Peer Influence and Educational Preferences: Direct Influence or Access to Friends' Educational Resources?

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Data availability statement

Requests to make use of the dataset can be send to E.V.

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Abstract

While educational preferences can be influenced by friends through various mechanisms, the specific pathways of this influence remain underexplored. This study employs random-coefficient multilevel stochastic actor-oriented models to examine a longitudinal sample of Hungarian students ($N_{students}$=493, $N_{classes}$=21) observed from fifth to seventh grade. The study investigates how friends' preferences and friends' parental resources influence educational preferences while accounting for friends' academic achievement and friendship selection. The analysis identifies distinct pathways through which friends can influence educational preferences. The study suggests that adolescents do not adjust their secondary school track preferences to conform to their friends' preferences but are instead affected by the indirect influence of their friends' parental background. Students who befriend adolescents with highly educated parents are more likely to adjust their preferences toward the academic-oriented secondary school track.

Keywords

Educational preferences, aspirations, expectations, social networks, multilevel random coefficient Stochastic Actor-Oriented Models

1. Introduction

Educational preferences—students' inclinations towards specific educational paths—are shaped by both personal factors and social interactions (Appadurai, 2004; Gutman & Akerman, 2008). These preferences are closely intertwined with students' broader aspirations and expectations (Eccles & Wigfield, 2002; Gottfredson, 2005) and determine educational attainment and academic outcomes (Chowdry et al., 2011; Gutman & Akerman, 2008). Peers, particularly friends, shape these preferences—a finding consistently supported by empirical research building on the Wisconsin Longitudinal Study (Sewell & Hauser, 1972; Kretschmer & Roth, 2021; Lorenz et al., 2020; Raabe & Wölfer, 2019).

One key mechanism of peer influence occurs through direct influence, where adolescents adopt the attitudes and behaviors of relevant peers (Berndt & Savin-Williams, 1993; Brown & Larson, 2009). This influence manifests in multiple ways: peers serve as role models, share information, convey social expectations, and actively shape behavior through encouragement or discouragement of certain actions (Bourdieu, 1990; Brown & Larson, 2009; Ikonen et al., 2018). Friends' influence on adolescents' educational preferences can also operate indirectly through friends' parental background. This parental influence represents a distinct and powerful mechanism in how social networks can provide access to otherwise unavailable resources and social capital (Coleman, 1988; Granovetter, 1973, 1983; Lin, 2001). For example, access to information from well-educated parents of friends provides valuable insights into educational pathways (Crosnoe, 2004; Wohn et al., 2013). Such resource-sharing mechanisms can be particularly valuable for students from disadvantaged backgrounds, who may have limited access to familial resources (Burgess & Umaña-Aponte, 2011; Lessard & Juvonen, 2019; Sokatch, 2006).

However, this potential benefit is often constrained by homophily in friendships—the tendency for friends to share similar attributes—which can limit disadvantaged children's access to more resourceful peers (McPherson et al., 2001; McDermott et al., 2020). While

friends can influence educational preferences, the similarity in these preferences among friends can also result from processes such as friendship selection based on shared characteristics and baseline homophily, where individuals with similar backgrounds or preferences naturally cluster within the same social environments due to exogeneous factors (Kretschmer & Roth, 2021; Lorenz et al., 2020; Mouw, 2006; Mundt & Mundt, 2020).

This study enhances the understanding of peer influence on adolescents' educational preferences by simultaneously examining both direct influence (adjustment to friends' preferences) and indirect influence (through friends' parental background), while also accounting for friendship selection using multilevel social network models (Steglich et al., 2010; Koskinen & Snijders, 2023). In contrast to previous studies that have sought to differentiate between social influence and selection effects (e.g., Kretschmer & Roth, 2021; Lorenz et al., 2020; Mundt & Mundt, 2020), this study offers insights into the role of peer influence on the educational outcomes of Hungarian adolescents prior to their distribution to highly stratified school tracks (Buchmann & Dalton, 2002; Lorenz et al., 2020; Raabe & Wölfer, 2019).

2. Friends' influence on adolescents' secondary educational preferences

2.1. Direct Influence: Adjustment to friends' educational preferences

During adolescence, children become increasingly susceptible to the opinions of their peers, particularly those of their friends (Laursen & Veenstra, 2021; Berndt & Savin-Williams, 1993; Brown & Larson, 2009). Peers influence each other's behaviors through mechanisms such as social pressure, reinforcement, role modeling, sanctioning undesired actions, facilitating behaviors, and establishing norms (Brown et al., 2008; Brown & Larson, 2009). Peer influence can extend to educational decisions as friends collaboratively establish shared educational standards and promote specific long-term plans for academic tracks. To avoid the social and psychological costs of nonconformity, individuals often align with the dominant educational

practices within their social networks (Jæger, 2007; Manzo, 2013; Nash, 2005). Moreover, peers can transmit their parents' perceptions of what constitutes 'good education' and shape preferences through discussions about available educational options (Bourdieu, 1990; Ikonen et al., 2018).

Empirical research has consistently indicated that adolescents' educational preferences are similar to those of their friends (e.g., Kretschmer & Roth, 2021; Raabe & Wölfer, 2019; Rosenqvist, 2018), particularly in educational settings with diverse academic pathways (Buchmann & Dalton, 2002; Lorenz et al., 2020). While a recent cross-sectional study found no direct association between friends' secondary school track choices among Hungarian adolescents (Keller, 2023), the majority of research supports the following hypothesis:

Hypothesis 1 (Adjustment hypothesis): Adolescents adjust their educational preferences to their school friends' preferences.

2.2. Indirect influence through friends' parental resources

Middle-class or highly educated parents actively provide resources, encourage participation in extracurricular activities, and possess a deeper understanding of educational systems (Calarco, 2014; Crosnoe, 2004; Lareau, 2011). This advantaged position increases children's aspirations by offering opportunities, support, and high expectations (Boudon, 1974; Breen & Goldthorpe, 1997), while disadvantaged children often lack these resources, constraining their aspirations (Appadurai, 2004).

Schools serve as social contexts where students can access educational resources and social capital beyond their parents' resources. Through social networks, the educational resources of highly educated parents such as knowledge about navigating the educational system can become accessible to their children's friends (Crosnoe, 2004; Granovetter, 1973, 1983; Lin, 2001). This access proves especially valuable for secondary school applications, where information about admissions criteria and programs is crucial. Beyond information,

friends' parents may provide tangible resources like admissions-related materials unavailable in other families (Chiu & Chow, 2015).

The transmission of these resources occurs through multiple mechanisms. Network ties among parents foster prosocial norms and offer collective resources beyond the capacity of individual families (Coleman, 1988). Actively involved parents create environments that value academic success, indirectly influencing their children's friends by fostering achievement-oriented communities (Sui-Chu & Willms, 1996). Some students build direct relationships with their friends' parents, forming channels for resource-sharing and influence. Simultaneously, parents actively shape their children's peer interactions (Offer & Schneider, 2007). For example, they may organize extracurricular or cultural activities that support specific educational goals. Parents of friends can also serve as role models, particularly when parental socialization has been less successful (Bisin & Verdier, 2000). The educational capital of friends' parents has been linked to positive academic outcomes, including achievement (Carolan & Lardier, 2018; Coleman, 1988), aspirations, expectations, and college completion (Cherng et al., 2013; McDermott et al., 2020). Drawing on the documented mechanisms and empirical evidence of parental influence, we formulate the following hypothesis:

Hypothesis 2a (Instrumental Resource Hypothesis a): Adolescents are more likely to adjust their preferences to the academic-oriented track when they have more friends whose parents completed tertiary education.

Resources accessible through social networks can be particularly supportive for disadvantaged students in pursuing high aspirations (Burgess & Umaña-Aponte, 2011; Sokatch, 2006; Wohn et al., 2013). However, middle-class parents are more likely to put their networks to use in times of educational uncertainty (Horvat et al., 2003). DiMaggio and Garip (2012) argue that social networks can reinforce existing inequalities; however, studies rarely examine whether peer influence mitigates or exacerbates intergroup disparities. This raises the question of whether the influence of friends with highly educated parents depends on adolescents'

parental background. While middle-class parents may actively utilize networks, students without access to such resources at home might derive greater benefits from friendships with peers whose parents are highly educated Accordingly, we propose:

Hypothesis 2b (Instrumental Resource Hypothesis b): Adolescents are more likely to adjust their preferences to the academic-oriented track when they have more friends whose parents completed tertiary education, particularly if their parents did not.

