friendship formation (est = 1.72, SE = .11, p < .001). Thus, students had a strong tendency to reciprocate friendship nominations at a later wave. Adding reciprocity to the model reduced the coefficient of the three-way interaction, indicating the selection bias slightly, but it remained significant (est = −.36, SE = .18, p = .049). This refutes Hypothesis 3.

In contrast, there was no indication of a selection bias once triadic closure was taken into account (Model 4 of Table 2). The positive and highly significant triadic closure effect indicates that students had a strong tendency to nominate the friends of their friends' friends (est = .38, SE = .02, p < .001). Including this network process in the model cut the coefficient for the three-way interaction indicating the selection bias almost in half and rendered it insignificant (est = −.23, SE = .21, p = .27). This supports Hypothesis 5, suggesting that negative outgroup attitudes do not directly cause a rejection of outgroup friends. Triadic closure seems to play a role in it, but the exact underlying mechanism was not yet revealed by these analyses.

Mediation through Network Processes

To test the mediation models, I followed as closely as possible the method proposed by Baron and Kenny (1986). This method has been criticized, not because it might detect mediation processes that are not real but because it lacks statistical power

and may overlook existing mediation processes (Zhao, Lunch, and Chen 2010). Unfortunately, a bootstrap test for indirect effects (Preacher and Hayes 2004) does not exist for social network data.

The first mediation model proposes that negative outgroup attitudes lead to fewer friendship invitations from outgroup members (path a in Figure 2, I). Accordingly, I tested whether negative outgroup attitudes reduced the likelihood of Dutch students to be nominated as a friend by a Turkish or Moroccan classmate. This translated into an interaction between negative attitudes alter, Dutch alter, and Turkish/Moroccan ego.[5]

Outgroup attitudes did not affect Dutch majority group students' likelihood of being nominated as a friend by Turkish or Moroccan minority group classmates. Model 1 in Table 3 shows a negative but insignificant coefficient for this three-way interaction (est = −.10, SE = .08, p = .23). This leads to a rejection of Hypothesis 4a and is in line with the finding that reciprocity does not underlie the selection bias. Reciprocating friendship invitations was not related to the formation of interethnic friendships because compared to less prejudiced students, more prejudiced students were not less likely to receive friendship invitations from outgroup members. Thus, the mediation model building on reciprocity (as proposed in Hypothesis 4b) does not underlie the selection bias.

In line with the second mediation model (Figure 2, II), more prejudiced Dutch students were in network positions

where their friends tended to have fewer outgroup friends. A three-way interaction of Dutch ego × negative attitude ego × Turkish/Moroccan alter at distance 2 was negative and statistically significant (est = −1.02, SE = .51, p = .047, Model 2 of Table 3). The last variable indicates whether students are more likely to nominate a friend, the more Turkish or Moroccan friends this potential friend already has. This model does not include the basic network effects reciprocity and triadic closure. As such, the coefficient of the three-way interaction cannot be interpreted as a behavioral tendency to avoid classmates with outgroup friends. Rather, it shows a descriptive pattern in the data. The more prejudiced Dutch students were, the less likely they were to have friends who already had Turkish or Moroccan friends. This is in line with Hypothesis 6a. To illustrate the strength of this relationship, I calculated predicted values for the likelihood of a hypothetical Dutch student to be friends with another Dutch student who had the same number of Dutch and of Turkish or Moroccan friends. If the hypothetical student had positive attitudes (M − 1 SD), he was twice as likely to be a friend of the other Dutch student than when he had negative attitudes (M + 1 SD, OR = 2.13).

The data did not clearly indicate that more prejudiced students deliberately selected themselves into network positions where their friends had fewer outgroup friends (path a in Figure 2, II). When the basic network processes reciprocity and transitivity were added to the model, the three-way interaction between Dutch ego × negative attitude ego × Turkish/Moroccan alter at distance 2 was only marginally significant (est = −.83, SE = .49, p = .094, Model 3 of Table 3). This suggests that there was a tendency to avoid friends with outgroup friends. However, the descriptive pattern in the data was also partially due to the

---

[5]The stochastic actor-based model does not allow three-way interactions that include two alter variables. I solved this problem by first computing a new variable by multiplying negative attitude and Dutch. The three-way interaction presented in Model 1 of Table 3 is thus actually a two-way interaction between Turkish/Moroccan ego and the alter effect of this newly generated variable.

