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Tamás Keller

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No evidence of direct peer influence in upper-secondary track choice—evidence from Hungary

Tamás Keller [a,b,c]

[a]Computational Social Science – Research Center for Educational and Network Studies, Centre for Social Sciences, Budapest, Hungary; [b]Institute of Economics, Centre for Economic and Regional Studies, Budapest, Hungary; [c]TÁRKI Social Research Institute, Budapest, Hungary

ABSTRACT

This paper investigates direct peer influence in upper-secondary track choice in the stratified and selective Hungarian educational system and makes two contributions to the literature. First, it tests both peer-contrasting and peer-conforming influences by considering peers' GPA and endogenous educational choices. Second, the paper investigates mechanisms behind peer-conforming educational choices (such as peers' normative pressure and information potential), with a focus on two structurally different peer relationships: self-selected friends and randomly assigned deskmates. The study uses a unique dataset that merges administrative data with randomized field experiment data. The results show no evidence of peer influence, after accounting for unobserved classroom homogeneity. Within the classroom, peers' ability did not decrease, and peers' ambitious endogenous educational choices did not increase students' own choice of the academic upper-secondary track. Concerning the mechanisms of peer-conforming educational choices, the results reveal that peers' informational potential (but not their normative pressure) might be the mechanism that drives students to conform to peers' choices. Thus, the absence of peer influence may contribute to the reproduction of pre-existing social inequalities in upper-secondary track choices since peer influence cannot derail students' socially determined educational choices in Hungary..

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CONTACT Tamás Keller keller.tamas@tk.hu Computational Social Science – Research Center for Educational and Network Studies, Centre for Social Sciences, Tóth Kálmán utca 4, Budapest 1097

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Introduction

Peers have a dominant influence on students' educational choices (Anelli and Peri 2019; Buchmann and Dalton 2002; Fletcher 2012, 2015; Jonsson and Mood 2008; Lyle 2007; Rosenqvist, 2018; Zölitz and Feld 2021). In this regard, contrast and conformity are two different types of direct, peer-to-peer influence (Kelley 1952).

On the one hand, students are discouraged by able peers' ambitious educational choices, and they contrast their own choices with able peers' educational choices. This leads to a *negative* relationship between peers' abilities and students' educational choices (Alwin and Otto 1977; Davis 1966).

On the other hand, students also conform to their peers' ambitious educational choices; they are encouraged by peers' ambitious choices, which translates into a *positive* relationship between students and their peers' endogenous educational choices (De Giorgi *et al.* 2010; Lyle 2007). Thus, peers both discourage and encourage students' educational choices, leading to peer influences that operate in opposite directions (Rosenqvist 2018).

Students may *contrast* with their peers' educational choices, as being surrounded by many able peers with ambitious educational plans causes a feeling of inferiority and decreases self-confidence (Marsh and Parker 1984), discouraging students from making ambitious educational choices (Davis 1966; von Keyserlingk *et al.* 2020).

Students may *conform* to their peers' educational choices due to two different mechanisms: normative and informative peer influence (Deutsch and Gerard 1955). Normative influence originates from students' desires for interpersonal attachments and needs for belonging, motivating students to conform to their peers' educational choices (Baumeister and Leary 1995). The informational influence is based on the acceptance of information obtained from peers (Abrams and Hogg 1990). Peers' informational potential can trigger peer-conforming educational choices, as receiving relevant information from peers about educational tracks or potential schools to apply to may prompt undecided students to imitate their peers' educational choices (Fletcher 2012).

Previous studies have been unable to disentangle the normative and informative mechanisms behind students' peer-conforming, endogenous educational choices. These studies have mostly relied on a single peer group that can simultaneously channel both the normative and

informative influence. For example, Rosenqvist (2008) defined peers as all students within the same school and cohort, and was therefore not able to analyze the different mechanisms behind peer-conforming educational choices. Consequently, there is limited knowledge about how and why students conform to their peers' educational choices.

This ignorance is problematic, since the normative and informative mechanisms require different policy interventions. If peers normatively influence students, then students' interpersonal attachments should be targeted as a policy goal. By contrast, if peers' informational potential leads to peer-conforming educational choices, policies should foster students' access to relevant information that guides them in their choices.

This paper contributes to the literature on peer effects in educational choices in several respects. First, I jointly test the two types of direct peer-to-peer influence (contrast and conformity)—an approach that has rarely been used before (Rosenqvist 2018).