3. How educational preferences can contribute to friendship selection

Friendship ties are endogenously selected based on similarity along relevant dimensions (Brown & Larson, 2009; McPherson et al., 2001). In Hungarian primary schools, fixed class assignments mean students spend most of their time with the same peers, allowing close observation of each other's academic behavior. Since admissions criteria and competitiveness vary across school tracks (Horn et al., 2016; Shavit & Blossfeld, 1993), educational preferences may be reflected in behaviors such as academic achievement, classroom engagement, and information-seeking about schools, which in turn shape friendship selection (Wang et al., 2018). Therefore, to accurately measure the role of influence on the similarity of friends' educational preferences, it is essential to disentangle social influence and selection mechanisms (Steglich et al., 2010; Veenstra & Dijkstra, 2012).

Hypothesis 3 (Selection Hypothesis): Students tend to create and maintain friendship ties with others who share similar educational preferences.

4. The Hungarian educational context

Most students in Hungary transition to secondary school after completing eighth grade at age 14 or 15. Students may submit applications to multiple secondary school programs and indicate their preferences without the need for binding teacher recommendations. Over the past decade, between 36.75% and 41.14% of eighth-grade applicants placed grammar school as their first

choice (peaking in 2019), while 35.95% to 45.32% placed vocational secondary school first (peaking in 2024), with 34.33% to 36.59% admitted to grammar schools (Oktatási Hivatal, 2024).

Educational institutions may use combinations of three admission procedures: central written examination, academic performance evaluation, and oral examination or aptitude test. An algorithmic matching process assigns students to their preferred schools, provided they meet admission criteria (European Commission, n.d.). Secondary school tracks are highly stratified by academic performance and family background, affecting later educational and career opportunities. The grammar school track is characterized by the most advantageous family background and best academic achievements relative to the mixed (vocational secondary) and vocational tracks (Horn et al., 2016; Shavit & Blossfeld, 1993).

5. Data, measurement methods

5.1. Data

The data for this analysis were collected in central Hungary as part of the MTA 'Lendület' RECENS research project, entitled 'Competition and Negative Ties' (Kisfalusi et al., 2021). The sample included classes with high ethnic variability, resulting in an overrepresentation of low-status and Roma minority students. The study examined peer relationships, school track preferences, achievement, attitudes, and students' backgrounds. Questionnaires were collected on tablets during school classes in the presence of research assistants. Before data collection, parents and students received written details of the research project, and consent from parents and students was required for participation. Students were assured that their responses would be kept confidential and anonymized after collection.

This analysis used data from the second, fourth, and fifth waves, collected in the spring semesters of 2013/2014 (N = 1131), 2014/2015 (N = 1054), and 2015/2016 (N = 743) from students in grades five through seven. Only classes participating in all three waves (N = 39)

were included in the analysis. Midterm and final grades within the same year are interdependent, affecting subsequent performance—a relationship seen in waves 1-2 and waves 3-4 but not between waves 2, 4, and 5. Thus, only spring semester data (waves 2, 4, and 5) were used for consistent modeling of academic performance effects on preferences. Excessive missing responses can lead to unstable and biased estimates in social network analysis, and a threshold of 20 or 25 percent is often used in research practice (Boda, 2018; Huisman & Steglich, 2008). Therefore, school classes with a participation rate of less than 75 percent in any waves or those having more than 20 percent change in composition were excluded. Following our modeling approach, classes without any changes in students' preferences were also removed, leaving 21 classes for analysis. The tables below present data for these 21 classes (N = 493). The Jaccard indices (proportion of ties stable over time out of all ties) were at least .3 in all groups, indicating that the turnover in friendship nominations was neither too low nor too high, making the sample suitable for longitudinal network analysis (Snijders et al., 2024a).

The selection of the subsample is a severe restriction requiring attention. No significant difference was observed between included and excluded school classes regarding changes in students' preferences (*Table 1*). Additionally, the grammar school preferences of students in the included classes in 2016 (the year preceding their applications) were more similar to the proportion of Hungarian students who preferred grammar school track education in their applications in 2017 (39.89%) than those in the excluded classes (32.88% vs. 24.38%) (Oktatási Hivatal, 2024).

5.2. Measures

5.2.1. Dependent variables

Students indicated their preferred secondary school track after primary school completion: Grammar school (academic track)/Vocational secondary school (mixed track)/Vocational school/Don't know yet. This was coded as a binary variable of grammar school preference (1)

versus other tracks or undecided (0). The vocational secondary track was analyzed separately as a binary outcome in supplementary models (online supplementary material).

Students rated their relationship with classmates on a 1-5 scale, with ratings of 5 ('we are good friends') coded as friendships in binary adjacency matrices. The classroom represents the primary social unit in Hungarian schools, with students spending most of their day with classmates in shared lessons and activities. Network characteristics across waves are detailed in *Appendix A*.

5.2.2. Independent variables

Descriptive statistics of the independent variables are shown in *Table 2*. The analytical approach included both individual-level covariates and friends' values, as the data and models connect friendship matrices with individual responses.

Parental education was measured based on students' reports of their (foster) parents' education levels in waves four through six, using the highest level reported, following Erikson's (1984) dominance criterion. The study employed the most recent data as a constant covariate, assuming students become increasingly aware of their parents' educational background as they grow older. *Parental background* was coded as a binary variable, indicating whether at least one parent completed tertiary education (undergraduate, graduate, or postgraduate programs). Supplementary analysis also distinguished between tertiary and secondary education levels.

Individual *academic achievement* can affect educational preferences (Breen & Goldthorpe, 1997), while friends' achievement may alter self-evaluations and goals through comparison (Huguet et al., 2009; Marsh, 1991; Rosenqvist, 2018). Achievement was measured as the mean of self-reported Hungarian literature and mathematics grades from the last midterm report prior to each wave's data collection.

Students' *gender* was included in the models as a binary variable comparing females to males because gender may influence educational ambitions (e.g., Raabe & Wölfer, 2019) and

also friendship selection (e.g., Poulin & Pedersen, 2007). Self-reported ethnic identity was also included, as Roma students tend to achieve lower test scores (Kertesi & Kézdi, 2011) and might have lower expectations than non-Roma peers due to institutional labeling (Szalai, 2008). Students identifying as Roma or both Roma and Hungarian were considered Roma.

5.3. Analytical strategy

The study examines the co-evolution of adolescents' friendship ties and educational preferences using Stochastic Actor-oriented Models (SAOM; Snijders 1996; Steglich et al., 2010). SAOM model the joint evolution of a network (friendships) and a behavior-dependent variable—students' educational preferences. These models disentangle social selection and influence by simulating *mini steps* in which actors decide whether to create, maintain, or terminate friendship ties or adjust their educational preferences in response to friends' preferences (Snijders et al., 2024a; Steglich et al., 2010).

The dataset includes multiple social networks (school classes). We use random coefficient multilevel SAOM implemented through *sienaBayes()* in the *multiSiena* package in R to model the co-evolution of friendship ties and secondary school preferences while accounting for class heterogeneity (Snijders et al., 2024b). Network dynamics are allowed to vary across groups except for hypothesis-related effects, while behavior dynamics are assumed non-varying. We use weakly informative priors to minimize influence on inference (Gelman et al., 2008) while supporting model estimation. Following Koskinen and Snijders (2023), we set prior means at -1 for outdegree and 1.5 for reciprocity effects, with other prior means at 0 and variances defined in a matrix with diagonal values of 0.01.

Convergence was assessed using four independent sequences with 3,000 iterations via the *rstan* package (Stan Development Team, 2020). Models are considered to converge if all $\hat{R}$ values are ≤ 1.1 for each parameter of interest, and the estimated equivalent sample size is ≥ 5

times the number of chains (20), as suggested by Gelman and colleagues (2014). All presented results met this requirement.

5.3.1. Model specification

The complete model specification is presented in *Appendices B* and *C*. The models investigate whether adolescents' educational preferences are influenced by each unit increase in the average of friends' preferences or parental background, while considering friends' academic achievement, friendship selection, and individual attributes that affect preference adjustment. The analysis focused on grammar school track preferences and tertiary-educated parents, with supplementary models for vocational secondary track and more detailed parental education classifications.

Regarding friendship dynamics egoXaltX effects indicate whether adolescents with grammar school preferences, highly educated parents, or high academic achievement tend to form friendships with others who share similar traits. Alter effects for the same covariates (more likely to be nominated as friends) served as controls. Ego effects (more likely to nominate others as friends) were excluded due to convergence issues, even when limiting outgoing ties or allowing time/random variation of ego effects. Excluding ego effects may introduce bias into the egoXaltX estimates, so the selection hypothesis (Hypothesis 3) should be interpreted cautiously. Endogenous structural effects related to social network evolution in students' friendship networks were included to control for confounding processes.