Table 3. Test of the Mediation Models: Stochastic Actor-Based Multigroup Analyses of the Co-Evolution of Twenty Classroom Friendship Networks and Students' Outgoup Attitudes (N = 453)

	Model 1		Model 2		Model 3		Model 4	
	Est	SE	Est	SE	Est	SE	Est	SE
Attitude function	Included		Included		Included		Included	
Network function								
Network effects								
Outdegree	−2.47***	.10	−2.48***	.10	−3.53***	.11	−3.58***	.12
Reciprocity	—		—		.99****	.13	.98****	.13
Triadic closure	—		—		.38***	.02	.38***	.02
Time and gender	Included		Included		Included		Included	
Negative outgroup attitude								
Negative attitude ego	.23***	.06	.13*	.06	.10+	.05	.10+	.05
Negative attitude alter	.005	.04	−.005	.03	.0003	.04	−.003	.04
Attitude similarity	.09	.30	.13	.31	.30	.32	.31	.32
Ethnicity Dutch								
Dutch ego	−.41**	.14	−.53***	.14	−.39**	.12	−.45**	.13
Dutch alter	.11	.16	.14	.10	.26*	.11	.31**	.11
Same Dutch	.27**	.10	.23**	.08	.29**	.09	.37****	.10
Ethnicity Turks/Moroccans								
Turks/Moroccans ego	.13	.17	Reference		Reference		Reference	
Turks/Moroccans alter	Reference		.07	.12	.04	.13	.17	.16
Same Turks/Moroccans	.40***	.10	.45***	.08	.36***	.10	.47****	.12
Ethnicity other								
Ethnicity other ego	Reference		−.08	.18	−.05	.16	−.14	.17
Ethnicity other alter	−.07	.12	Reference		Reference		Reference	
Same other ethnicity	−.21+	.11	−.30**	.09	−.27**	.10	−.36**	.12

(continued)

Table 3. (continued)

	Model 1 Est	SE	Model 2 Est	SE	Model 3 Est	SE	Model 4 Est	SE
Test of reciprocity as mediator								
Dutch alter × negative attitude alter	−.02	.04	—		—		—	
Dutch alter × Turkish/Moroccan ego	−.17	.39	—		—		—	
Turkish/Moroccan ego × negative attitude alter	.02	.08	—		—		—	
Dutch alter × Turkish/Moroccan ego × negative attitude alter	−.10	.08	—		—		—	
Test of triadic closure as mediator								
Turkish/Moroccan alter at distance 2	—		−.13	.35	.01	.32	−.01	.32
Dutch ego × negative attitude ego	—		−.51***	.12	−.40***	.10	−.40***	.10
Dutch ego × Turkish/Moroccan alter at distance 2	—		−2.11***	.52	−.36	.51	−.46	.51
Turkish/Moroccan alter at distance 2 × negative attitude ego	—		−.36	.27	.52+	.27	−.45	.32
Dutch ego × negative attitude ego × Turkish/Moroccan alter at distance 2	—		−1.02*	.51	−.83+	.49	−.74	.61
Selection bias of Dutch								
Dutch ego × Turks/Moroccans alter	—		—		—		.39	.30
Negative attitude ego × Turks/Moroccans alter	—		—		—		−.11	.13
Dutch ego × negative attitude ego × Turks/ Moroccans alter	—		—		—		−.10	.24

Note: Unstandardized effects. The complete table can be found in Appendix E in the online supplemental material.
+*p* < .10.*p < .05. **p < .01. ***p < .001(two-tailed tests).

144

basic network processes. Triadic closure (becoming friends with the friends of a friend) most likely reinforced students' preference for ingroup friends (ethnic homophily) and more prejudiced students' slight tendency to avoid friends who already had Turkish or Moroccan friends. Thus, there was only partial support for Hypothesis 6b.