Second, this paper demonstrates a way to disentangle the normative and informational mechanisms within peer-conforming educational choices by relying on two (instead of one) specific and structurally different peer groups: friends (who might exert normative pressure) and deskmates (who might have an informational potential). It is assumed that friends' peer influence and deskmates' peer influence differ from each other. This difference provides a means to disentangle the normative and informative mechanisms behind peer-conforming educational choices.[1]

Third, the paper analyzes peer influence in upper-secondary track choice (Jonsson and Mood 2008; Keller *et al.* 2022; Rosenqvist 2018). Most previous studies on educational choices have focused on choices after compulsory education (Alwin and Otto 1977; Arcidiacono and Nicholson 2005; Lyle 2007; Mayer 2002; Sacerdote 2001; Zölitz and Feld 2021).

Fourth, I use students' application behavior as an outcome variable (their submitted choices of secondary schools). This outcome has received little scrutiny despite its importance. Prior literature has examined peer influence in students' application intentions (Alwin and Otto 1977; Mayer 2002), college enrollment (Fletcher 2012, 2015), major choice (Lyle 2007; Sacerdote 2001; Zölitz and Feld 2021), or the choice of area of specialty (Arcidiacono and Nicholson 2005).

[1]Empirical evidence supporting this assumption for Hungary can be found in the section on institutional background.

Fifth, I compare students' application behavior within the same classroom by deploying classroom fixed effects to control for group-level unobservables (Fletcher 2015).

Sixth, the paper uses the case of Hungary as an example of a highly stratified and selective educational system (Horn, Keller, and Róbert 2016). In such educational systems, track choices are socially determined, and peers' influence may have the potential to derail them.

Prior evidence of peer influence in educational choices in Hungary is mixed. Using observational data, Buchmann and Dalton (2002) investigated peer influence by studying friends' expectations of students' achievements in math, and found that peers significantly influenced students' aspirations to enter university in Hungary. In contrast, our more recent experimental study failed to identify peer influence in upper-secondary track choice in Hungary (Keller *et al.* 2022). We showed that treated students—trained to act as ambassadors to spread factual information about upper-secondary track choices in their network—were unsuccessful at persuading their untreated classroom peers to apply to the college-bound secondary track. The contradictory nature of the empirical evidence concerning peer influence in educational choices in Hungary highlights the need for new research.

In the empirical analysis, two data sets were merged at the student level via students' personal identifiers so that unique matches could be made. Specifically, I merged peer-relationship data from a randomized field experiment with high-quality administrative data on upper-secondary school applications. The analytical sample contained data on 416 eighth-grade students from 29 classrooms and 26 schools.

The results are twofold. First, I find no direct peer-to-peer influence in students' educational choices, after considering unobserved classroom heterogeneity in the form of classroom-fixed effects. Peers' abilities did not prevent students from making ambitious educational choices, nor did peers' ambitious endogenous educational choices encourage students to make ambitious educational choices themselves.

Second, concerning the mechanisms behind peer-conforming educational choices, the study explored how peers' informational potential (but not their normative pressure) might drive students to adjust their upper-secondary track choices in line with peers' choices. The difference between the two mechanisms of peer-conforming educational choices is substantive, though peers' informational potential is part of unobserved classroom heterogeneity.

In conclusion, the absence of peer influence in educational choices within classrooms may contribute to the reproduction of pre-existing social inequalities. Socially determined educational choices in Hungary might not be derailed by peers' influence.

The two types of peer influence

Peer-contrasting educational choices

Students contrast themselves with their peers' educational choices when surrounded by high-ability peers, they make less ambitious choices, and when surrounded by low-ability peers, they make more ambitious educational choices. This contrast effect might be relate to damaged or boosted academic self-confidence. Being surrounded by more able peers causes a feeling of inferiority and a decrease in academic self-concept. By contrast, being surrounded by less able peers causes a feeling of superiority and an increase in academic self-concept. The inverse relationship between peers' ability and students' academic self-concept is referred to as the big-fish–little-pond effect (Marsh 1987; Marsh and Parker 1984). Supporting this idea, von Keyserlingk *et al.* (2020) showed on German data a small negative indirect effect of schools' mathematics achievement composition on students' aspirations and enrollment in a STEM major via mathematics self-concept.

There is empirical evidence on peer-contrasting educational choices in relation to both college plans and upper-secondary track choices.