6. Results

6.1. Descriptive results

Table 1 shows how students' preferences changed between two measurements (from T1 to T2 and from T2 to T3) according to their preferences at the first measurements (T1 and T2, respectively) for school classes included and excluded from the SAOM. There was a smaller

change in preferences for the grammar school track in the second period compared to the first period, while there was a significant adjustment from uncertain preferences to all other preferences in the second period. This suggests that students' preferences solidified as they got closer to applying to secondary school.

6.2. Random coefficient multilevel Siena model results

SAOM results are derived for the probabilities of changes in friendship ties and the preference for the grammar school track between two observations and should be interpreted as log odds ratios in logistic regression models. The study presents models with posterior means, standard deviations, and Bayesian p-values. For hypotheses with a negative effect, p-values < .025 and p > .975 are accepted, indicating sufficient evidence for a positive or negative effect. Considering that these thresholds are meant as guidelines for one-sided hypotheses, we also consider parameters with p-values < .05 or p > 0.95. Bayesian p-values represent the probability that a parameter is positive given the data, model, and priors. For example, a p-value of .025 indicates a 2.5% probability that the parameter is positive, while .975 suggests a 97.5% certainty of a positive effect given the data, the models, and priors.

Table 3 presents the results for social selection and social influence related to grammar school track preferences and parental background, as well as whether the effect of friends' parental background on grammar school preferences is moderated by students' own parental background. Additional models, available in the online supplementary materials, include:

1. Models examining social selection and influence effects solely on grammar school track preferences, as well as a separate model for social selection and influence effects on grammar school track preferences and parental background without the interaction effect between students and their friends' parental backgrounds; and

2. Models distinguishing between grammar and vocational secondary school preferences, along with classifications for tertiary and secondary parental education.

The study found mixed support for friends' influence on adolescents' educational preferences. Contrary to *Hypothesis 1*, students did not adjust their grammar school track preferences to match their friends' (*Table 3*, grammar school track preferences, θ = -1.65, SD = 1.07., p = .05). The results rather suggest a tendency to deviate from friends' preferences. The results supported the Instrumental resource hypothesis (*Hypothesis 2a*), suggesting that the educational background of friends' parents had a positive impact on adolescents' preferences for the grammar school track (*Table 3*, grammar school track preferences, θ = 1.40, SD = .71, p = .98). The average alter parameter of -1.65 implies that for each unit increase in friends' grammar school track preferences, students are $e^{-1.65*friends' \, average \, preferences}$ times less likely to adjust toward that preference. When all friends have grammar school track preferences, the centered value of 0.73 (reflecting 1 minus the mean of this binary preference variable) corresponds to students being about 0.30 times less likely to adjust toward the grammar school track.. Conversely, the 1.40 parameter for friends' tertiary parental background suggests $e^{1.40*friends' average \, parental \, backgroudn}$ times higher odds of adjusting to grammar school track preferences with each unit increase in friends' parental background. When all friends have a tertiary parental background, the centered value of 0.72 corresponds to students being about 2.75 times more likely to adjust toward the grammar school track.

The effect of friends' parental background could be claimed as influence as the model disentangled friends' indirect influence through their parental background from the tendency of creating or maintaining ties based on similarity in parental background. Nevertheless, supplementary results suggested that friends' parental background was only impactful when focusing on friends' parents with tertiary education. The effect of friends' parental backgrounds was not moderated by students' parental background (*Hypothesis 2b*) suggesting that students' with and without parents with tertiary-level education were equally susceptible to the effect of having friends' parents with tertiary-level education on their grammar school track preferences (*Table 3*, Grammar school track preferences).

Students with grammar school track preferences were more likely to maintain and form friendships with those sharing the same preferences, as indicated by the positive egoXaltX effects (*Table 3*, friendship dynamics, $\theta = .48$, $SD = .16$, $p > .99$). The results for the egoXaltX effects require caution due to the exclusion of the ego effects, which did not converge. Although the model accounts for preference-based similarity and social selection in friends' educational preferences, the missing ego effect means that conclusions about the Selection hypothesis should be drawn carefully. The model is designed to consider both selection and influence together, reducing bias, yet the absence of the ego effect limits the full capture of selection effects. Regarding general friendship dynamics, the negative coefficient of the outdegree is the intercept for the model. The positive reciprocity effect indicated that students tended to reciprocate incoming ties, and the positive transitivity effect suggested a tendency towards triadic closure. Students with more incoming ties seemed to be less likely to receive friendship ties over time.

7. Discussion

Schools serve as educational and social institutions where students are shaped by both the formal curriculum and the norms and behaviors established by their peers and parents (Crosnoe, 2011). Previous research has linked adolescents' educational preferences and expectations to their friends' preferences and expectations (Kretschmer & Roth, 2021; Raabe & Wölfer, 2019; Rosenqvist, 2018) and their friends' parental background (Cherng et al., 2013; McDermott et al., 2020).

The present study investigated the direct and indirect influences of friends on secondary school track preferences among Hungarian adolescents in the upper grades of primary school. Using longitudinal multilevel social network analysis, we examined whether students adjust their preferences in response to: (1) the preferences of their friends and (2) having friends with highly educated parents. Additionally, we explored whether the latter process varied according

to the students' own parental backgrounds, potentially compensating for a lack of parental educational resources.

Our results were partially consistent with previous research. Contrary to several previous findings (Kretschmer & Roth, 2021; Raabe & Wölfer, 2019; Rosenqvist, 2018) and our *Hypothesis 1*, we did not find evidence that adolescents adjust their preferences for the academically oriented track based on their friends' preferences once we accounted for friendship selection. In fact, we found some weak evidence suggesting the opposite effect. This discrepancy likely stems from the significant role of parental influence during this developmental stage.

Our study focuses on the development of educational preferences at a much younger age than most previous studies, concentrating on concrete educational choices—preferred secondary school tracks—rather than potential future outcomes. This contextual difference is crucial, as research shows that educational systems significantly shape peer effects on students' aspirations (Buchmann & Dalton, 2002; Lorenz et al., 2020). At a younger age, parents—particularly those with higher educational levels who are well-informed about educational transitions—are deeply involved in selecting appropriate secondary education for their children well before the application process begins (Breen & Goldthorpe, 1997; Calarco, 2014; Crosnoe, 2004; Lareau, 2011). While this strong parental involvement doesn't necessarily preclude peer effects, the formal nature of track selection and intensive parental guidance may override or mask friendship influences.

Regarding the weakly supported negative effect of friends' preferences, it is possible that the aspirations of friends create discrepancies between students' own aspirations and expectations, amplifying the gap between what adolescents hope to achieve and what they realistically expect (Chen & Hesketh, 2021). As a result, students may adjust their preferences away from those of their friends. Furthermore, a significant percentage of students in our study reported 'uncertain preferences', especially at the first measurement, indicating they were unsure

about their future educational paths. This uncertainty likely reflects their inability or reluctance to commit to a specific academic track at that time, which may have affected how they responded to their friends' preferences. However, our models do not capture transitions between all different preference categories, limiting our ability to fully assess the impact of this uncertainty.

In line with *Hypothesis 2a*, we found that friends influenced preferences for the academically oriented secondary school track through their parental resources. Specifically, adolescents adjusted their preferences toward the academic track in response to having friends with highly educated parents. This aligns with prior findings indicating that friends' advantageous family backgrounds can positively impact educational outcomes (Cherng et al., 2013; McDermott et al., 2020). Our study emphasizes that the resources and informational advantages associated with more educated parents are transmitted through social networks, influencing adolescents' educational preferences. These advantages may manifest in various ways, such as sharing strategies for academic success, offering guidance on navigating school systems, or modeling behaviors that encourage educational ambition. This highlights the role of schools as social institutions that facilitate these dynamics, where interactions within students' and their parents' social networks shape outcomes beyond the formal curriculum (Coleman, 1988; Crosnoe, 2004).