The test of the full mediation model remained inconclusive. Following the Baron and Kenny (1986) method, I tested how the coefficient of path c in Figure 2, II changed once the process underlying the potential mediators were included in the model. Model 4 in Table 3 thus includes the three-way interaction representing the selection bias, the three-way interaction representing the mediator, and triadic closure as the underlying mechanism. Triadic closure remained significant in this model (est = .38, SE = .02, $p < .001$) whereas the coefficient of three-way interaction for the selection bias was close to zero (est = −.10, SE = .24, $p = .68$). This would be in line with complete mediation according to Hypothesis 7. However, the coefficient of the mediator also was insignificant in this model (est = −.74, SE = .61, $p = .22$). This was most likely due to high multicollinearity between the estimates given seven interaction effects that were partially based on the same main effects. Based on these findings, it cannot be concluded with certainty that the proposed mediation model in Figure 2, II is the ultimate cause of the selection bias.

DISCUSSION

The present study found that a seemingly direct effect of majority group students' negative outgroup attitudes on the avoidance of outgroup friends (the selection bias) was actually caused by the network process triadic closure. More prejudiced majority group students were less likely than less prejudiced students to have friends who already had friends from ethnic minority groups. This was partially due to more prejudiced students' preference to not befriend classmates with outgroup friends and partially due to their tendency to become friends with their friends' friends (triadic closure). The direct effect of prejudice on fewer intergroup friendships (the selection bias) disappeared once students' preference for triadic closure was included in the models. This suggests that more prejudiced students did not actively avoid outgroup members. Rather, they became friends with their friends' friends who happened to be from the ingroup, not the outgroup.

There was no evidence for an alternative model, which suggested that reciprocity mediates the selection bias. More prejudiced individuals might be rejected by outgroup members and may thus not receive friendship invitations from the outgroup. However, the empirical results did not support this model. Students from the ethnic minority groups were not less likely to select more prejudiced majority group students as friends. Reciprocity could thus not underlie the selection bias.

Mediation Instead of a Direct Effect?

The findings indicate that outgroup attitudes play a role in the development of intergroup friendships, but the underlying process looks different from what is commonly assumed. Earlier longitudinal studies that found evidence for the selection bias explained it as a psychological preference of more prejudiced individuals to avoid outgroup members and of less prejudiced people to engage in intergroup contact (e.g., Binder et al. 2009; Levin et al. 2003; Sidanius et al. 2008). However, intergroup friendships do not develop because students with positive attitudes seek out friends from other groups. It is

not so much individual preferences but rather network processes that are responsible for the link between attitudes and intergroup contact. Students with positive attitudes are more likely to be in network positions where they have friends who already have outgroup friends. Subsequently, new and old friends are introduced to each other and intergroup friendships form as a consequence of triadic closure. In contrast, more prejudiced students' friends do not form bridges between the ethnic ingroup and the outgroup and therefore cannot introduce more prejudiced individuals to outgroup members. Instead, triadic closure only leads to more ingroup friends for more prejudiced students.

More prejudiced students ended up in network positions with fewer friends who already had contact with the outgroup partially due to network processes (triadic closure) and partially due to their own decision. This tendency of more prejudiced students to avoid others who already have outgroup friends could be a consequence of the homophily principle (McPherson et al. 2001). Students in schools often befriend those who have similar attitudes or opinions on what are considered important issues (Stark and Flache 2012). Outgroup attitudes may be such an important issue for those who have negative attitudes. More prejudiced students may infer from existing intergroup friendships that those with outgroup friends must have positive outgroup attitudes and thus avoid them as friends. Alternatively, students may not select friends who already have outgroup friends because they want to avoid cognitive dissonance; they would like their new friends but disagree on their attitudes toward the outgroup (see balance theory, Heider 1946, 1958).

Even though there was evidence for each step in the proposed mediation model, a test of the complete model remained inconclusive. As expected, the coefficient of the selection bias was insignificant and close to zero when triadic closure and students' preference for avoiding friends who already had outgroup friends were added to the model. However, this latter coefficient was also insignificant in the full model, most likely due to high multicollinearity.