Concerning college plans, the proportion of able students on a university campus is negatively associated with undergraduate men's high-performance career ambitions (Davis 1966). Similarly, Alwin and Otto (1977) found that school-average academic ability negatively affected students' desire to attend a four-year college or university. Meyer (1970) established a similar negative correlation between average ability at high school and students' college intentions using a sample of 518 American public high schools.

Regarding upper-secondary track choice, Jonsson and Mood (2008) found that Swedish students were less likely to opt for an academic upper-secondary school program (and more likely to choose a vocational program) when surrounded by high-achieving schoolmates in the final year of comprehensive school.

In sum, being surrounded by high-achieving students decreases the possibility of making an ambitious educational choice, while being

surrounded by low-achieving peers increases the probability of making an ambitious educational choice. This gives rise to the first hypothesis:

> H1 Peers' GPA has a *negative* effect on students' likelihood of choosing an academic-track high school as their first choice on the application list.

Peer-conforming educational choices

Students conform to their peers' educational choices if they imitate their peers' ambitious educational choices.

Several studies have documented that students tailor their educational choices to their peers' educational choices. At Bocconi, an Italian private university, a higher proportion of peers in tutorial groups choosing a major in economics instead of business led to an increase in students' own choice of economics (De Giorgi *et al.* 2010). At the US military academy West Point, Lyle (2007) found that an increase in the share of sophomore peers intending to study engineering in a company (a group of four classes) increased the likelihood of freshmen students choosing engineering as a major.

Fletcher (2015) showed that increasing a high school student's exposure to college-going peers increased students' probability of enrolling in college.

These considerations lead to a general formulation of the second hypothesis. Since students *conform* to their peers' educational choices when making their own choices, I hypothesize that:

> H2 If peers choose an academic-track high school instead of a mixed or vocational school as their first choice on the application list, this *increases* the likelihood of students choosing an academic-track high school as their first choice on the application list.

The two mechanisms of peer-conforming educational choices

Normative pressure

Normative pressure is the first mechanism through which students conform to peers' educational choices. It is fueled by the desire to maintain friendships. The motivation to maintain friendships has substantial importance, especially during adolescence (Crosnoe *et al.* 2003). Throughout this paper, I assume that over and above other peer relationships, friends exert normative pressure on students' educational choices.

While friends might exert normative pressure on students' educational choices, deskmates ought not to. Students might not conform normatively to their deskmates' educational plans since the deskmate relationship is often established by teachers and serves the purpose of arranging students to desks within the classroom.

These considerations lead to a specification of H2. Since students might want to maintain emotionally important friendship ties, they will conform to their friends' educational choices:

> H2A If *friends* choose an academic-track high school instead of a mixed or vocational school as their first choice on the application list, this increases the likelihood of students choosing an academic-track high school as their first choice on the application list.

Informational potential

Peers' informational potential is the other mechanism through which students conform to peers' educational choices. It manifests in factual information and awareness of potential institutions, schools, scholarships, or application procedures. Students might make more informed and better choices if, due to discussions with peers, a school that they had not heard of before or did not consider themselves worthy of applying to becomes a potential target school. Fletcher (2012) argues that infusions of nonredundant information that facilitate better educational choices could be a relevant policy approach to take advantage of peer preferences.

Stratified educational systems require well-informed students who can responsibly choose between the various parallel educational options available at the same level of education (Jackson, 2013). Students' demand for information has given rise to interventions providing transparent and relevant information to students in various educational systems (Barone *et al.* 2018; Bettinger *et al.* 2012; Ehlert *et al.* 2017; Kerr *et al.* 2020). This research has shown that students are sensitive to factual information when choosing between educational options.

In particular, application to upper-secondary education is a multistage process that requires well-informed students in all educational systems. For instance, providing information about the admission standards of neighboring college-bound secondary schools to Hungarian primary school students increased applications and admissions among students

who had a pre-existing interest in the academic track but were unsure of their chances of admission (Keller *et al.* 2022). These results show that students have considerable agency and can utilize new information in secondary track choices.

Students usually gather information about educational options via diverse networks and personal testimonies from older/former students or from teachers at secondary schools. Students prefer unofficial, informal communication and 'hot' knowledge over official and formal types of communication and the resulting 'cold' knowledge (Ball and Vincent 1998). Slack *et al.* (2014) showed that first-year undergraduate students gave the most credence to 'hot' knowledge from other students and friends rather than information from brochures and websites. This evidence supports the need for relevant information from peers through informal types of communication.