Previous studies have reported ambiguous findings regarding whether the effect of friends' parental backgrounds on educational outcomes is moderated by an individual's own parental background. Some research suggests a compensatory effect, where resources provided by peers' parents help mitigate disadvantages faced by students from less privileged families and raise their aspirations (Burgess & Umaña-Aponte, 2011; Sokatch, 2006; Wohn et al., 2013). Conversely, other studies have found no support for this notion, indicating that friends' parental backgrounds do not compensate for students' own parental resources (McDermott et al., 2020). Understanding these contradictory findings requires examining how social networks actually

function in education. While social networks can provide students with valuable resources and information crucial for educational success (Lessard & Juvonen, 2019; Wohn et al., 2013), these networks are often segregated by socioeconomic background, limiting their potential to act as equalizers (McDermott et al., 2020). Some scholars argue that social networks often reproduce rather than mitigate existing inequalities (DiMaggio & Garip, 2012). Moreover, middle-class parents are generally more adept at cultivating and utilizing their networks to support their children's education, which can exacerbate educational disparities (Horvat et al., 2003).

Our study adds to this debate, showing no evidence that educational resources from friends' parents particularly benefit students from less advantaged backgrounds, contradicting *Hypothesis 2b*. This suggests that friends with highly educated parents do not compensate in excess for a lack of a students' own parental resources; rather, the parental background of friends serve as an additional resource that supplements students' family backgrounds. One possible explanation is that accessing resources through social networks requires the recognition of such opportunities and active engagement in such exchanges. Less educated parents may not identify the potential educational benefits offered by their children's friends or may not encourage their children to participate in situations where such resources are accessible. Additionally, some families might perceive the experiences of highly educated parents as irrelevant or too different from their own, reducing the likelihood of meaningful interactions. These barriers to accessing and utilizing network resources suggest that simply creating opportunities for cross-class contact may be insufficient for promoting educational equity through social networks.

Despite limitations such as restricted generalizability due to sampling procedures and the exclusion of ego effects on friendship selection, this study contributes meaningfully to the discussion on peer effects in educational outcomes, especially concerning decisions made prior to tracking into secondary education. This study uniquely models how multiple influence and selection mechanisms shape adolescents' educational trajectories over time, emphasizing the role of socioeconomic composition in friendships. Our findings suggest also that while friends'

parental backgrounds do have an effect on educational preferences, students from less advantaged parental backgrounds may struggle to compensate for their own lack of parental educational resources through their friends' parental resources. These insights invite further investigation into the complex mechanisms of peer influence and their potential to either perpetuate or mitigate social disparities in education.

8. References

Appadurai, A. (2004). The Capacity to Aspire: Culture and the Terms of Recognition. In V. Rao & M. Walton (Eds.), *Culture and Public Action* (pp. 59–84). Stanford University Press.

Berndt, T. J., & Savin-Williams, R. C. (1993). Peer Relations and Friendships. In P. H. Tolan & B. J. Cohler (Eds.), *Handbook of Clinical Research and Practice with Adolescents (Wiley Series on Personality Processes)*. John Wiley & Sons.

Bisin, A., & Verdier, T. (2000). "Beyond the Melting Pot": Cultural Transmission, Marriage, and the Evolution of Ethnic and Religious Traits. *The Quarterly Journal of Economics*, *115*(3), 955–988.

Boda, Zs. (2018). Social Influence on Observed Race. *Sociological Science*, *5*, 29–57. https://doi.org/10.15195/v5.a3

Boudon, R. (1974). *Education, opportunity, and social inequality: Changing prospects in Western society*. Wiley.

Bourdieu, P. (1990). *The Logic of Practice* (R. Nice, Trans.). Stanford University Press.

Breen, R., & Goldthorpe, J. H. (1997). Explaining Educational Differentials towards a Formal Rational Action Theory. *Rationality and Society*, *9*(3), 275–305. https://doi.org/10.1177/104346397009003002

Brown, B. B., Bakken, J. P., Ameringer, S. W., & Mahon, S. D. (2008). A Comprehensive Conceptualization of the Peer Influence Process in Adolescence. In M. J. Prinstein & K. A. Dodge (Eds.), *Understanding Peer Influence in Children and Adolescents* (pp. 17–44). Guilford Press.

Brown, B. B., & Larson, J. (2009). Peer Relationships in Adolescence. In R. M. Lerner & L. Steinberg (Eds.), *Handbook of Adolescent Psychology* (pp. 74–103). Wiley.

Buchmann, C., & Dalton, B. (2002). Interpersonal Influences and Educational Aspirations in 12 Countries: The Importance of Institutional Context. *Sociology of Education*, *75*(2), 99–122. https://doi.org/10.2307/3090287

Burgess, S., & Umaña-Aponte, M. (2011). *Raising your Sights: The Impact of Friendship Networks on Educational Aspirations*. Centre for Market and Public Organisation, Bristol Institute of Public Affairs, University of Bristol.

Calarco, J. M. (2014). Coached for the Classroom: Parents' Cultural Transmission and Children's Reproduction of Educational Inequalities. *American Sociological Review*, *79*(5), 1015–1037. https://doi.org/10.1177/0003122414546931

Carolan, B. V., & Lardier, D. T. (2018). Adolescents' Friends, Parental Social Closure, and Educational Outcomes. *Sociological Focus*, *51*(1), 52–68. https://doi.org/10.1080/00380237.2017.1341247

Chen, X., & Hesketh, T. (2021). Educational Aspirations and Expectations of Adolescents in Rural China: Determinants, Mental Health, and Academic Outcomes. *International Journal of Environmental Research and Public Health*, *18*(21), 11524. https://doi.org/10.3390/ijerph182111524

Cherng, H.-Y. S., Calarco, J. M., & Kao, G. (2013). Along for the Ride: Best Friends' Resources and Adolescents' College Completion. *American Educational Research Journal*, *50*(1), 76–106. https://doi.org/10.3102/0002831212466689

Chiu, M. M., & Chow, B. W.-Y. (2015). Classmate characteristics and student achievement in 33 countries: Classmates' past achievement, family socioeconomic status, educational resources, and attitudes toward reading. *Journal of Educational Psychology*, *107*(1), 152–169. https://doi.org/10.1037/a0036897

Chowdry, H., Crawford, C., & Goodman, A. (2011). The role of attitudes and behaviours in explaining socio-economic differences in attainment at age 16. *Longitudinal and Life Course Studies*, *2*(1). https://doi.org/10.14301/llcs.v2i1.141

Coleman, J. S. (1988). Social Capital in the Creation of Human Capital. *American Journal of Sociology*, *94*, 95–120. https://doi.org/10.1086/228943

Crosnoe, R. (2004). Social Capital and the Interplay of Families and Schools. *Journal of Marriage and Family*, *66*(2), Article 2. https://doi.org/10.1111/j.1741-3737.2004.00019.x

DiMaggio, P., & Garip, F. (2012). Network Effects and Social Inequality. *Annual Review of Sociology*, *38*(1), 93–118. https://doi.org/10.1146/annurev.soc.012809.102545

Eccles, J. S., & Wigfield, A. (2002). Motivational Beliefs, Values, and Goals. *Annual Review of Psychology*, *53*(1), 109–132. https://doi.org/10.1146/annurev.psych.53.100901.135153

Erikson, R. (1984). Social Class of Men, Women and Families. *Sociology*, *18*(4), 500-514. https://doi.org/10.1177/0038038584018004003

European Commission. (n.d.). *Organisation of the education system and of its structure*. Eurydice. Retrieved July 20, 2024, from https://eurydice.eacea.ec.europa.eu/national-education-systems/hungary/organisation-0

Gelman, A. (2014). *Bayesian Data Analysis* (Third edition). CRC Press.

Gelman, A., Jakulin, A., Pittau, M. G., & Su, Y.-S. (2008). A weakly informative default prior distribution for logistic and other regression models. *The Annals of Applied Statistics*, *2*(4), 1360-1383. https://doi.org/10.1214/08-AOAS191

Gottfredson, L. S. (2005). Applying Gottfredson's Theory of Circumscription and Compromise in Career Guidance and Counseling. In *Career development and counseling: Putting theory and research to work.* (pp. 71–100). John Wiley & Sons, Inc.

Granovetter, M. S. (1973). The Strength of Weak Ties. *American Journal of Sociology*, *78*(6), 1360–1380.

Granovetter, M. (1983). The strength of weak ties: A network theory revisited. *Sociological Theory*, *1*(1), 201–233.

Gutman, L. M., & Akerman, R. (2008). *Determinants of Aspirations [Wider Benefits of Learning Research Report No. 27*. Centre for Research on the Wider Benefits of Learning, Institute of Education, University of London.

Horn, D., Keller, T., & Róbert, P. (2016). Early tracking and competition–A recipe for major inequalities in Hungary. In *Models of Secondary Education and Social Inequality* (pp. 129-148). Edward Elgar Publishing.