Extended and Direct Contact

The results of this study may seem particularly concerning in light of the extended contact hypothesis (Wright et al. 1997). Research has found that merely knowing that ingroup friends have positive contact with outgroup members reduces prejudice (see Dovidio et al. 2011). The present study suggests that more prejudiced individuals do not experience extended contact because they have a tendency to avoid friends who have outgroup friends.

However, this study focused on small social settings in which existing friendships between a potential friend and outgroup members could be easily observed. More prejudiced students could infer that classmates with outgroup friends must have positive outgroup attitudes and reject them because of their dissimilar attitudes. These processes might look different if extended contact does not take place within a small social setting. New friendships may be formed within one social setting and people may be unaware of the outgroup friends that their new friends already have from another setting. Once they learn about these outgroup friends they are faced with cognitive dissonance: they like their new friend but disagree about their attitudes toward the outgroup. Balance theory (Heider 1946, 1958) states that people can solve this dissonance by either dissolving their friendship or reassessing their attitudes toward the outgroup. The

decision to remain friends and reduce prejudice may be one of the mechanisms behind the extended contact effect (Munniksma et al. 2013).

There was no support for the traditional contact hypothesis. Having more friendships with outgroup members did not reduce prejudice. This was most likely because of too little statistical power in the small sample under study. Contact had the expected effect in additional analyses with larger samples in which I tested for the selection bias among the minority group (Appendix D in the online supplemental material).

Limitations

Social network analyses are rarely representative for an entire society (Wasserman and Faust 1994), and the present study relied on data from schools in one city in the Netherlands. Moreover, due to convergence problems, 4 of 24 classes could not be considered in the analyses. It is thus unclear how well these results generalize to other settings. Future research should test whether in samples with older or more prejudiced respondents outgroup attitudes more strongly affect people's willingness to have intergroup contact than in this student sample.

The test of the reciprocity model revealed that minority group students were not less likely to choose Dutch majority peers with negative outgroup attitudes as friends than they were to select those with positive attitudes. This finding may be restricted to settings in which negative attitudes do not reflect very strong prejudice. It could also be that students find it difficult to identify their classmates' actual attitudes. Minority group students may not have chosen more prejudiced friends if they had been aware of these attitudes. Future research that assesses *perceived* attitudes of potential friends should test these two alternatives.

The present study only focused on students' friends among their classmates although friendship networks outside of the classroom may be just as important. For example, minority members with negative attitudes toward the majority group may retreat into social networks of their own ethnic or religious community outside of school (Maliepaard and Phalet 2012). As a result, these individuals may not form ties with majority group members or with others who already have friends from the majority within the integrated context of a school class.

CONCLUSIONS

Psychologists are increasingly interested in social network processes and argue for incorporating these processes in theory formation and empirical research (see Westaby, Pfaff, and Redding 2014; Wölfer, Faber, and Hewstone 2015). The present paper suggests that this is particularly beneficial for research on intergroup contact. Intergroup friendships do not only depend on one individual's attitudes and preferences but concern different individuals. Moreover, friendships often develop within social contexts that involve other people (Pettigrew 2008; Pettigrew et al. 2007). A social network perspective offers a new theoretical view on the processes underlying intergroup contact. For instance, research has found that contact effects are mediated by perceived ingroup norms (Dovidio et al. 2011). Social network research, in contrast, has demonstrated that outgroup attitudes are influenced by direct network contacts (Van Zalk et al. 2013). A combination of both approaches may further our understanding of which outgroup or ingroup members exert most influence on people's outgroup attitudes. The network perspective may also lead to new hypotheses about the type of network configurations (e.g., high or low clustering) in

which intergroup contact is less or more consequential for outgroup attitudes. In fact, a social network perspective allows us to systematically consider the level of social interactions and thereby to go beyond the more individualistic approach that characterizes most of the existing work on the contact hypothesis.