The informational potential of friends and deskmates may differ. Due to the homophily of friendship selection, friends are similar (Kandel 1978). Friends have similar academic orientations and educational aspirations, and they may access the same factual information about school choice (Hamm 2000). Thus, friends can encourage already established educational plans. Still, they cannot provide new dimensions to the choice by channeling new information or suggesting schools that students have not thought about before.

However, students' backgrounds and their deskmates' backgrounds often differ. Thus, deskmates can channel fresh information about educational options that would otherwise be more difficult to access (Keller and Takács 2019; van den Berg and Cillessen 2015). Furthermore, indirect or weak contacts have long been hypothesized to channel different ideas and influences through information that people do not usually have access to in their close networks (Granovetter 1973). This idea further strengthens the substantial importance of deskmate relationships as a realization of weak social ties.

These considerations lead to a further specification of H2. Since deskmates might provide students with new perspectives on school choice or suggest a school that students have not considered, I hypothesize that:

> H2B If *deskmates* choose an academic-track high school instead of a mixed or vocational school as their first choice on the application list, this increases the likelihood of students choosing an academic-track high school as their first choice on the application list.

Institutional background

Upper-secondary track choice in Hungary and the role of information

The Hungarian educational system is a tracked and stratified educational system, whereby social inequalities translate into educational inequalities (Horn, Keller, and Róbert 2016). Education is free in Hungary at all levels (including the upper-secondary and tertiary levels). This egalitarian feature of the system should provide greater scope for potential peer influences, as the financial situation of families does not constrain students' choices.

Students choose between upper-secondary school tracks at the age of 14 in the eighth year of undivided primary education, which combines general and lower-secondary education (ISCED 1 and ISCED 2 levels). Students can choose between three upper-secondary school tracks. The college-bound academic track (*gimnázium*) is associated with the greatest chance of entering college. The vocational track (*szakképző iskola*) provides vocational diplomas for those who wish to become skilled in a trade, but this diploma does not provide direct access to tertiary education. Lastly, a mixed secondary track (*technikum*) provides vocational-oriented subjects alongside general subjects, with a mix of the features of academic and vocational schools.

gThe upper-secondary track choice that students in Hungary make at the age of 14 has far-reaching consequences. First, graduating from an academic-track high school is the main gateway to tertiary education. Based on my calculations using the registry data of all university freshmen in 2015, more than 70 percent of university freshmen graduated from an academic-track high school. Second, graduating from an academic-track high school and successfully transitioning to tertiary education influences students' later life prospects. Among 25 OECD countries, the economic return from college graduation is the highest in Hungary. Young Hungarian college graduates between the ages of 25–34 earn more than twice as much as those with upper-secondary and post-secondary but non-tertiary education (OECD 2008: 173). Therefore, the upper-secondary track choice involves high stakes, and students need help making informed decisions.

Students' decisions play a crucial role in upper-secondary track choice, even though they are only 14 years old when they make that choice. In a sample of almost 10,000 students from the Hungarian Life Course Survey [HLCS] (a nationally representative sample of nearly 10,000 ninth-grade students), 67% of students reported having the final word in the choice of

secondary school. By contrast, 15% of students responded that their parents made this choice, and among the rest, parents and students had an equal influence on the choice.

Students in Hungary apply to upper-secondary education by submitting an application form in which they rank their preference for secondary schools. Students can apply to any number of secondary schools free of charge. They are admitted to the school that they most prefer and for which they fulfill the admission requirements.[2] Therefore, the upper-secondary school ranked first on the application list has particular importance.

The admission process is administered in primary schools, but the process is restricted only to keeping to deadlines. Students need to access qualitative information before composing their application list, and they (and their parents) often seek out publicly unavailable information on the environment of the secondary school—regarding teacher quality or peer composition. Furthermore, when ranking the schools to apply to, students need to know their chance of being admitted to particular schools—information that is publicly not available but might be discovered informally.

There are two semi-structured events at which students can access qualitative information about secondary schools. First, secondary schools organize open days, which eight-grade primary school students can voluntarily attend. Such open days consist of a visit to the secondary school, where students can meet students, teachers, and the head teacher. Second, the primary school organizes obligatory orientation days for students on regular school days to inform them of their track choices and help them plan their careers. Students complete tests during orientation days, informing them of their own strengths and areas of interest, which assist them in making an informed choice.