Horvat, E. M., Weininger, E. B., & Lareau, A. (2003). From Social Ties to Social Capital: Class Differences in the Relations Between Schools and Parent Networks. *American Educational Research Journal*, *40*(2), 319–351.

Huguet, P., Dumas, F., Marsh, H., Régner, I., Wheeler, L., Suls, J., Seaton, M., & Nezlek, J. (2009). Clarifying the Role of Social Comparison in the Big-Fish–Little-Pond Effect (BFLPE): An Integrative Study. *Journal of Personality and Social Psychology*, *97*(1), 156–170. https://doi.org/10.1037/a0015558

Huisman, M., & Steglich, C. (2008). Treatment of non-response in longitudinal network studies. *Social Networks*, *30*(4), 297–308. https://doi.org/10.1016/j.socnet.2008.04.004

Ikonen, K., Leinonen, R., Asikainen, M. A., & Hirvonen, P. E. (2018). The Influence of Parents, Teachers, and Friends on Ninth Graders' Educational and Career Choices. *International Journal of Gender, Science and Technology*, *9*(3), 316–338.

Jæger, M. M. (2007). Economic and Social Returns to Educational Choices: Extending the Utility Function. *Rationality and Society*, *19*(4), 451-483. https://doi.org/10.1177/1043463107083739

Keller, T. (2023). No evidence of direct peer influence in upper-secondary track choice—Evidence from Hungary. *European Societies*, *25*(1), 154–180. https://doi.org/10.1080/14616696.2022.2127828

Kertesi, G., & Kézdi, G. (2011). The Roma/Non-Roma Test Score Gap in Hungary. *The American Economic Review*, *101*(3), 519–525.

Kisfalusi, D., Janky, B., & Takács, K. (2021). Grading in Hungarian Primary Schools: Mechanisms of Ethnic Discrimination against Roma Students. *European Sociological Review*, *37*(6), 899–917. https://doi.org/10.1093/esr/jcab023

Koskinen, J., & Snijders, T. A. B. (2023). Multilevel longitudinal analysis of social networks. *Journal of the Royal Statistical Society Series A: Statistics in Society*, *186*(3), 376–400. https://doi.org/10.1093/jrsssa/qnac009

Kretschmer, D., & Roth, T. (2021). Why Do Friends Have Similar Educational Expectations? Separating Influence and Selection Effects'. *European Sociological Review*, *37*(2), 201–217. https://doi.org/10.1093/esr/jcaa042

Lareau, A. (2011). *Unequal childhoods: Class, race, and family life* (2nd ed., with an update a decade later). University of California Press.

Laursen, B., & Veenstra, R. (2021). Toward understanding the functions of peer influence: A summary and synthesis of recent empirical research. *Journal of Research on Adolescence*, *31*(4), 889–907. https://doi.org/10.1111/jora.12606

Lessard, L. M., & Juvonen, J. (2019). Cross-Class Friendship and Academic Achievement in Middle School. *Developmental Psychology*, *55*(8), 1666–1679. https://doi.org/10.1037/dev0000755

Lin, N. (2001). *Social Capital: A Theory of Social Structure and Action*. Cambridge University Press.

Lorenz, G., Boda, Z., Salikutluk, Z., & Jansen, M. (2020). Social Influence or Selection? Peer Effects on the Development of Adolescents' Educational Expectations in Germany. *British Journal of Sociology of Education*, *41*(5), 643–669. https://doi.org/10.1080/01425692.2020.1763163.

Manzo, G. (2013). Educational Choices and Social Interactions: A Formal Model and a Computational Test. In G. E. Birkelund (Ed.), *Comparative Social Research* (Vol. 30, pp. 47–100). Emerald Group Publishing Limited. https://doi.org/10.1108/S0195-6310(2013)0000030007.

Marsh, H. W. (1991). Failure of High-Ability High Schools to Deliver Academic Benefits Commensurate with Their Students' Ability Levels. *American Educational Research Journal, 28*(2), 445–480. https://doi.org/10.3102/00028312028002445.

McDermott, E. R., Umaña-Taylor, A. J., Schaefer, D. R., Martinez-Fuentes, S., Co, L., Ison, A., Ryan, A. M., & Rivas-Drake, D. (2020). The structure of educational inequity: Adolescents' access to parent education through friendship networks and its impact on academic outcomes. *Social Development*, sode.12494. https://doi.org/10.1111/sode.12494

McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a Feather: Homophily in Social Networks. *Annual Review of Sociology*, *27*(1), 415–444. https://doi.org/10.1146/annurev.soc.27.1.415

Mouw, T. (2006). Estimating the Causal Effect of Social Capital: A Review of Recent Research. *Annual Review of Sociology*, *32*(1), 79–102. https://doi.org/10.1146/annurev.soc.32.061604.123150

Mundt, S. D., & Mundt, M. P. (2020). The Role of Peer Groups in Adolescents' Educational Expectations: A Stochastic Actor-Based Model. *International Journal of Adolescence and Youth*, *25*(1), 1009–1021. https://doi.org/10.1080/02673843.2020.1828109

Nash, R. (2005). The cognitive habitus: Its place in a realist account of inequality/difference. *British Journal of Sociology of Education, 26*(5), 599-612. https://doi.org/10.1080/01425690500293546

Offer, S., & Schneider, B. (2007). Children's Role in Generating Social Capital. *Social Forces*, *85*(3), 1125–1142. https://doi.org/10.1353/sof.2007.0049

Oktatási Hivatal. (2024). *Középfokú felvételi eljárás a 2023/2024. tanévben. [Secondary school admission procedure for the academic year 2023/2024]*. https://www.oktatas.hu/pub_bin/dload/kozoktatas/beiskolazas/prezentaciok/kifir_felveteli_2024.pptx

Poulin, F., & Pedersen, S. (2007). Developmental Changes in Gender Composition of Friendship Networks in Adolescent Girls and Boys. *Developmental Psychology*, *43*(6), 1484–1496. https://doi.org/10.1037/0012-1649.43.6.1484

Raabe, I. J., & Wölfer, R. (2019). What Is Going on Around You: Peer Milieus and Educational Aspirations. *European Sociological Review*, *35*(1), 1-14. https://doi.org/10.1093/esr/jcy048

Rosenqvist, E. (2018). Two Functions of Peer Influence on Upper-Secondary Education Application Behavior. *Sociology of Education*, *91*(1), 72–89. https://doi.org/10.1177/0038040717746113.

Ryan, A. M. (2001). The Peer Group as a Context for the Development of Young Adolescent Motivation and Achievement. *Child Development*, *72*(4), 1135-1150. https://doi.org/10.1111/1467-8624.00338

Sewell, W. H., & Hauser, R. M. (1972). Causes and Consequences of Higher Education: Models of the Status Attainment Process. *American Journal of Agricultural Economics*, *54*(5), 851-861. https://doi.org/10.2307/1239228

Shavit, Y., & Blossfeld, H.-P. (Eds.). (1993). *Persistent inequality: Changing educational attainment in thirteen countries*. Westview Press.

Snijders T. A. B. (1996) Stochastic actor-oriented models for network change. *The Journal of Mathematical Sociology* 21(1–2): 149–172.

Snijders, T. A. B., Ripley, R., Boda, Z., Voros, A., & Preciado, P. (2024a). *Manual for RSiena* (R package version 1.4.18). Retrieved October 15, 2024, from https://www.stats.ox.ac.uk/~snijders/siena/

Snijders, T. A. B., Ripley, R. M., & Koskinen, J. (2024b). *multisiena – Simulation investigation for empirical network analysis* (R package version 1.2.16).

Sokatch, A. (2006). Peer Influences on the College-Going Decisions of Low Socioeconomic Status Urban Youth. *Education and Urban Society*, *39*(1), 128–146. https://doi.org/10.1177/0013124506291783

Stan Development Team. (2020). *RStan: The R interface to Stan* (2.21.2) [Computer software]. https://mc-stan.org/

Steglich, C., Snijders, T. A. B., & Pearson, M. (2010). Dynamic Networks and Behavior: Separating Selection from Influence. *Sociological Methodology*, *40*(1), 329–393. https://doi.org/10.1111/j.1467-9531.2010.01225.x

Sui-Chu, E. H., & Willms, J. D. (1996). Effects of Parental Involvement on Eighth-Grade Achievement. *Sociology of Education*, *69*(2), 126. https://doi.org/10.2307/2112802

Szalai, J. (2008). Széttartó jövőképek. *Esély: Társadalom-És Szociálpolitikai Folyóirat*, *19*(2), Article 2.