Next to the theoretical relevance, this research has implications for practitioners who want to promote intergroup friendships among more prejudiced majority group members. Earlier findings of a selection bias suggested that more prejudiced people's attitudes have to be improved before contact or even friendships with minority group members can be established. I argued that this leads to a vicious circle as contact proved to be one of the most effective means to reduce prejudice (Hodson 2011; Paluck and Green 2009). The results of the present research indicate that there may not be such a vicious circle after all. More prejudiced majority group members tend to be in network positions where they are less likely to meet minority group members and social network processes translate these positions into fewer intergroup friendships. Intervention programs may be able to bypass these network processes through directly establishing contact between members of different groups.

ACKNOWLEDGMENTS

FUNDING

REFERENCES

Allport, Gordon W. 1954. *The Nature of Prejudice*. Cambridge: Addison-Wesley.

Baron, Reuben M. and David A. Kenny. 1986. "The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic and Statistical Considerations." *Journal of Personality and Social Psychology* 51:1173–82.

Binder, Jens, Hanna Zagefka, Rupert Brown, Friederich Funke, Thomas Kessler, Amelie Mummendey, Annemie Maquil, Stephanie Demoulin, and Jacques-Philippe Leyens. 2009. "Does Contact Reduce Prejudice or Does Prejudice Reduce Contact? A Longitudinal Test of the Contact Hypothesis among Majority and Minority Groups in Three European Countries." *Journal of Personality and Social Psychology* 96:843–56.

Brown, Rupert, Anja Eller, Sarah Leeds, and Kim Stace. 2007. "Intergroup Contact and Intergroup Attitudes: A Longitudinal Study." *European Journal of Social Psychology* 37:692–703.

Brown, Rupert and Miles Hewstone. 2005. "An Integrative Theory of Intergroup Contact." *Advances in Experimental Social Psychology* 37:255–343.

Cartwright, Dorwin and Frank Harary. 1956. "Structural Balance—a Generalization of Heider Theory." *Psychological Review* 63: 277–93.

Christ, Oliver and Ulrich Wagner. 2013. "Methodological Issues in the Study of Intergroup Contact: Towards a New Wave of Research." Pp. 233–61 in *Advances in Intergroup Contact*, edited by G. Hodson and M. Hewstone. London: Psychology Press.

Davies, Kristin, Linda R. Tropp, Arthur Aron, Thomas F. Pettigrew, and Stephen C. Wright. 2011. "Cross-Group Friendships and Intergroup Attitudes: A Meta-Analytic Review." *Personality and Social Psychology Review* 15:332–51.

Davis, James A. 1963. "Structural Balance, Mechanical Solidarity, and Interpersonal Relations." *American Journal of Sociology* 68:444–62.

Dovidio, John F., Anja Eller, and Miles Hewstone. 2011. "Improving Intergroup Relations through Direct, Extended and Other

Forms of Indirect Contact." *Group Processes & Intergroup Relations* 14:147–60.

Eller, Anja and Dominic Abrams. 2003. "'Gringos' in Mexico: Cross-Sectional and Longitudinal Effects of Language School-Promoted Contact on Intergroup Bias." *Group Processes & Intergroup Relations* 6:55–75.

Feddes, Allard R., Peter Noack, and Adam Rutland. 2009. "Direct and Extended Friendship Effects on Minority and Majority Children's Interethnic Attitudes: A Longitudinal Study." *Child Development* 80:377–90.

Goodreau, Steven M., James A. Kitts, and Martina Morris. 2009. "Birds of a Feather, or Friend of a Friend? Using Statistical Network Analysis to Investigate Adolescent Social Networks." *Demography* 45:103–25.

Heider, Fritz. 1946. "Attitudes and Cognitive Organization." *Journal of Psychology* 21:107–12.

Heider, Fritz. 1958. *The Psychology of Interpersonal Relations*. New York: Wiley.

Hewstone, Miles and Hermann Swart. 2011. "Fifty-Odd Years of Inter-Group Contact: From Hypothesis to Integrated Theory." *British Journal of Social Psychology* 50:374–86.

Hodson, Gordon. 2011. "Do Ideologically Intolerant People Benefit from Intergroup Contact?" *Current Directions in Psychological Science* 20:154–59.

