Chapter 9
Immigrant Children's Access to Social Capital in School-Class Networks

Michael Windzio

9.1 Introduction

Social capital is an important concept in sociological and economic studies. Not only has it been intensively investigated in migration and integration research; it is also fundamental in research on social stratification and social inequality. Certainly one of the most famous versions of this concept was elaborated by Bourdieu (1986), who argued that children profit from well-educated and economically well-off parents. Benefiting from social capital in families surely provides an important advantage in the educational system and therefore also in the status attainment process. In Bourdieu's view it is rather an obfuscation of economic inequalities to consider social capital naïvely as the ultimate cause of success in the life course. A minimum amount of economic capital is a precondition for allocating parents' time to investments into their children's socialisation. Nonetheless, social capital has been considered as a resource sui generis in studies on the integration of immigrants, although the "negative side" of close ties to co-ethnic immigrants has also been taken into account (Portes 1998).

Possibly due to Bourdieu's emphasis on the intra-familial transformation of capital, the role of children's ties to their peers has been neglected so far. Certainly, children can support each other not only in their daily social interactions, but also with regard to learning issues. It is a common result in the sociology of education that high levels of *cultural* capital in children's families increase children's chances of success in the educational system (Ho and Willms 1996). Children's personalities or "habitus" is strongly affected by the cultural capital available in the family. But it may also make an important difference with whom

M. Windzio (✉)
Institut für Empirische und Angewandte Soziologie (EMPAS), Universität Bremen, Celsiusstraße 1(FVG), Raum M1061, 28359 Bremen, Germany
e-mail: mwindzio@empas.uni-bremen.de

they interact in their classroom-based support networks. Hence, the "quality" of their peers' "habitus" and competences might be crucial for the quality of children's peer-related *social* capital.

It is known from previous research that highly motivated and well-performing peers can increase academic performance (Hanushek et al. 2003). Moreover, it is known that there is a considerable degree of social and ethnic homophily, especially with regard to ties in dimensions which require higher levels of investment (Windzio 2012), such as spending leisure time together or visiting friends at home (Windzio and Bicer 2013). As a matter of course, the flip side of this coin is ethnic and social segregation in networks. Despite the fact that immigrant pupils seem to have higher aspirations to pursue good educational degrees (Kristen and Dollmann 2010) numerous studies have revealed their problems and their disadvantage in the educational system.

The basic question addressed in the present chapter is whether the access to peer-related social capital could be an additional factor which contributes to the explanation of educational disadvantages. In order to compare the levels of peer-related social capital of native and immigrant children, the current chapter analyses classroom-based social networks of friendship ties and networks in which pupils complete homework together. Using the data of complete networks in school classes, it will be shown that especially dyads of two Turkish pupils have a much higher propensity of being involved in homework-groups than dyads of two native German pupils. However, considering also the *quality* of these network ties with regard to the school performance of ego's partners as well as their endowment with family-related cultural capital, it can be shown that Turkish pupils have lower rates of possessing "high quality" network ties. On the one hand, the motivation and aspiration towards good education is high in many immigrant families and there actually is a tendency to use social capital in homework networks. On the other hand, however, ethnic and social segregation in school class-based social networks seems to prevent pupils from benefiting from "high quality" network ties.

In the following Sect. 9.2 we will discuss theoretical arguments and existing empirical results on peer-related social capital and its effects on school attachment and performance. Section 9.3 describes the data and statistical methods and Sect. 9.5 presents the results.

9.2 Social Capital, Educational Attainment and Immigrant Integration in Institutional Contexts

The educational system will never be completely determined from outside the system (Luhmann 2008), neither by policy-makers nor by school principals. Nonetheless, educational outcomes can be influenced by the primary effects of education policies. *Primary* effects result from policies addressing learning

conditions such as class size, school autonomy or teachers' salaries. In addition to these primary institutional effects, *secondary* institutional effects result, among other things, from issues people care about, but which originated outside the organisation. Formal decision-making usually does not address the questions of how social networks among students evolve in schools and how processes of social interaction and social capital influence educational outcomes. When students establish school-related ties in their networks, the selection and stability of these ties are strongly affected by factors students bring in with them from outside the institution. For instance, the concept of homophily describes the actors' propensity to form ties according to similarity with regard to significant social characteristics. As McPherson et al. (2001, p. 215) argue, especially race and ethnicity are important sources of homophily. In addition, homophily depends on similarity in religion and social status. Yet homophily results from complex processes, most of them taking place outside of educational institutions. For instance, Alba and Nee (2003) extensively describe the origin and the dynamics of *ethnic boundaries* in modern societies. Surely, educational institutions and especially schools are important focus points where children and adolescents can meet and establish network ties. However, social and ethnic segregation in networks should not be regarded as being independent of discourses, debates and ethnic boundaries outside of educational institutions.

In this chapter, ethnic homophily and the unequal access to knowledge and cultural capital will be assumed as being relevant for educational outcomes. It will be argued that homophily leads to an unequal access to social capital since there is a considerable degree of inequality in the distribution of knowledge and cultural capital in social networks. But why is the access to social capital important?

The basic argument about how social capital affects social inequality is rather simple: ties in social networks provide access to resources which otherwise would not be available at the same cost. Social relations of reciprocal exchange, but also ties of asymmetric dependence, can structure the flow of resources from one social unit—e.g. from one individual—to the other. In most cases, strong and close ties to family members provide mutual support and constitute the basic context of children's socialisation. Depending on the level of economic, educational and time-related resources in the parents' generation, family-related social capital is supposed to strongly influence the probability of success in educational institutions. This is what numerous studies on ethnic inequalities in educational outcomes have shown (Ho and Willms 1996; Kristen and Dollmann 2010): when the impact of social background is controlled in statistical models, ethnic disparities are strongly reduced, although in most cases some ethnic residuals remain.

Below, this well-established effect of social background will be called the *direct effect of family-related social capital*. In addition, there is also a *direct effect of peer-related social capital* that results from ties to peers in children's classrooms.[1]

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[1] Which is at the same time a secondary institutional effect on integration and inequality in educational institutions.