Veenstra, R., & Dijkstra, J. K. (2012). Transformations in Adolescent Peer Networks. In B. Laursen & W. A. Collins (Eds.), *Relationship Pathways: From Adolescence to Young Adulthood* (pp. 135–154). Sage.

Wang, M.-T., Kiuru, N., Degol, J. L., & Salmela-Aro, K. (2018). Friends, Academic Achievement, and School Engagement during Adolescence: A Social Network Approach to Peer Influence and Selection Effects. *Learning and Instruction*, *58*, 148–160. https://doi.org/10.1016/j.learninstruc.2018.06.003.

Wohn, D. Y., Ellison, N. B., Khan, M. L., Fewins-Bliss, R., & Gray, R. (2013). The Role of Social Media in Shaping First-generation High School Students' College Aspirations: A Social Capital Lens. *Computers & Education*, *63*, 424–436. https://doi.org/10.1016/j.compedu.2013.01.004

Tables

Table 1

Change of Educational Preferences for the Main Categories by whether Students' Class was Included in the Analysis (%)

		T1 to T2		T2 to T3	
		Classes Included in SAOM	***Classes Not Included in SAOM***	***Classes Included in SAOM***	***Classes Not Included in SAOM***
		% (N)	% (N)	% (N)	% (N)
Grammar School	Change to another option	13.2% (49)	13.7% (59)	9.01% (30)	9.05% (20)
	Other preferences at both	60.8% (225)	62.3% (269)	57.66% (192)	67.42% (149)
	Keeping preferences	12.4% (46)	14.4% (62)	18.02% (60)	14.03% (31)
	Change to grammar school track	13.5% (50)	9.7% (42)	15.32% (51)	9.50% (21)
	Chi-squared (p-value)	3.14 (.37)		6.8 (.08)	
Vocational Secondary School	Change to another option	15.95% (59)	14.35% (62)	12.61% (42)	14.48% (32)
	Other preferences at both	54.59% (202)	50.00% (216)	51.35% (171)	40.27% (89)
	Keeping preferences	14.86% (55)	19.21% (83)	16.52% (55)	19.46% (43)
	Change to vocational secondary school	14.59% (54)	16.44% (71)	19.52% (65)	25.79% (57)
	Chi-squared (p-value)	3.77 (.29)		6.84 (.08)	
	Change to another option	15.68% (58)	19.91% (86)	22.52% (75)	19.91% (44)
	Other preferences at both	46.76% (173)	47.45% (205)	55.56% (185)	57.92% (128)
	Keeping preferences	15.14% (56)	12.50% (54)	7.51% (25)	7.69% (17)
	Change to uncertain preferences	22.43% (83)	20.14% (87)	14.41% (48)	14.48% (32)
	Chi-squared (p-value)	3.51 (.32)		0.56 (.91)	

Table 2

Descriptive Statistics of Dependent and Predictor Variables

	Range	Mean (SD) (*missing N*)		
		Time 1	**Time 2**	**Time 3**
Friendship network	0-30	5.52 (4.63)	5.37 (4.80)	4.89 (4.51)
Secondary school track preferences: grammar school	0 'Not', 1 'Yes'	.27 (.44) *(78)*	.25 (.44) *(84)*	.33 (.47) *(128)*
Secondary school track preferences: vocational secondary	0 'Not', 1 'Yes'	.25 (.46) *(78)*	.25 (.46) *(84)*	.27 (.48) *(128)*
Mean of academic achievement in Hungarian literature and Mathematics according to the last midterm review (changing covariate)	1 'Insufficient', 5 'Excellent'	3.63 (1.00) *(77)*	3.58 (0.96) *(84)*	3.56 (.90) *(124)*
Parents' highest level of education (constant covariate)				
Tertiary	0 'None of the parents completed tertiary education', 1 'At least one of the parents completed tertiary education'		.28 (.45)	(*0*)
Secondary	0 'None of the parents completed secondary education', 1 'At least one of the parents completed secondary, but none of them completed tertiary education'		.22 (0.41)	(*0*)
Self-reported ethnic identity: being Roma (constant covariate)	0 'Self-reported ethnic identity: Hungarian or other', 1 'Self-reported ethnic identity: Roma or Hungarian-Roma'	.33 (.47) *(81)*	.34 (.48) *(85)*	.35 (.48) *(124)*
Gender (constant covariate)	1 'Female', 0 'Male'	.48 (.50) *(0)*		

Notes. Total subsample of 21 school classes N=493

Descriptive statistics include the vocational secondary school track and secondary parental background because these variables are included in the online supplementary analysis.

Table 3

Random Coefficient Multilevel Siena Model Results

	Friendship dynamics				
	***θ* (SD)**	**Credible**		***p*-value**	**Varying**
		from	**to**		
Outdegree	**–2.42 (0.19)**	**-2.79**	**-2.03**	**<.01**	Yes
Reciprocity	**1.99 (0.15)**	**1.68**	**2.27**	**>.99**	Yes
Transitive triplets	**1.86 (0.11)**	**1.65**	**2.09**	**>.99**	Yes
Transitive reciprocated triplets	**-0.84 (0.11)**	**-1.06**	**-0.62**	**<.01**	Yes
Indegree popularity – sqrt	**–0.27 (0.07)**	**-0.42**	**-0.14**	**<.01**	Yes
Outdegree activity – sqrt	0.01 (0.04)	-0.07	0.09	.61	Yes
Alter attributes (altX)					
Grammar school preferences	**–0.14 (0.06)**	**-0.25**	**-0.02**	**.01**	No
Academic achievement	**0.05 (0.02)**	**0.01**	**0.09**	**.99**	No
Parental background	0.04 (0.04)	-0.04	0.12	.84	No
Covariate-ego × alter (egoXaltX)					
Grammar school preferences (H3)	**0.48 (0.15)**	**0.18**	**0.79**	**>.99**	No
Academic achievement	–0.01 (0.02)	-0.04	0.03	.33	No
Parental background	–0.09 (0.07)	-0.23	0.04	.08	No
Gender similarity	**0.4 (0.06)**	**0.28**	**0.51**	**>.99**	Yes
	Grammar school track preferences				
	***θ* (SD)**	**Credible**		***p*-value**	**Varying**
		from	**to**		
Linear shape	**-0.46 (0.15)**	**-0.79**	**-0.18**	**<.01**	No
Friends' attributes					
Friends' average grammar school track preferences (H1)	***-1.65 (1.07)***	***-3.88***	***0.36***	***.05***	No
Friends' average academic achievement	0.03 (0.38)	-0.71	0.77	.52	No
Friends' average parental background (H2a)	**1.40 (0.71)**	**0.14**	**2.82**	**.98**	No
Friends' average parental background x student's parental background (H2b)	-0.12 (1.20)	-2.49	2.29	.46	No
Individual attributes					
Academic achievement	**0.62 (0.19)**	**0.26**	**1.01**	**>.99**	No
At least one parent has tertiary-level education	***0.63 (0.35)***	***-0.04***	***1.29***	***.96***	No
Being a girl	0.05 (0.27)	-0.46	0.59	.57	No
Being Roma	0.10 (0.38)	-0.63	0.85	.59	No

Notes. θ = posterior means, SD = posterior standard deviation, p-value =one-sided posterior p-values testing whether the parameter is positive or negative. Values close to 1 indicate a positive effect of the parameter, while values close to 0 indicate a negative effect. In contrast to the frequentist approach, p-values here are intended to serve as guidelines rather than definitive cutoffs. We evaluated the results according to the following thresholds: **p>=.975, p<=.025 for strong evidence** and ***.975>p>=.95, .025<p<=.05 for weaker evidence***