Huisman, Mark and Christian E.G. Steglich. 2008. "Treatment of Non-Response in Longitudinal Network Studies." *Social Networks* 30:297–308.

Levin, Shana, Colette van Laar, and Jim Sidanius. 2003. "The Effects of Ingroup and Outgroup Friendships on Ethnic Attitudes in College: A Longitudinal Study." *Group Processes & Intergroup Relations* 6:76–92.

Maliepaard, Mieke and Karen Phalet. 2012. "Religious Identity Expression among Dutch Muslims: The Role of Minority and Majority Group Contact." *Social Psychology Quarterly* 75:131–48.

McPherson, Miller, Lynn Smith-Lovin, and James M. Cook. 2001. "Birds of a Feather: Homophily in Social Networks." *Annual Review of Sociology* 27:415–44.

Munniksma, Anke, Tobias H. Stark, Maykel Verkuyten, Andreas Flache, and D. Rene Veenstra. 2013. "Extended Intergroup Friendships within Social Settings: The Moderating Role of Initial Outgroup Attitudes." *Group Processes & Intergroup Relations* 16:752–70.

Paluck, Elizabeth L. and Donald P. Green. 2009. "Prejudice Reduction: What Works? A Review and Assessment of Research and Practice." *Annual Review of Psychology* 60:339–67.

Pettigrew, Thomas F. 2008. "Future Directions for Intergroup Contact Theory and Research." *International Journal of Intercultural Relations* 32:187–99.

Pettigrew, Thomas F., O. Christ, U. Wagner, and J. Stellmacher. 2007. "Direct and Indirect Intergroup Contact Effects on Prejudice: A Normative Interpretation." *International Journal of Intercultural Relations* 31:411–25.

Pettigrew, Thomas F. and Linda R. Tropp. 2006. "A Meta-Analytic Test of Intergroup Contact Theory." *Journal of Personality and Social Psychology* 90:751–83.

Pettigrew, Thomas F., Linda R. Tropp, Ulrich Wagner, and Oliver Christ. 2011. "Recent Advances in Intergroup Contact Theory." *International Journal of Intercultural Relations* 35:271–80.

Preacher, Kristopher J. and Andrew F. Hayes. 2004. "SPSS and SAS Procedures for Estimating Indirect Effects in Simple Mediation Models." *Behavior Research Methods, Instruments, and Computers* 36:717–31.

Ripley, Ruth M., Tom A. B. Snijders, and Paulina Preciado. 2011. *Manual for Siena Version 4.0 (Version August 27, 2013)*. Oxford: University of Oxford, Department of Statistics; Nuffield College. http://www.stats.ox.ac.uk/siena/.

Rutland, Adam, Rupert J. Brown, Lindsey Cameron, Anni Ahmavaara, Katie Arnold, and Jenni Samson. 2007. "Development of the Positive-Negative Asymmetry Effect: In-Group Exclusion Norm as a Mediator of Children's Evaluations on Negative Attributes." *European Journal of Social Psychology* 37:171–90.

Schaefer, David R., Olga Kornienko, and Andrew M. Fox. 2011. "Misery Does Not Love Company: Network Selection Mechanisms and Depression Homophily." *American Sociological Review* 76:764–85.

Schmid, Katharina, Miles Hewstone, Beate Küpper, Andreas Zick, and Ulrich Wagner. 2012. "Secondary Transfer Effects of Intergroup Contact: A Cross-National Comparison in Europe." *Social Psychology Quarterly* 75:28–51.

Sidanius, Jim, Shana Levin, Colette Van Laar, and David O. Sears. 2008. *The Diversity Challenge: Social Identity and Intergroup*

Relations on the College Campus. New York: Russell Sage Foundation.

Snijders, Tom A. B., Gerhard G. Van de Bunt, and Christian E. G. Steglich. 2010. "Introduction to Stochastic Actor-Based Models for Network Dynamics." *Social Networks* 32:44–60.

Stark, Tobias H. and Andreas Flache. 2012. "The Double Edge of Common Interest: Ethnic Segregation as an Unintended Byproduct of Opinion Homophily." *Sociology of Education* 85:179–99.