Children's ties for emotional support, motivation and appropriate assistance in learning can lead to the direct effect of peer-related social capital. But the concept of social capital implies that actors can actually *benefit* from their ties. With regard to support in learning and also with regard to the emotional challenges of the lesson's requirements it might play an important role *with whom* the children establish ties. Do their friends have good or bad grades? Are children involved in learning groups with others whose parents have a rather high or low level of cultural capital? Apparently, the level of cultural capital in peers' families has an effect on peers' habitus, which includes cognitive competences as well as motivation and school attachment. Moreover, contact with peers from better-educated families provides weak ties linking children from deprived families to well-educated parents in two steps through the network. This will be defined as the *indirect effect of family-related social capital*.

This distinction between peer-related and different kinds of family-related social capital should clarify two important issues: firstly, there are different ways in which peer-related social capital can influence pupils' performance at school. These different modes are an indicator of the importance of the concept, but at the same time underline the problem of a comprehensive measurement of peer-related social capital. Secondly, it should have become clear that children's peer-related social capital is by no means independent from family-related cultural and social capital.

Many studies have highlighted the effects of children's peer relations on educational outcomes. In their study on risk factors on dropping out of school, Audas and Willms (2001) tried to explain their children's failure in the educational system with the fact that they "got into the wrong crowd". Similarly, Ellenbogen and Chamberland (1997) showed effects of network integration and inclusion on dropping out of school. Also, conflicts with other pupils can increase dissociative feelings with school peers and increase drop-out rates (Kelly 1993). In contrast, as a special kind of social embeddedness, religious involvement increases school outcomes, as Glanville et al. (2008) have shown. One reason is the degree of social control due to intergenerationally closed social networks, that is, due to social ties among children's parents, but also due to higher levels of educational resources.

According to the study of Antonio (2004), friends' level of intellectual self-confidence increases the pupil's own intellectual self-confidence, which could be—but does not have to be—positively associated with performance in school. In line with this result, Crosnoe et al. (2003) were able to show that pupils whose friends are academically oriented (e.g. they like school or are good at school) have fewer scholastic performance problems.

In the "Hamburg KESS 4" study there is a small sub-sample of total networks which includes information on two important network dimensions: cooperative learning for tests and completing homework together (Stubbe et al. 2007). These data have only been used for a descriptive analysis of three networks (density and hierarchy) and qualitative in-depth descriptions of individual actors. In her groundbreaking analysis of Dutch network data, Lubbers (2004) had the opportunity also to analyse "academic networks", e.g. cooperation and the comparing of

grades. However, so far no systematic analysis of the determinants of ties in networks where pupils complete homework together has been conducted. Most existing studies on ethnic segregation in networks are limited to the analysis of friendship nominations in schools and classrooms (Quillian and Campbell 2003; Mouw and Entwisle 2006; Knecht 2008). But is there an "ethnic factor" in the development of homework networks? Are there ethnic boundaries between "good" and "bad" ties in friendship and homework networks? These questions are closely related to the social preconditions of structural assimilation on the immigrants' side. Several studies have shown for different countries that immigrants have *ceteris paribus*—controlling e.g. for socioeconomic background—*higher* educational aspirations than natives (Dollmann 2010; Stanat 2006). Controlling for academic performance and parental social background, children from Turkish families have *higher* net-participation rates in upper-secondary education (Kristen and Dollmann 2010).

In this chapter, different dimensions of social networks of 10-year-old fourth-graders will be investigated. In contrast to a mere descriptive analysis, the focus here is placed on the determinants of ties in different network dimensions, namely friendship networks and homework networks. In addition, each of these two dimensions will be qualified with regard to the level of resources that the network ties provide. It will be investigated which determinants affect ties in friendship and homework networks to other pupils who have either a high level of "objective" cultural capital at home (as indicated by the number of books owned) or who have a grade point average above the class mean.

According to the argument presented above, one could expect that ethnic homophily restricts immigrants' access to peer-related social capital since there are remarkable differences in the average economic and cultural capital endowment between immigrants and natives.

9.3 Data

We will analyse data from a school survey of 1,604 fourth graders in 105 school classes collected in 2009 in the cities of Bremen and Bremerhaven in Germany. This survey was conducted in the DFG funded project "Dynamics of Social Assimilation in Multiplex Peer Networks". For the model estimation, we only considered classes where at least 75 % of all pupils were present during the interview. Response rates at the class level do also depend on the level of teachers' support of the study, because the teachers had to administrate the distribution and the collection of the parental consent form. Teachers' commitment to the study could be eventually correlated with pupils' characteristics, but there is no strong argument of why it should result in a highly selective sample. The multivariate analyses are based on a minimum of 1,248 students in 17,644 directed dyads in either 76 (friendship) or 75 classes (homework). The network generator was a combination of 15 network-related items in the questionnaire and visible numbers

placed on each pupil's seat in the classroom. By reporting their own ID-numbers and the ID-numbers of their classmates with regard to each network dimension in the questionnaire, pupils provided data on complete social networks in the classroom in several dimensions. Using the indicator "visits to birthday parties" as an objective event, the reliability of the network generator could be assessed by comparing ego's information on who visited him/her at his/her birthday party with alter's information on whose birthday party he or she attended. This procedure yields a Cohen's Kappa inter-rater reliability of 0.709 and an accordance rate of 91 %, which is a good level of reliability.

Below, empirical results of effects on six dependent variables will be presented. We asked the children to report the numbers of those classmates they consider as *friends*, without restricting the total number of nominations. In addition, children reported the number of classmates with whom they sometimes *do homework together*.

In a further step, these two dimensions were differentiated with regard to the resources potentially available in these network ties: first, ties of friendship were regarded only if the respective alter's parents have *at least* 150 *or more books at home*. In other words, in these networks only relationships with alteri whose parents' level of cultural capital in the "objectified state" (Bourdieu 1986) is high were regarded as ties. By the same logic, an alternative condition was introduced, namely whether *alter's grade point average is better than the class mean*.[2] These two alternative qualifications of friendship and homework ties were made in order to account for the different levels of academic support that is potentially available in these networks. As argued in the preceding section, immigrants are expected to have lower levels of academic resources in their peer networks.

Ethnic background was measured by the mother's and father's country of origin. Children are defined as "German", "Turkish" or "Russian" if both biological parents are of the respective origin. Children are assigned to the category "German1P" if they have one native German and one immigrant parent, with "other" as the residual category. The ethnic origin of the mother takes priority in mixed non-German parental couples: if of one parent is Turkish or Russian and the other parent of another origin (except German), the child is assigned to the category of his or her mother.