Eighth-grade Hungarian students regularly discuss their plans, exchange experiences at open days, and discuss feedback they have received at orientation days.

Deskmates' information potential

Deskmates are potential sources of information when students decide on secondary education. Survey evidence supports the qualitative argument

[2]Admission requirements vary between schools. All schools consider students' prior school grades, typically those from the seventh and eighth grades. Some schools also consider the scores that students obtain on the national admissions test in math and Hungarian. Only elite schools are allowed to organize personal interviews with students. A Gale-Shapley algorithm matches students to secondary schools (Gale & Shapley, 1962).

about deskmates' information potential: Deskmate exposure is intensive (1), it gives access to a dissimilar classroom peer (2), and normative pressure in educational choices is less relevant among deskmates than it is among friends (3).

First, students in the eighth grade spend 20 hours a week next to their deskmates in close physical proximity during all general subjects (except physical education and art lessons), which gives rise to intensive deskmate exposure. Intensive exposure to deskmates during the school day and regular cooperation during lessons provide the means for the exchange of various ideas between deskmates.

Survey evidence further demonstrates that deskmate exposure is intensive. A teacher survey I conducted in February 2022 (N = 656) showed that students in most classrooms have regular deskmate activities (95% of teachers reported weekly activities, and 61% reported daily activities among deskmates). The three most common deskmate activities were helping each other learn, working together, and developing social skills. Nearly 80% of teachers reported facilitating each of these activities at least every week.

Second, deskmate exposure provides access to a dissimilar classroom peer, as students' abilities and behavior at the desk level are often not the same. Another teacher survey I conducted in Summer 2021 among Hungarian teachers (N = 413) showed that teachers who employed seating charts in their classroom intentionally placed high-ability and low-ability students at the same desk (39%), as well as well-behaved and badly-behaved students (55%).[3] Ultimately, such discordant seating might foster access to diverse deskmates with differing educational plans.

Third, normative pressure in educational choices is less relevant among deskmates than among friends, as the results of a student survey I conducted in Spring 2022 among eighth-grade students (N = 430) revealed.[4] Students monitor their friends' track choices more than those of their deskmates'. For example, 63% of students could recall the particular secondary school their friends applied to. This ratio is 56 percentage points lower for deskmates' track choices. Thus, only 7% of

[3]71% of teachers employed seating charts, mostly (88%) determined by the teacher and not by students.

[4]This is a post-hoc survey, conducted four years after completing the fieldwork for this current survey among different eight-grade students to explore the qualitative differences between deskmates and friends' influence.

students could recall a secondary school from their deskmates' application list.

Furthermore, almost every third student (32.8%) applied to the same secondary school as their friends[5], but the applied-for secondary schools matched by only 2% and 8% between students and deskmates and students and random classmates, respectively. These figures indicate that students might adjust their application in line with their friends' applications, but they do not do so with deskmates or random classmates.

In sum, the facts that students can recall their friends' educational choices (1) and friends tend to apply to the same secondary school (2) reflect the normative importance of friends' (but not deskmates') track choices.

By contrast, the same survey results revealed that both students and deskmates are a significant source of information in track choice. 52% of students regularly talked to their friends about secondary track choices. This ratio is slightly lower (12 percentage points) between students and deskmates but much lower between students and a random classmate (41 percentage points lower).

Similarly, 48% of students received information about secondary track choices from their friends, while 40% of students received information from their deskmates (the difference between the two figures is only marginally significant $p = 0.072$). However, classmates' informational potential is dramatically different: Only 15% of students reported that a random classmate informed them concerning secondary school choice (a 33% difference compared to friends—a statistically highly significant difference, $p < 0.001$).

In sum, friends and deskmates are significant sources of information concerning students' track choices. However, since deskmates' and students' backgrounds are dissimilar while friends' and deskmates' backgrounds are similar, students might access different information from friends than deskmates.

The survey data (with analysis scripts) mentioned in this section are publicly available on the OSF platform: https://osf.io/7ednb/.

Materials and methods

Data

A unique data set was used, merging field experiment data on peer relationships with registry data on application behavior. Both data sets

[5]This means that students and their friends shared at least one school on their application lists.

contain information about the same students concerning the academic year 2017/2018.