Appendices

Appendix A

School class friendship network characteristics over the three waves

		Density			Participation rate			Jaccard similarity index		Composition change (%)	
		Time						Period (Time t to time t+1)			
Network	Size	1	2	3	1	2	3	1 to 2	2 to 3	1 to 2	2 to 3
#1	19	.36	.43	.33	95%	94%	100%	.60	.39	3%	12%
#2	31	.27	.29	.30	100%	94%	79%	.41	.50	2%	3%
#3	33	.19	.24	.26	89%	100%	90%	.42	.40	7%	11%
#4	32	.25	.29	.21	87%	90%	93%	.54	.50	3%	7%
#5	22	.34	.36	.43	95%	89%	84%	.49	.56	14%	3%
#6	17	.21	.24	.38	100%	100%	88%	.36	.44	0%	3%
#7	19	.29	.32	.33	100%	94%	100%	.69	.61	0%	12%
#8	27	.29	.24	.24	96%	100%	91%	.52	.48	5%	14%
#9	28	.31	.32	.42	100%	92%	75%	.47	.60	8%	10%
#10	19	.25	.33	.29	94%	94%	86%	.34	.59	15%	10%
#11	21	.22	.26	.43	95%	94%	100%	.45	.37	11%	6%
#12	31	.25	.30	.31	77%	90%	77%	.51	.54	3%	7%
#13	19	.53	.38	.48	94%	100%	94%	.48	.34	6%	6%
#14	19	.26	.20	.29	100%	94%	89%	.51	.41	5%	0%
#15	24	.25	.42	.43	96%	95%	90%	.51	.39	9%	5%
#16	19	.32	.49	.55	100%	94%	87%	.67	.27	12%	12%
#17	26	.20	.23	.27	96%	95%	100%	.32	.56	9%	7%
#18	18	.27	.20	.29	100%	80%	100%	.46	.35	3%	10%
#19	21	.33	.40	.44	87%	90%	79%	.72	.64	9%	11%
#20	27	.30	.25	.44	89%	96%	100%	.59	.49	8%	12%
#21	21	.39	.36	.39	100%	100%	94%	.54	.53	11%	3%

Notes: Time 1, Time 2, Time 3: the three data collection waves included in the present study. **Network sizes** refer to the total number of students who were part of a school class in at least one wave. Since class compositions were still subject to change between waves, the **composition change** measures the proportion of students leaving the class or arriving as new students between two waves. This is calculated as a percentage of the number of students who attended the class in either of the two waves. **Participation rates** refer to the percentage of students who attended a specific school class in a given wave and agreed to fill out the questionnaire, relative to the total number of students present in the class during that wave. **Density** refers to the number of friendship nominations as a proportion of the possible (between participating students) friendship nominations in a specific wave excluding self-nominations. The Jaccard indices show the proportion of ties that are stable across two waves over all ties (Snijders et al. 2024a). In this study, only the response 'A good friend of mine' (value 5) was considered a friendship tie; responses from 1 to 4 on the scale indicated varying levels of liking or disliking and were not treated as friendships (1: I would never be friends with them, 2: I don't like them, 3: Neutral, indifferent, 4: I like them). Total N=493

Appendix B

Model Specification: Effects for Friendship Dynamics

Effect name (RSiena effect name)	Modelling the tendency of creating and maintaining friendship ties… (example for grammar school track preferences)
Structural effects	
Outdegree (density)	**in general (as an intercept)**
Reciprocity (recip)	**by reciprocating friendship ties**
Transitive triplets (gwespFF)	**with friends of friends**
Interaction between reciprocity and transitive triplets	**with friends of friends who also nominate ego**
Indegree popularity – sqrt (inPopsqrt)	**with those actors who have more/fewer incoming ties**
Outdegree activity – sqrt (outActsqrt)	**when already having more/fewer ties**
Alters' attributes (altX)	
Preferences	**with those who prefer the grammar school track**
Academic achievement	**with those who have higher academic achievement**
Parental background	**with those who have at least one parent with tertiary education**
Similarity (egoXaltX)	**based on the interaction between ego's and alters' attributes: capturing the tendency for individuals (egos) with a high score on an attribute to form or maintain ties with others (alters) who also have high scores on that attribute, measured by the product of an actor's attribute and the sum of the attributes of connected**
Preferences (H3)	**students preferring grammar school with others who prefer grammar school**
Academic achievement	**high-achieving students with others who are also high-achieving**
Parental background	**students with a parent holding tertiary education with others who also have a parent with tertiary education**
Gender similarity (simX)	**based on gender similarity measured by the centered similarity scores between an actor and those to whom that actor is tied to**

Notes. Own edition, based on Snijders et al. (2024a)

Appendix C

Model Specification– Effects for Behavior Dynamics

Effect name (RSiena effect name)	**Modelling the tendency of… (examples for grammar school track preferences and tertiary parental background)**
Linear (linear)	changes to and from grammar school track preferences over time
Average alter (friendship) (avAlt) (H1)	changing preferences to and from grammar school track based on friends' average preferences
Alters' (friendship) average parental background (avXAlt) (H2a)	changing preferences to and from grammar school track based on friends' average parental background (cross-influence between behaviors)
Alters' (friendship) average academic achievement (avXAlt)	changing preferences to and from grammar school track based on friends' average academic achievement (cross-influence between behaviors)
Ego's academic achievement (effFrom)	changing preferences to and from grammar school track based on own academic achievement
Tertiary parental background (effFrom)	changing preferences to and from grammar school track based on own parental tertiary education
Being a girl (effFrom)	changing preferences to and from grammar school track based on gender
Being Roma (effFrom)	changing preferences to and from grammar school track based on ethnicity
Interaction between alters' average parental background and Ego's parental background (H2b)	changing preferences to and from grammar school track based on friends' parental background when having tertiary-educated parents

Notes. Own edition, based on Snijders et al. (2024a)

Online Supplementary document

Table 1

Average Dyadic Similarities among Friends and Non-friend Classmates in the Included and Excluded School Classes

		Average dyadic similarities among friends (non-friend classmates)		
		T1	**T2**	**T3**
Classes included in the analysis				
Educational preferences	Grammar school track	**.58 (.62)*** **	.63 (.62)	**.64 (.61)** **
	Vocational secondary school track	.59 (.60)	.60 (.58)	.57 (.57)
	Uncertain preferences	.51 (.53)	.54 (.54)	.68 (.68)
Parental education	Tertiary	**.67 (.64)***	**.66 (.63)** **	.66 (.64)
	Secondary	.67 (.68)	.67 (.68)	**.64 (.67)** **
Classes not included in the analysis				
Educational preferences	Grammar school track	**.66 (.72)*** **	.68 (.70)	**.68 (.64)** **
	Vocational secondary school track	.59 (.56)	.54 (.56)	.55 (.54)
	Uncertain preferences	.53 (.52)	.58 (.57)	.71 (.70)
Parental education	Tertiary	**.69 (.65)***	**.71 (.67)** **	**.74 (.69)*** **
	Secondary	.69 (.67)	**.69 (.66)** **	.66 (.64)

Notes. Average dyadic similarities range between 0 and 1 and are the mean of dyadic similarities computed for each dyad. Dyadic similarity measures the absolute difference between ego's (sender of a tie) and alter's (receiver of a tie) attributes, divided by the range of values and subtracted by 1 (Snijders et al., 2024).
P-values were obtained from Mann-Whitney tests comparing the average dyadic similarities among friends and non-friend classmates. Significant results indicate that there is enough proof to accept that the average similarities are different for friends and classmates. ***p<0.001, **p<0.01, *p<0.05

Table 2

Random Coefficient Multilevel Siena Model Results excluding Friends' Parental Background and/or the Interaction Effect Part 1 (Social Selection)

Network dynamics	Model 1				Model 2				Varying
	θ (SD)	Credible from	Credible to	*p*-value	θ (SD)	Credible from	Credible to	*p*-value	
Outdegree	**-2.41 (.19)**	**-2.79**	**-2.03**	**<.01**	**-2.40 (.21)**	**-2.79**	**-1.96**	**<.01**	Yes
Reciprocity	**1.91 (.14)**	**1.63**	**2.21**	**>.99**	**1.97 (0.16)**	**1.68**	**2.31**	**>.99**	Yes
Transitive triplets	**1.83 (.10)**	**1.63**	**2.04**	**>.99**	**1.85 (0.11)**	**1.64**	**2.09**	**>.99**	Yes
Transitive reciprocated triplets	**-0.80 (0.11)**	**-1.02**	**-0.58**	**<.01**	**-0.83 (0.12)**	**-1.07**	**-0.67**	**<.01**	Yes
Indegree popularity – sqrt	**-0.25 (0.07)**	**-0.39**	**-0.12**	**<.01**	**–0.27 (0.07)**	**-0.43**	**-0.13**	**<.01**	Yes
Outdegree activity – sqrt	0.01 (0.04)	-0.07	0.09	0.58	0.01 (0.04)	-0.07	0.09	0.59	Yes
Alter attributes (altX)									
Grammar school preferences	-0.09 (0.06)	-0.21	0.02	0.06	**–0.14 (0.06)**	**-0.25**	**-0.02**	**0.01**	No
Academic achievement					**0.05 (0.02)**	**0**	**0.09**	**0.99**	No
Parental background					0.04 (0.04)	-0.04	0.12	0.85	No
Covariate-ego × alter (egoXaltX)									
Grammar school preferences (H3)	**0.49 (0.15)**	**0.2**	**0.8**	**>.99**	**0.47 (-0.14)**	**0.2**	**0.76**	**>.99**	No
Academic achievement					–0.01 (-0.02)	-0.04	0.03	0.33	No
Parental background					**–0.09 (0.07)**	**-0.23**	**0.04**	**0.09**	No
Gender similarity	**.39 (.06)**	**0.28**	**0.5**	**>.99**	**0.39 (0.06)**	**0.28**	**0.51**	**>.99**	Yes