When the main focus is on the effects of the ethnic composition of dyads, several characteristics related to social background and personality should be controlled. In order to control for *cultural capital* (Bourdieu 1986) in ego's family, "homophily: number of books" is included in the model. Absolute differences in the number of books between ego and were been multiplied by −1. The wording of the item was "How many books do you have at home?" and the response categories were "1. none, or just a few (0–10)", "2. one shelf (11–25)", "3. one rack (26–100)", "4. two racks (101–200)", "5. three or more racks (201 and more)". The midpoints

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[2] The grade point average was computed for the subjects German, Mathematics and English. Each grade was centred around the class mean in order eliminate teacher specific grade levels.

of the intervals were used for the computation of the similarity of ego and alter. This information was then used to qualify the dependent variable with regard to cultural capital in alter's family. In the other models without such a control, ethnic homophily could be a spurious effect of status homophily, especially since many Turkish and other immigrant children have low-educated parents.

As a further indicator of the capital endowment of the family, it was controlled for whether both children either lived in a *single-family house* or in *an apartment block* with six or more floors. Other constellations formed the reference group, which consisted of mixed constellations, houses with fewer than five separate flats or houses with five or more separate flats. Other control variables measured whether *ego visits a museum* at least several times a year (together with parents/ other relatives), *ego's self-control* and *empathy* and also similarity in terms of *mother's control of children's leisure time* (see Appendix for the scales).

As generally known from Peter Blau's structural sociology (Blau 1994), *group size* can have a considerable impact on the social climate and on the choice of friends and partners (see also Mouw and Entwisle 2006). Thus, the percentage of immigrant children of the backgrounds Turkish, Russian, one-German-parent and other were controlled for at the class level.

9.4 Methods

Recent versions of exponential random graph models use simulation methods in order to directly estimate the probability P of observing a given network x out of the set of all possible networks which can be formed by a given set of actors (Robins et al. 2007). Dyadic constellations of actor attributes, but especially structural network characteristics, can have a potential influence on P. We follow a simpler approach of estimating a binary choice model: each model estimates the effects on the propensity of having a tie ($1 = $ yes, $0 = $ no) in a dyad. The dependent variable is thus binary. However, especially in the homework networks, but also in the friendship networks with alteri whose parents possess many books, the average network density is rather low. Instead of logistic regression models, which are often the first choice in binary dependent variable models, complementary log–log models were estimated. The complementary log–log model has the following form:

$$P\left(x_{i,j} = 1 | x_{ij}^{C}\right) = 1 - \exp\left(-\left(\exp\left\{\theta\left[Z\left(x_{ij}^{+}\right) - Z\left(x_{ij}^{-}\right)\right] + \beta_0 + u_{0j} + \beta'\mathbf{x}\right\}\right)\right)$$

With regard to the prediction of *very low* probabilities the complementary log–log link function is virtually identical to the logistic link function (see Fig. 9.1). The complementary log–log model is often applied in the analysis of discrete time event history models (Skrondal and Rabe-Hesketh 2004, p. 356), where the share of sub-spells that end with an event is *rather low*. In such a situation, the asymmetric shape of the complementary log–log model (see Fig. 9.1) usually leads to a

Fig. 9.1 Complementary log–log model and logistic model compared
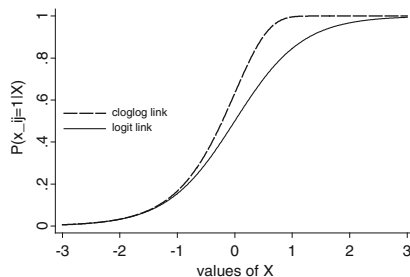
better fit with the data (Singer and Willett 2003, p. 420). For this reason, complementary log–log models are estimated, because the share of ones is rather low. Since the results did not substantially differ from logistic regression models (results not shown), but resulted in a slight gain in efficiency, this choice seems justified. The interpretation is very similar to Odds Ratios, but mathematically the coefficients do not show Odds Ratios but Hazard Ratios. Aside from the different terminology, the interpretation is substantially the same.

However, a standard discrete choice model does not account for the non-independence of observations in networks. Expanding the data set into a structure where each record represents a directed dyad allows the estimation of exponential random graph ($p*$) models (Robins et al. 2007) by using models for discrete choice analysis. In this study, the model estimates effects on the probability P of having a tie between vertices i and j in a given network X. The term $\theta\left[Z\left(x_{ij}^{+}\right) - Z\left(x_{ij}^{-}\right)\right]$ represents the effect of the surrounding network structure on the propensity of a tie in a dyad. $Z\left(x_{ij}^{+}\right) - Z\left(x_{ij}^{-}\right)$ is the difference of a network characteristic Z when a tie is defined as being present $\left[Z\left(x_{ij}^{+}\right)\right]$ and then as absent $\left[Z\left(x_{ij}^{-}\right)\right]$, regardless of its empirical status (Windzio 2011). Since the analyses are based on 75–76 pooled class networks in which children's dyads are clustered, an error component u_{0j} related to the intercept β_0 was estimated in a multilevel design (Rabe-Hesketh and Skrondal 2008, p. 360).

Well-aware of the problems of using maximum likelihood estimation for network data, we follow a conventional approach for practical reasons, which accounts for the statistical dependence of observations in networks by including appropriate covariates into the model. These covariates are 2-in- and out-stars, the log odds of the density of each network (Vermeij et al. 2009) and the change in the number of transitive triads due to the presence or absence of each tie. For the latter, the "prepstar" software developed by Crouch and Wasserman (1997) was used. Based on complementary log–log regressions models, Table 9.1 shows rate ratios of ties in dyads in complete networks with effects of ethnic homophily as a measure of the degree of network segregation.