The field experiment data were taken from a larger field experiment conducted in 2017 in 195 third-to-eighth-grade classrooms in 41 Hungarian primary schools. Here, I randomized classroom-seating charts, and students were seated accordingly during the entire semester (five months from the beginning of September 2017 until the end of January 2018). Since students choose upper-secondary schools in the eighth grade, all eighth-grade classrooms from that field experiment were used.

Participating schools in the field experiment were not representative of eighth-grade students in Hungary. Most participating schools were from deprived rural areas of the country. No school was included from Budapest, the capital city.[6]

Students' outcome data were obtained from the registry of the Hungarian Educational Authority about applications to secondary schools in Spring 2018. The registry stores all upper-secondary schools indicated by students on their application lists. Since students' grades serve as admission standards for secondary schools, the registry data also contain students' grades for various subjects.

The field experiment data was merged with the registry data via students' IDs, identifying students in both data sets to enable unique matching. Out of the 467 eighth-grade students in the field experiment, 416[7] students (89%) appeared in the registry data. The analytical sample consisted of these students from 29 classrooms and 26 schools.

The data and analysis scripts are publicly available on the OSF platform: https://osf.io/7ednb/.

Student-level variables

All student-level variables (educational choices and GPA) were sourced from the registry data.

[6]The field experiment recruited schools from seven contiguous counties of central Hungary. Schools that voluntarily participated in the field experiment were mostly village schools, probably due to the requirements for participation; schools gave their consent to adopt a seating chart designed by the researchers rather than school-teachers. Furthermore, participating in such a project may have been more attractive for village schools (which perhaps were more appreciative of working with a Budapest-based research group) than larger schools in urbanized areas.

[7]Students may have been missing from the educational authority's registry database for three reasons: First, if they had not applied to secondary education (the current regulation allows this if students are older than 16 years old). Second, if the student ID that identifies them in the registry data provided by the school was erroneous (these two reasons cannot be disentangled, but together there were a total of 28 students missing for these two reasons). Third, students' data may have been missing if parents had not consented to the school providing the student's ID which identifies them in the registry data (N = 23).

The outcome variable (Y) is a binary variable that indicates whether the secondary school that students chose in first place on their application list was an academic-track high school (= 1) or a mixed or vocational school (= 0). The variable measures the applications students submitted through the application procedure in Spring 2018.

Students' seventh-year GPA is the mean of nonmissing grades from the following subjects: Hungarian literature (reading class), Hungarian language (writing class), mathematics, foreign language, history, biology, chemistry, geography, physics, and informatics.

Peer relationships

Data about students' peer relationships was taken from the field experiment. The field experiment randomized students to free-standing, front-facing, two-person desks arranged in a grid layout within each classroom. Since the rows and columns of desks were separated by aisles, every student had only one deskmate. There were no students without a deskmate. Compliance with the intended seating chart was 76% in the analytical sample at the end of the intervention.

Students' friendship relationships were measured in a 45-minute in-class survey, which was the endline survey of the field experiment. The survey was conducted in Spring 2018, so students answered the survey when they were applying to secondary schools. Students could nominate up to five of their 'best friends' in the classroom by answering the following question: 'Please think of your best friends in your class. In the table below, write down who your 5 best friends are in the class. If you have fewer than 5 friends in your class, then write fewer names in the table.' Twelve percent of students did not indicate having any friends.

Students' deskmates did not appear among their friends in 71% of cases, while in the remaining 29% students indicated their deskmate among their five best friends. Thus, in most cases, deskmates and friends did not coincide.

Peer influence

Peer-contrasting social influence was operationalized by peers' GPA. Since there were two particular peer relationships (deskmates and friends), the following definitions were employed: First, the deskmate's GPA is equal to the student's (unique) deskmate's GPA. Second, friends' GPA is the average of friends' seventh-grade GPA.

Peer-conforming social influence was operationalized by peers' endogenous outcome (Y), which indicates whether the secondary school that peers chose in the first place on the application list was an academic-track high school (= 1) or a mixed or vocational school (= 0). Students' deskmate's endogenous educational choice was defined as 1 if the deskmate opted for an academic-track high school and 0 otherwise. Students' friends' endogenous educational choice was 1 if at least one of the listed friends had chosen an academic-track high school as their first choice on their application list, and 0 otherwise.

Classroom fixed effects

Beyond direct, peer-to-peer influence, group-level unobserved variables might simultaneously influence students' and peers' educational choices (Fletcher 2015; Lauen 2007). Using Manski's (1993) terminology, 'correlated effects' (the third effect besides contextual and endogenous effects) originate in the same institutional environment, which simultaneously influences students' and peers' educational choices. Such effects go beyond the impact of direct peer-to-peer interactions.