Steglich, Christian E. G., Tom A. B. Snijders, and Michael Pearson. 2010. "Dynamic Networks and Behavior: Separating Selection from Influence." *Sociological Methodology* 40:329–93.

Swart, Hermann, Miles Hewstone, Oliver Christ, and Alberto Voci. 2011. "Affective Mediators of Intergroup Contact: A Three-Wave Longitudinal Study in South Africa." *Journal of Personality and Social Psychology* 101:1221–38.

Van Zalk, Maarten H. W., Margaret Kerr, Nejra Van Zalk, and Hakan Stattin. 2013. "Xenophobia and Tolerance toward Immigrants in Adolescence: Cross-Influence Processes within Friendships." *Journal of Abnormal Child Psychology* 41:627–39.

Vermeij, Lotte, Marijtje A. J. Van Duijn, and Chris Baerveldt. 2009. "Ethnic Segregation in Context: Social Discrimination among Native Dutch Pupils and Their Ethnic Minority Classmates." *Social Networks* 31:230–39.

Vervoort, Miranda H. M., Ron H. J. Scholte, and Peer L. H. Scheepers. 2011. "Ethnic Composition of School Classes, Majority-Minority Friendships, and Adolescents' Intergroup Attitudes in the Netherlands." *Journal of Adolescence* 34:257–67.

Vezzali, Loris, Dino Giovannini, and Dora Capozza. 2010. "Longitudinal Effects of Contact on Intergroup Relations: The Role of Majority and Minority Group Membership and Intergroup Emotions." *Journal of Community & Applied Social Psychology* 20:462–79.

Vorauer, Jacquie D. 2006. "An Information Search Model of Evaluative Concerns in Intergroup Interaction." *Psychological Review* 113:862–86.

Vorauer, Jacquie D. 2013. "Getting Past the Self: Understanding and Removing Evaluative Concerns as an Obstacle to Positive Intergroup Contact Effects." Pp. 23–48 in *Advances in Intergroup Contact*, edited by

G. Hodson and M. Hewstone. London: Psychology Press.

Vorauer, Jacquie D. and Yumiko Sakamoto. 2006. "I Thought We Could Be Friends, but . . . Systematic Miscommunication and Defensive Distancing as Obstacles to Cross-Group Friendship Formation." *Psychological Science* 17:326–31.

Wasserman, Stanley and Katherine Faust. 1994. *Social Network Analysis: Methods and Applications*. Cambridge: University Press.

Westaby, J. D., D. L. Pfaff, and N. Redding. 2014. "Psychology and Social Networks a Dynamic Network Theory Perspective." *American Psychologist* 69:269–84.

Wimmer, Andreas and Kevin Lewis. 2010. "Below and Beyond Racial Homophily. Erg Models of a Friendship Network Documented on Facebook." *American Journal of Sociology* 116:583–642.

Wright, Stephen C., Arthur Aron, Tracy McLaughlin-Volpe, and Stacy A. Ropp. 1997. "The Extended Contact Effect: Knowledge of Cross-Group Friendships and Prejudice." *Journal of Personality and Social Psychology* 73:73–90.

Wölfer, Ralf, Nadira S. Faber, and Miles Hewstone. 2015. "Social Network Analysis in the Science of Groups: Cross-Sectional and Longitudinal Applications for Studying Intra- and Intergroup Behavior." *Group Dynamics: Theory, Research, and Practice* 19:45–61.

Zhao, Xinshu, John G. Lunch Jr., and Qimei Chen. 2010. "Reconsidering Baron and Kenny: Myths and Truths about Mediation Analysis." *Journal of Consumer Research* 37:197–206.

BIO

Tobias Stark is a Marie Curie International Outgoing Fellow at the European Research Centre on Migration and Ethnic Relations (ERCOMER) at Utrecht University in the Netherlands and he was a visiting scholar at the Department of Communication at Stanford University between 2012 and 2014. His main research interest is in the measurement of racial attitudes as well as in the link between such attitudes, interethnic relations, and social networks.