Nevertheless, the empirical results hold only under the assumption that non-Markovian dependence structures do not exist in the networks and that the bias

Table 9.1 Determinants in friendship and homework networks

	M. 1 Friends	M. 2 Friends with many books	M.3 Friends with good grades	M.4 Homework	M.5 Homework with many books	M. 6 Homework with good grades
Ego: empathy	0.99	0.96	1.04	1.13**	1.14[+]	1.12
Ego: low self-control	0.99	0.96	0.81**	1.03	0.97	1.00
Ego: museum	1.05[+]	1.01	1.21**	1.01	1.26*	1.06
Boy → boy	ref.	ref.	ref.	ref.	ref.	ref.
Boy → girl	0.34**	0.43**	0.50**	0.19**	0.19**	0.26**
Girl → girl	1.04	1.09[+]	0.79**	0.99	0.99	0.81
Girl → boy	0.37**	0.40**	0.48**	0.22**	0.26**	0.21**
Homophily						
Mother: control leisure	1.08**	1.17**	1.31**	1.15*	1.26**	1.31**
No. of books/10	1.00*	–	1.00	1.01**	–	1.01*
Single family house	1.05	1.10*	1.06	1.18*	1.18	1.31*
Apartment block (6 fl.[+])	1.02	0.77**	1.00	0.99	0.67*	0.76
Other housing const.	ref.	ref.	ref.	ref.	ref.	ref.
Unemploym. parents	0.96	0.86	0.70	1.15	1.05	0.96
German → german	ref.	ref.	ref.	ref.	ref.	ref.
German → german1P	0.80**	0.60**	0.83[+]	1.00	0.69*	0.88
German → turk	0.69**	0.22**	0.61**	0.53**	0.20**	0.42*
German → russian	0.96	0.79	1.15	0.94	0.589	0.73
German → other	0.88[+]	0.53**	0.59**	0.71[+]	0.555*	0.38*
German1P → german	1.03	1.02	1.03	0.88	0.822	0.77
German1P → german1P	0.87	0.76*	0.75	1.26	1.18	1.66[+]
German1P → turk	0.95	0.51**	0.41**	0.89	0.31[+]	0.81
German1P → russian	1.16	1.22	1.07	0.70	0.32	Dropped
German1P → other	0.92	0.59**	0.54*	1.05	0.59	0.56
Turk → german	0.91	0.89	0.56**	1.00	0.90	0.72
Turk → german1P	0.96	0.77	0.42**	1.18	0.73	1.00
Turk → turk	1.22[+]	0.44**	0.46**	1.79**	0.43*	0.73
Turk → russian	1.02	0.94	0.49	0.84	0.34	0.38
Turk → other	1.17	0.59*	0.95	1.17	0.97	0.85
Russian → german	0.96	1.03	1.33[+]	1.27	1.38	2.09*
Russian → german1P	1.03	0.72	1.03	0.73	0.66	1.19
Russian → turk	1.06	0.22**	0.84	1.07	0.42	0.48
Russian → russian	0.89	0.87	1.47	1.21	0.49	2.03
Russian → other	0.85	0.77	1.10	1.59	1.77	1.23
Other → german	0.86[+]	0.83[+]	0.58**	1.33[+]	1.19	1.25
Other → german1P	1.08	0.83	0.60[+]	0.95	0.55	1.44
Other → turk	1.02	0.50**	0.73	1.16	0.39	0.54

Table 9.1 (continued)

	M. 1 Friends	M. 2 Friends with many books	M.3 Friends with good grades	M.4 Homework	M.5 Homework with many books	M. 6 Homework with good grades
Other → russian	1.01	1.02	1.06	0.83	1.09	1.27
Other → other	1.16	0.52**	0.67	1.20	0.72	0.66
% german1p	1.00	1.00	0.99	1.00[+]	1.00	0.99
% turkish	0.99	0.98**	0.99	1.00	0.99	1.00
% russian	1.00	0.99	1.01	1.00	1.00	1.01
% other	1.00	0.98**	0.98*	1.00	0.98*	0.98
Network structure (friends and homework)						
Net density	0.86	1.02	0.68	1.19*	1.25	0.68[+]
Transitive triads	1.13**	1.07**	1.13**	1.26**	1.13**	1.32**
2-in-stars	0.96**	1.02*	1.01	0.98	1.08[+]	0.98
2-out-stars	1.02**	1.03**	1.03**	1.16**	1.25**	1.19**
Mutuality	3.57**	3.56**	4.33**	13.53**	11.78**	15.88**
ρ	0.046**	0.149**	0.285**	0.002 n.s.	0.090**	0.226**
R2 Nagelkerke[++]	0.555	0.343	0.348	0.392	0.321	0.310
N classes	76	76	76	75	75	75
N pupils	1,262	1,271	1,262	1,248	1,256	1,248
N dyads	20,536	20,830	17,644	20,354	20,636	19,932

Multilevel complementary log–log models for ties in friendship and homework networks (p*), rate ratios
[++] single level model
[+] p <= 0.10
*p <= 0.05
**p <= 0.01

inherent in the pseudo-likelihood estimates does not affect the results too severely. Due to the error term at the class level, unobserved heterogeneity between the networks can be at least partially controlled. In the light of the strong and robust effects which refer to the hypotheses, this somewhat out-of-date procedure can give a first insight into the degree of segregation in these different network dimensions.