Notes. θ = posterior means, SD = posterior standard deviation, p-value =one-sided posterior p-values testing whether the parameter is positive or negative. Values close to 1 indicate a positive effect of the parameter, while values close to 0 indicate a negative effect. In contrast to the frequentist approach, p-values here are intended to serve as guidelines rather than definitive cutoffs. We evaluated the results according to the following thresholds: **p>=0.975, p<=0.025 for strong evidence** and ***0.975>p>=0.95, 0.025<p<=0.05 for weaker evidence***

Table 3

Random Coefficient Multilevel Siena Model Results excluding Friends' Parental Background and/or the Interaction Effect Part 2 (Social Influence)

Behavior (Educational preferences) dynamics	Model1				Model 2				Varying across classes
	θ (SD)	Credible from	Credible to	p-value	*θ* (SD)	Credible fro	Credible to	p-value	
Linear shape	**-0.46 (0.14**	**-0.73**	**-0.19**	**<.01**	**–0.50 (0.14**	**-0.78**	**-0.22**	**<.01**	No
Friends' average grammar school track preferences (H1)	-1.43 (1.00	-3.56	0.38	0.06	– 1.33	-3.28	0.47	.07	No
Friends' average academic achievement					0.04 (0.34	-0.65	0.69	.55	No
Friends' average parental background (H2a)					**1.52 (0.69**	**0.23**	**2.89**	**.99**	No
Friends' average parental background x student's parental									No
Academic achievement	**0.63 (0.17**	**0.30**	**0.98**	**>.99**	**0.61 (0.17**	**0.28**	**0.97**	**>.99**	No
At least one parent has tertiary-level education	**0.67 (0.30**	**0.07**	**1.26**	**0.99**	0.53 (0.31	-0.08	1.14	.96	No
Being a girl	-0.05 (0.27	-0.54	0.50	0.50	0.06 (0.27	-0.47	0.59	.59	No
Being Roma	-0.24 (0.36	-0.94	0.45	0.25	0.14 (0.40	-0.66	0.92	.63	No

Notes. θ = posterior means, SD = posterior standard deviation, p-value =one-sided posterior p-values testing whether the parameter is positive or negative. Values close to 1 indicate a positive effect of the parameter, while values close to 0 indicate a negative effect. In contrast to the frequentist approach, p-values here are intended to serve as guidelines rather than definitive cutoffs. We evaluated the results according to the following thresholds: **p>=0.975, p<=0.025 for strong evidence** and ***0.975>p>=0.95, 0.025<p<=0.05 for weaker evidence***

Table 4

Random Coefficient Multilevel Siena Model Results for Grammar and Vocational Secondary School Tracks With Friends' Parents' Tertiary- and Secondary-Level Education Part 1 (Social Selection)

Network (friendship) dynamics	Grammar school track				Vocational secondary school				Varying across classes
	θ (SD)	Credible from	Credible to	*p*-value	θ (SD)	Credible from	Credible to	*p*-value	
Outdegree	**-2.44**	**-2.80**	**-2.04**	**<.01**	**-2.39**	**-2.75**	**-2.00**	**<.01**	Yes
Reciprocity	**2.00**	**1.70**	**2.30**	**>.99**	**1.97**	**1.70**	**2.27**	**>.99**	Yes
Transitive triplets	**1.86**	**1.65**	**2.09**	**>.99**	**1.84**	**1.64**	**2.09**	**>.99**	Yes
Transitive reciprocated	**-.86**	**-1.08**	**-.63**	**<.01**	**-.83**	**-1.08**	**-0.63**	**<.01**	Yes
Indegree popularity – sqrt	**-.28**	**-.42**	**-.13**	**<.01**	**.01**	**-.43**	**-.14**	**<.01**	Yes
Outdegree activity – sqrt	.01 (.04)	-.07	.09	.63	**-.27**	-.07	.09	0.60	Yes
Alters' preferences	**-.13**	**-.25**	**-.01**	**.02**	**.14**	**.03**	**.26**	**.99**	No
Preferences ego × alter	**.48 (.15)**	**.19**	**.79**	**>.99**	**.31**	**.01**	**.60**	**.98**	No
Alter's academic	**.05 (.02)**	**.004**	**.09**	**.98**	**.04**	**-.005**	**.08**	**.96**	No
Academic achievement ego × alter (egoXaltX)	-.01 (.02)	-.04	.03	.38	<.001 (.02)	-.03	.03	.51	No
Alter`s parental background									
Tertiary	.04 (.05)	-.05	.13	.82	.03	-.05	.12	.76	No
Secondary	.01 (.05)	-.08	.10	.60	.01	-.08	.10	.55	No
Parental background: ego × alter (egoXaltX)									
Tertiary	-.08	-.21	.06	.12	-.07	-.21	.07	.18	No
Secondary	-.14	-.33	.06	.07	-.15	-.34	.05	.07	No
Gender similarity	**.40 (.06)**	**.28**	**.52**	**>.99**	**.40**	**.29**	**.51**	**>.99**	Yes

Notes. θ = posterior means, SD = posterior standard deviation, p-value =one-sided posterior p-values testing whether the parameter is positive or negative. Values close to 1 indicate a positive effect of the parameter, while values close to 0 indicate a negative effect. In contrast to the frequentist approach, p-values here are intended to serve as guidelines rather than definitive cutoffs. We evaluated the results according to the following thresholds: **p>=0.975, p<=0.025 for strong evidence** and ***0.975>p>=0.95, 0.025<p<=0.05 for weaker evidence***
These models excluded ethnicity as parameters failed to converge in the influence part. For the third track (non-secondary vocational school), models did not converge, and preferences were nearly absent in many school classes (in 14 of 21 classes), student numbers were below two.

Table 5

Random Coefficient Multilevel Siena Model Results for Grammar and Vocational Secondary School Tracks With Friends' Parents' Tertiary- and Secondary-Level Education Part 2 (Social Influence)

Behavior (Educational preferences) dynamics	**Grammar school track**				**Vocational secondary school track**				**Varying across classes**
	θ **(SD)**	**Credible**		**p-value**	θ **(SD)**	**Credible**		***p*-value**	
		from	**to**			**from**	**to**		
Linear shape	**-.53 (.15)**	**-.82**	**-.24**	**<.01**	**-.45 (.13)**	**-.72**	**-.19**	**<.01**	No
Friends' average aspirations (H1)	***-1.70 (1.11)***	***-4.15***	***.34***	***.05***	**-3.41 (1.40)**	**-6.71**	**-1.08**	**<.01**	No
Friends' average academic	.10 (.37)	-.63	.83	.61	-.09 (.32)	-.72	.52	.39	No
Friends' average parental background (H2a)									
Tertiary	1.20 (.82)	-.40	2.84	.93	-.54 (.84)	-2.19	1.16	.25	No
Secondary	-.80 (1.02)	-2.90	1.14	.21	1.23 (.97)	-.64	3.17	.90	No
Academic achievement	**.64 (.20)**	**.26**	**1.08**	**>.99**	.01 (.16)	-.29	.32	.53	No
Parents' highest education level									
At least one parent with tertiary-level education	.43 (.37)	-.28	1.16	.89	-.19 (.37)	-.92	.53	.30	No
At least one parent with secondary-level education	-.30 (.39)	-1.11	.44	.22	.51 (.33)	-0.13	1.16	.94	No
Being a girl	.13 (.30)	-.45	.71	.66	.17 (.28)	-.37	.72	.74	No

Notes. θ = posterior means, SD = posterior standard deviation, p-value =one-sided posterior p-values testing whether the parameter is positive or negative. Values close to 1 indicate a positive effect of the parameter, while values close to 0 indicate a negative effect. In contrast to the frequentist approach, p-values here are intended to serve as guidelines rather than definitive cutoffs. We evaluated the results according to the following thresholds: **p>=0.975, p<=0.025 for strong evidence** and ***0.975>p>=0.95, 0.025<p<=0.05 for weaker evidence***
These models excluded ethnicity as parameters failed to converge in the influence part. For the third track (non-secondary vocational school), models did not converge, and preferences were nearly absent in many school classes (in 14 of 21 classes), student numbers were below two).