9.5 Results

The basic hypotheses of this chapter can be illustrated by comparing the different dimensions of the network in one exemplary class (ID no. 20792). The two columns in Fig. 9.2a–f, show this network in the dimensions of *friendship nomination* and *doing homework together*, respectively. White dots represent natives (both parents
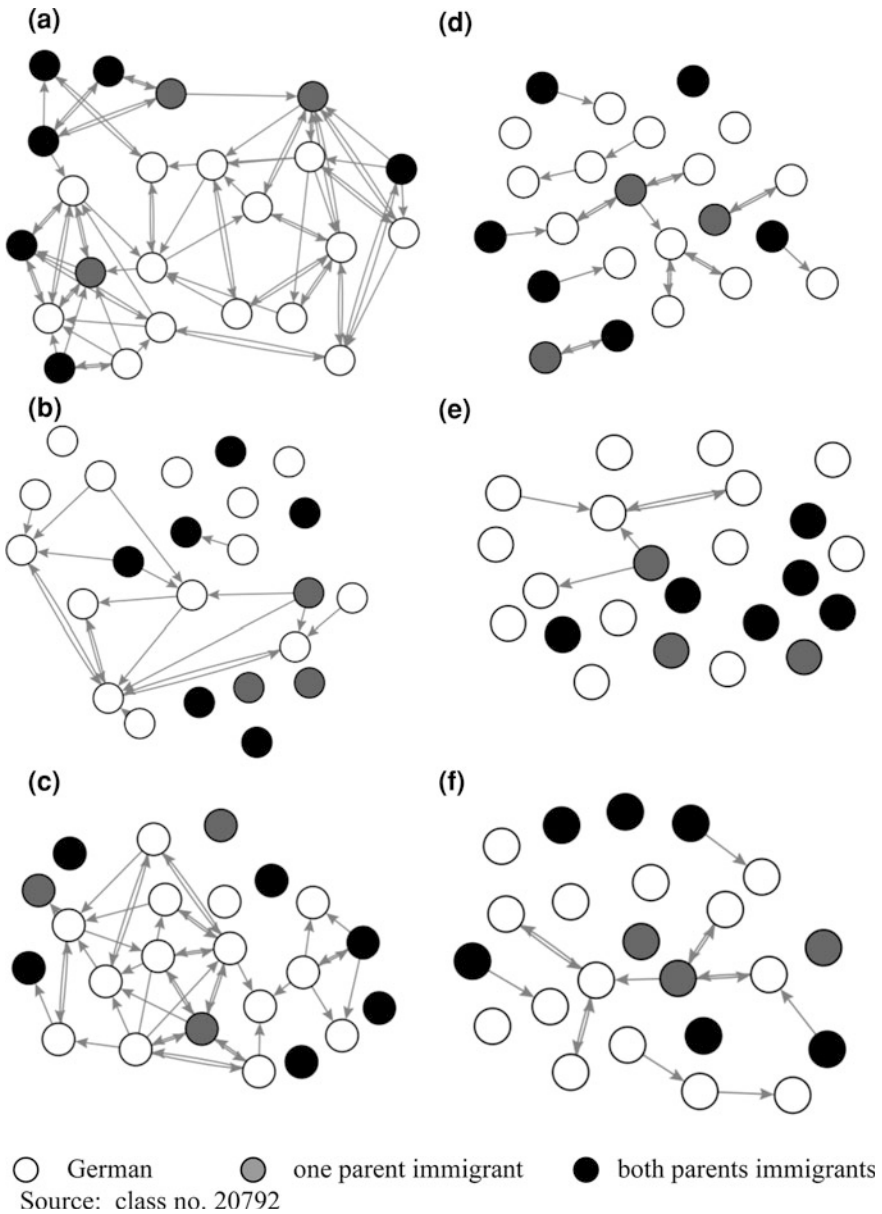
Fig. 9.2 a–f Networks of friendship and joint homework completion in one exemplary class, N = 23. **a** Friends. **b** Friends with many books. **c** Friends, grade above class mean. **d** Doing homework. **e** Doing homework with many books. **f** Doing homework, grade above class mean

native Germans), grey and black dots represent immigrants (either one or both parents are immigrants). The hypothesis of an additional disadvantage due to lower cultural and academic resources in immigrants' peer networks can be illustrated by such a simple description of the shares of isolates in the respective network.

In the *friendship dimension* the class network is quite integrated since there are no isolates and only two out of nine immigrants do not report a tie to a native child (Fig. 9.2a). Regarding ties to alteri whose parents have at least 150 books, the situation is quite different (Fig. 9.2b). Six out of nine immigrants are isolated, but only four out of 14 native Germans are as well (66.6 vs. 28.6 %). The basic pattern is similar in the network which shows ties to alteri whose grade point average is above the class mean: here, only one native German is isolated, but five out of nine immigrants (55.5 %).

In contrast to the friendship network, the *homework network* is not completely integrated, although the overall share of 13 % isolates is comparatively moderate (Fig. 9.2d). In this exemplary class, it seems to be quite usual to cooperate in homework completion, which holds for both immigrants and natives. However, in the network of cooperation with alteri whose parents possess at least 150 books at home (Fig. 9.2e), eight out of nine immigrants are isolated, whereas ten out of 14 are isolated in the native German group (88.8 vs. 71.4 %). In this case, it should be mentioned that the network consists only of three uni-directional ties and one mutual tie and has a very low density. But a similar pattern can be found in homework ties with alteri whose grades are better than the class mean: five out of nine immigrants are isolated, but only four out of 14 native Germans (55.5 vs. 28.5 %).

In summary, there might be some ethnic segregation in general friendship networks, but the important (tentative) finding is that the level of segregation turns out to be much higher if we regard ties to friends who have a high level of cultural resources or better grades. Similarly, both immigrants and natives are involved in homework networks, but when we focus on homework ties to alteri who have a high level of cultural resources or better grades, the share of isolated immigrant children increases disproportionately.

Certainly, the analysis is based on a selective and descriptive example, but it illustrates the hypothesis quite well: immigrants are embedded in social networks of friendship as well as of joint homework completion. However, it seems that the cultural and academic resources available through these networks are of lower quality. Of course, there are other classes in which the pattern is less clear and the descriptive analysis does not include control variables. In order to test the hypothesis, multivariate analyses will be performed on the basis of a large sample of 75–76 classes.

Table 9.1 shows six two-level complementary log–log models for network data (p^*) which predict the rate ratios of ties in different dimensions of the social networks. The dependent variables in models 1–3 indicate ties in *friendship networks* (=1, 0 otherwise, model 1), ties to *friends whose parents have at least* 150 *books* in their household (=1, 0 otherwise, model 2), and *friends who have grade point averages above the class mean* (=1, 0 otherwise, model 3). Models 4–6 estimate effects on ties in *homework networks* (=1, 0 otherwise, model 4), on ties

in *homework networks to alteri whose parents have at least* 150 *books* (=1, 0 otherwise, model 5) and finally, on ties in homework networks to *alteri who have grade point averages above the class mean* (=1, 0 otherwise, model 6). The first three explanatory variables measure characteristics of ego, whereas all other variables either indicate characteristics of the dyads (the similarity with regard to the respective characteristic or the constellations of gender and ethnic origin), the ethnic composition of the class or the contribution of each tie to the entire network—calculated according to the $p*$ logic.

   To begin with, the control variables of the ethnic composition of the classes and the structural properties of the network will be interpreted (see lower end of Table 9.1): we find that, overall, the ethnic composition of the classes show only moderate effects, whereas the effects of the structural properties of the network are strong. Hence, the network effects indeed indicate a considerable level of dependence of ties within the networks. As expected, the embeddedness of a dyad in transitive triads as well as the mutuality increases the propensity of a network tie in all dimensions. In contrast, the effects of 2-in-stars ("popularity") and 2-out-stars ("expansiveness") (Robins et al. 1999) are rather inconsistent, albeit significant in most cases.[3]

   As a characteristic of the individual, empathy increases the propensity of completing homework with others, as well as with others whose parents have many books (models 4 and 5), although the latter effect is significant only at the 10 % level. Empathy thus increases, at least partially, the sociability in doing homework together, while low self-control reduces friendships to classmates with good grades. Also in line with the expectations, ego's cultural capital, as indicated by regular visits to a museum, increases the propensity of being friends with alter (model 1, 10 % level), especially if alter's grades are above the class mean (model 3). Moreover, children who often go to the museum have a higher propensity to do homework with children whose parents have many books (model 5).

   In line with many other studies, all network dimensions show high levels of gender segregation. Moreover, there are also effects of similarity, which indicate that social homophily is not only present in friendship networks, but also in homework groups: the more similar ego and alter are with respect to mother's control of her children's leisure time, the higher the rates are of having ties in all dimensions. Except for model 3, a similarity in the number of books has positive effects on friendship ties (factor 1.003) as well as on ties in homework networks (factor 1.009). It should be noted that the number of books in alter's household (at least 150) is one component of the dependent variable in models 2 and 5. In order to avoid endogeneity, the similarity in the number of books has not been included as a determinant of ties with alteri whose parents have many books at home (models 2 and 5).

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[3] For an example of how to interpret the in-and out-star effects when transitive triads are controlled, see Robins et al. (1999, p. 388).

We find a positive effect *of both children living in a single-family house* on having friends with many books (model 2), on doing homework with alter and also on doing homework with alteri who have good grades (models 4 and 6). This is another indicator of homophily with regard to socioeconomic background. Here, the reference group consists of all other housing constellations. Not surprisingly, the constellation of both children living in an apartment block has a negative effect on ties to alteri whose parents have at least 150 books, both in the friendship and in the homework networks (models 2 and 5). There is thus some degree of residential segregation by levels of cultural capital: the access to "good" ties in friendship and homework networks is hindered if both children live in an apartment block neighbourhood.[4]

Yet the most interesting results in this study are the effects of ethnic segregation in friendship and support networks. The reference group are dyads of native German pupils. Overall there is a tendency towards ethnic segregation in all kinds of networks. We see, for instance, that native Germans report a lower propensity of being friends with Turkish pupils than with native Germans (model 1). In addition, they also have a considerably lower propensity of doing homework together with Turkish pupils compared to their propensity of completing homework with native Germans (model 4). More strikingly, however, is the effect of *turkish → turkish* dyads: firstly, there is a slightly increased propensity of being friends compared to *german → german* dyads (factor 1.22, 10 % level, model 1), indicating that social integration in the minority group of Turkish children is somewhat better than in the majority group of native German children. But secondly, in *turkish → turkish* dyads, we find a strongly decreased propensity of having a friend whose parents have many books at home, and also of having a friend with good grades (models 2 and 3).

Even more interesting is the pattern of ethnic-social segregation in the homework network: compared to the reference group of native German dyads we find a much *higher* propensity towards doing homework together when the dyad consists of two Turkish children (factor 1.79, $p \le 0.01$). This means that the level of social capital with regard to cooperative behaviour in the classmates is higher in the Turkish group than in the German reference group. In line with findings of Stanat (2006) who analysed PISA-E data for Germany, this can be interpreted as an indicator of academic motivation and ambition in the Turkish group. But model 5 reveals that this high *quantity* of social capital does not automatically correspond with a high *quality* of resources in the network: compared to the reference group of all-native dyads, two Turkish children have a much lower propensity to be in a dyad in which homework is completed together with an alter whose parents have at least 150 books at home (factor 0.43, $p \le 0.05$). In the network dimension of doing homework together with children who have good grades, the effect shows a similar tendency (factor 0.73), but is not significant.

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[4] Perhaps, this could also be an issue of the limited living space offered by these blocks, which impedes the possession of many books.

Finally, results for Russian children (parents or pupils immigrated from the former Soviet Union) indicated that this group could actually benefit from social capital in the peer network: in *russian* → *german* dyads the propensity of friendships with alteri who have good grades is higher than in the reference group of two native German children (model 3, factor 1.33, p <= 0.10). Furthermore, Russian children's propensity to do homework with native Germans who have good grades is twice as high as in the reference group of two native German children. From the Russian children's perspective this means that they show an affinity to native Germans with good grades—both in friendship and homework networks.

These results indicate several important points: firstly, most children seem to be well-embedded in the social networks of their school classes. Secondly, there is some ethnic segregation in the friendship networks. Thirdly, when it comes to the potential relevance of these networks for the academic performance of immigrant children, there are important differences between the ethnic groups: whereas children of Turkish origin do not seem to get access to cultural and academic resources through their peer networks and seem at a disadvantage compared to native German children, children of Russian origin, in contrast, can successfully establish ties to friends who have good grades and with whom they jointly complete their homework.

These results highlight the access to social capital, but it is still unclear whether and to what degree children actually benefit from it with respect to their academic performance, school attachment and motivation. The same is true regarding the low-resource networks of Turkish children: future research has to investigate whether their networks actually result in a further disadvantage or not.

9.6 Conclusion

Peer-related social capital constitutes an interesting research field which combines the institutional perspective on the school with issues of children's living environment outside the educational institution. Ethnic homophily in networks is not induced by the educational institutions but is carried there from the outside. Consequently, the social capital issue raises the question of how rigid ethnic boundaries in the broader society are. Up to now, not many studies have been conducted on ethnic inequalities in the endowment with peer-related social capital.

Primary institutional effects on pupil performance can be addressed by school headmasters as well as by policy-makers. In addition to these effects, the results of the empirical analysis of social networks have shown that secondary institutional effects exist in such a way that ethnic boundaries affect patterns of friendship networks and of cooperative relationships among the children. It was the idea of this chapter to give evidence of a potentially important secondary institutional

effect on integration and inequality in educational institutions: ethnic boundaries are spanned, shifted, crossed or blurred (Alba and Nee 2003) outside of educational institutions. Obviously, this does not mean that daily social interaction between children in schools and classes can't refresh or even corroborate these boundaries. But in doing so, they refer to an already existing "social stock of knowledge" (Berger and Luckmann 1991), and based on this, children in their classrooms selectively establish networks of friendship and cooperation, which may have an enduring effect on the learning conditions in schools.

As already mentioned, it is not yet clear whether the access to cultural and academic resources through these peer networks actually has an effect on performance, school attachment or motivation. Yet, research has indeed established positive effects of "good" peers on academic performance (Hanushek et al. 2003). If this is the case then ethnic differences in the access to peer-related social capital would reinforce existing ethnic inequalities. Although the ultimate cause of ethnic segregation operates outside of educational institutions (ethnic boundaries), the transformation of these boundaries into ethnic inequalities by ethnically segregated networks takes place within the institutions, and this is the reason why these processes are considered as secondary institutional effects. In other words, educational institutions are the focus point where ethnic boundaries unfold their potential for inequalities in the access to peer-related social capital.

The direct effect of peer-related social capital operates via friendship or homework ties to alteri who have good grades—regardless of his or her social background and the social capital endowment of alter's family. However, there might also be an indirect effect of family-related social capital, because being friends or doing homework with a classmate whose parents have many books at home can be an indicator of getting support either by having contact with alter's parents (Windzio 2012), or by the transmission of information on academic issues provided by alter's parents. However, the analytic distinction between the different forms of family- and peer-related social capital has not been fully implemented in the empirical analysis. Future research should find alternative measures to define resources in social networks. Indirect effects of family-related social capital could be measured by an indicator of whether ego actually comes into contact with alter's parents during visits at their home, in combination with an improved indicator of socioeconomic status and cultural and academic resources.

Moreover, future research should be based on longitudinal data, as this enables researchers to estimate the effects of endowment with social capital on educational outcomes, such as grade point averages, school attachment, motivation and effort. There will certainly be simultaneity of selection into specific friendship- and cooperation networks which cannot be easily disentangled by the use of standard methods for panel data. Hence, up-to-date methods for the simultaneous analysis of selection and influence (Snijders et al. 2010) on the basis of longitudinal data should be also applied in the sociology of education.

Table A.1 Descriptive statistics

	N	Mean	Standard deviation	Minimum	Maximum
Friends	17,644	0.176		0	1
Friends with many books	17,644	0.081		0	1
Friends with good grades	17,644	0.084		0	1
Homework	17,644	0.035		0	1
Homework with many books	17,644	0.016		0	1
Homework with good grades	17,557	0.014		0	1
Ego: empathy	17,644	3.142	0.790	1	4
Ego: low self-control	17,644	2.149	0.652	1	4
Ego: museum	17,644	0.434		0	1
Boy → girl	17,644	0.281		0	1
Girl → girl	17,644	0.210		0	1
Girl → boy	17,644	0.282		0	1
Mother: control leisure	17,644	−0.738	0.612	−3	0
No. of books/10	17,644	−10.331	9.749	−29.5	0
Own house	17,644	0.286		0	1
Apartment block (6 floors⁺)	17,644	0.141		0	1
Unemployment of parents	17,644	0.024		0	1
German → german1P	17,644	0.088		0	1
German → turk	17,644	0.048		0	1
German → russian	17,644	0.020		0	1
German → other	17,644	0.060		0	1
German1P → german	17,644	0.085		0	1
German1P → german1P	17,644	0.027		0	1
German1P → turk	17,644	0.016		0	1
German1P → russian	17,644	0.008		0	1
German1P → other	17,644	0.023		0	1
Turk → german	17,644	0.045		0	1
Turk → german1P	17,644	0.016		0	1
Turk → turk	17,644	0.016		0	1
Turk → russian	17,644	0.005		0	1
Turk → other	17,644	0.016		0	1
Russian → german	17,644	0.021		0	1
Russian → german1P	17,644	0.008		0	1
Russian → turk	17,644	0.005		0	1
Russian → russian	17,644	0.006		0	1
Russian → other	17,644	0.011		0	1
Other → german	17,644	0.058		0	1
Other → german1P	17,644	0.022		0	1
Other → turk	17,644	0.016		0	1
Other → russian	17,644	0.010		0	1
Other → other	17,644	0.023		0	1
% german1p	17,644	16.004	9.607	0	41.176
% turkish	17,644	9.946	10.950	0	43.750

(continued)

Table A.1 (continued)

	N	Mean	Standard deviation	Minimum	Maximum
% russian	17,644	4.905	7.626	0	41.176
% other	17,644	13.081	11.844	0	40
Net density (friends)	17,644	−1.023	−0.353	1.801	−0.143
Transitive triads (friends)	17,644	4.088	4.928	0	39
2-in-stars (friends)	17,644	0.244		0	1
2-out-stars (friends)	17,644	5.177	2.679	0	19
Mutuality (friends)	17,644	5.216	2.909	0	25
Net density (homework)	17,481	−3.079	−0.501	4.575	−1.561
Transitive triads (homework)	17,644	0.129	0.591	0	10
2-in-stars (homework)	17,644	0.036	0.187	0	1
2-out-stars (homework)	17,644	0.811	0.986	0	6
Mutuality (homework)	17,644	0.819	1.047	0	8

Appendix

Scales (differences between ego and alter were multiplied by –1)

- **Mother: controls leisure time**, alpha = 0.754
   1. never, 2. sometimes, 3. often, 4. always, items:

   During leisure time…

1. Mother knows what I do
2. Mother knows where I am
3. Mother knows whom I am meeting

- **(low) self control**, alpha = 0.591
   1. not true, 2. rarely true, 3. rather true, 4. exactly true, items:

   1. Have difficulties concentrating
   2. Can't sit still for a long time
   3. I tend to become upset if things are not as I like them to be
   4. If I am frustrated/upset people should avoid me
   5. When I am in conflict with somebody, I can't stay calm

- **empathy**, alpha = 0. 579
   1. not true, 2. rarely true, 3. rather true, 4. exactly true, items:

   1. I notice when friends feel bad
   2. I can empathize with other children

References

Alba, R., and V. Nee. 2003. *Remaking the American mainstream. Assimilation and contemporary immigration*. Cambridge: Harvard University Press.

Antonio, A.L. 2004. The influence of friendship groups on intellectual self-confidence and educational aspirations in college. *The Journal of Higher Education* 75(4): 446–471.

Audas, R., and D.J. Willms. 2001. Engagement and dropping out of school: A life-course perspective. Human resources development Canada (Working paper, W-01-1-10E).

Berger, P.L., and T. Luckmann. 1991. *The social construction of reality. A treatise in the sociology of knowledge*. London: Penguin Books.

Blau, P.M. 1994. *Structural contexts of opportunities*. Chicago: University Press.

Bourdieu, P. 1986. The Forms of capital. In *Handbook of theory and research for the sociology of education*, ed. J.G. Richardson, 241–258. New York: Greenwood Press.

Crosnoe, R., S. Cavanagh, and Elder GH Jr. 2003. Adolescent Friendships as academic resources: The intersection of friendship, race, and school disadvantage. *Sociological Perspectives* 46(3): 331–352.

Crouch, B., and S. Wasserman. 1997. *A practical guide to fitting p* social network models via logistic regression*. Champaign: University of Illinois.

Dollmann, J. 2010. *Türkischstämmige Kinder am ersten Bildungsübergang. Primäre und sekundäre Herkunftseffekte*. Wiesbaden: VS Verlag.

Ellenbogen, S., and C. Chamberland. 1997. The peer relations of dropouts: a comparative study of at-risk and not at-risk youths. *Journal of Adolescence* 20(4): 355–367.

Glanville, J.L., D. Sikkink, and E.I. Hernandez. 2008. Religious involvement and educational outcomes. *The Sociological Quarterly* 49(1): 105–137.

Hanushek, E.A., J.F. Kain, J.M. Markman, and St.G. Rivkin. 2003. Does peer ability affect student achievement? *Journal of Applied Econometrics* 18(5): 527–544.

Ho, S.C., and D.J. Willms. 1996. Effects of parental involvement on eighth-grade achievement. *Sociology of Education* 69(2): 126–141.

Kelly, D.M. 1993. *Last chance high: how girls and boys drop in and out of alternative schools*. New Haven: Yale University Press.

Knecht, A. 2008. *Friendship selection and friends influence. Dynamics of networks and actor attributes in early adolescence*. Utrecht (Proefschrift, ICS Dissertation, Nr. 140).

Kristen, C. and J. Dollmann. 2010. Sekundäre Effekte der ethnischen Herkunft: Kinder aus türkischen Familien am ersten Bildungsübergang. In *Bildungsentscheidungen*, ed. J. Baumert, K. Maaz, and U. Trautwein, 205–229. Wiesbaden: VS Verlag. (Zeitschrift für Erziehungswissenschaft Sonderheft, 12).

Lubbers, M.J. 2004. *The social fabric of the classroom. Peer relations in secondary education*. Veenendaal: Universal Press.

Luhmann, N. 2008. *Die Politik der Gesellschaft*. Frankfurt/M.: Suhrkamp.

McPherson, J.M., L. Smith-Lowin, and J.M. Cook. 2001. Birds of a feather: Homophily in social networks. *Annual Review of Sociology* 27: 415–444.

Mouw, T., and B. Entwisle. 2006. Residential segregation and interracial friendship in schools. *American Journal of Sociology* 112(2): 394–441.

Portes, A. 1998. Social capital: Its origins and applications in modern sociology. *Annual Review of Sociology* 24: 1–24.

Quillian, L., and M.E. Campbell. 2003. Beyond black and white. The present and future of multiracial friendship segregation. *American Sociological Review* 68(4): 540–566.

Rabe-Hesketh, S., and A. Skrondal. 2008. *Multilevel and longitudinal modeling using STATA*. College Station: Stata Press.

Robins, G., P. Pattison, Y. Kalish, and D. Lusher. 2007. An introduction to exponential random graph (p *) models for social networks. *Social Networks* 29(2): 173–191.

Robins, G.L., P.E. Pattison, and S. Wasserman. 1999. Logit models and logistic regressions for networks: III. Valued relations. *Psychometrika* 64(3): 371–394.

Singer, J.D., and J.B. Willett. 2003. *Applied longitudinal data analysis. Modeling change and event occurrence*. Oxford: University Press.

Skrondal, A., and S. Rabe-Hesketh. 2004. *Generalized latent variable modeling. Multilevel, longitudinal, and structural equation models*. Boca Raton: Chapman & Hall.

Snijders, T.A., G. van de Bunt, and C.E.G. Steglich. 2010. Introduction to stochastic actor-based models for network dynamics. *Social Networks* 32(1): 44–60.

Stanat, P. 2006. Schulleistungen von Jugendlichen mit Migrationshintergrund: Die Rolle der Zusammensetzung der Schülerschaft. In *Herkunftsbedingte Disparitäten im Bildungswesen. Vertiefende Analysen im Rahmen von PISA 2000*, eds. J. Baumert, P. Stanat, and R. Watermann pp. 189–220. Wiesbaden: VS Verlag.

Stubbe, T.C., M. Pietsch, and H. Wendt. 2007. Soziale Netze an Hamburger Grundschulen. In *KESS 4—Lehr—und Lernbedingungen in Hamburger Grundschulen*, ed. W. Bos, C. Gröhlich, and M. Pietsch, 71–102. Münster: Waxmann.

Vermeij, L., M.A.J. van Duijn, and C. Baerveldt. 2009. Ethnic segregation in context: Social discrimination among native Dutch pupils and their ethnic minority classmates. *Social Networks* 31(4): 230–239.

Windzio, M. 2011. Ethnische segregation in Freundschaftsnetzwerken. Unit-non-response und imputation in einer Befragung von Schulklassen. In *Probleme der Integration von Theorie und Methode in der Netzwerkforschung*, eds. M. Hennig, and C. Stegbauer, Wiesbaden: VS Verlag, in press.

Windzio, M. 2012. Integration of immigrant children into inter-ethnic friendship networks: The role of "intergenerational openness". *Sociology* 46(2): 258–271.

Windzio, M. and E. Bicer. 2013. Are we just friends? Immigrant integration into high- and low-cost social networks. *Rationality and Society* (in press).