At least three specific features might explain why classroom-level unobservables affect students' school choices: social and economic disadvantage, academic pressure, and peers' average quality (Lauen 2007). For example, around primary schools in economically and socially disadvantaged regions, there are fewer high-quality schools to apply to, shrinking students' choice options. Furthermore, concerning the academic pressure, in primary schools where teachers set high academic expectations for students, students have higher motivation to apply to high-quality secondary schools, and they also have higher chances of being admitted. Lastly, peers' average background and aspirations in the classroom also influence students' choices—without an interpersonal direct peer-to-peer characteristic. Unobserved classroom fixed effects might contain and capture these influences.

Descriptive statistics

Table 1 shows descriptive statistics for the variables in the analysis.

Deskmates' descriptives are the same as students' descriptives since students and deskmates are paired, and thus students are deskmates.

Since students' deskmates were randomized, Table A1 in the Appendix shows the balance in the baseline covariates (the association between

students' and their deskmates' baseline characteristics). Students' and randomly allocated deskmates' baseline characteristics are not correlated. Thus the analytical sample is well balanced.

Due to randomization, students' and their deskmates' baseline characteristics are more dissimilar than students' and their friends' baseline characteristics. For example, there is no within-classroom correlation between students' and their deskmates' baseline GPA (coeff. = 0.033, p = 0.341) (see Table 1A), but the within-classroom correlation between students' and their friends' baseline GPA is positive and statistically significant (coeff. = 0.368, p = 0.003). These figures confirm that deskmates and students are more dissimilar than friends and students.

Statistical methods

The following classroom-fixed-effect linear probability model assesses the described hypotheses:

$$Y_{i,c,s} = \beta_0 + \beta_1 GPA_{f,c,s} + \beta_2 Y_{fc,s} + \beta_3 GPA_{dm,c,s} + \beta_4 Y_{dm,c,s} + \beta_5 GPA_{i,c,s} + \beta_6 Female_{i,cs} + \eta_{c,s} + \epsilon_{i,c,s} \quad (1)$$

where $Y_{i,c,s}$ indicates whether the i-th student in classroom c and school s chose an academic-track high school (= 1) or a mixed or vocational school (= 0) as their first choice on their application list in the eighth grade. The variable $GPA_{i,c,s}$ indicates the i-th student's seventh-grade GPA. The variable $Female_{i,c,s}$ is 1 if the student is female and 0 if the student is male. The notation f indicates friends, while the notation dm indicates deskmates. The variable $\eta_{c,s}$ refers to classroom-fixed effects and $\epsilon_{i,c,s}$ is the individual error term.

The coefficients β_1 and β_3 identify the effect of self-selected friends' GPA and randomly allocated deskmates' GPA, respectively, and test the peer-contrasting educational choice (H1).

Table 1. Descriptive statistics

	Mean	SD	*N*
Students	0.28	0.45	416
Academic-track high school selected as first choice			
GPA	3.45	0.92	416
Girl	0.49	0.50	416
Has no friends	0.12	0.32	416
Friends (average of five best friends)	0.63	0.48	368
Academic-track high school selected as the first choice			
GPA	3.56	0.65	368

The coefficient β_2 identifies the effect of self-selected friends' endogenous outcomes and tests peer-conforming educational choice utilizing friends' normative pressure (H2A).

The coefficient β_4 identifies the effect of the random deskmate's endogenous outcome and tests peer-conforming educational choice utilizing the deskmate's informational potential (H2B).

Classroom-fixed effects ($\eta_{c,s}$) rule out the potential impact of correlated effects (such as classroom-level unobservables) in the institutional environment that influence students' and peers' educational choices beyond direct peer-to-peer interactions.

The standard errors are clustered at the school level to adjust unobserved components in students' outcomes within the same schools. This adjustment was necessary since schools (rather than classrooms) were invited to participate in the study when the sample was recruited (Abadie *et al.* 2017).[8]

Results

Table 2 shows the results of the regression analysis, in which Panel A and Panel B contain the estimations without and with classroom-fixed effects, respectively.

Peer-contrasting educational choices—testing H1

The results do not support H1, since in Panel A neither friends' GPA (Model 1, $\beta_1 = 0.059$, $p = 0.077$) nor deskmates' GPA (Model 2, $\beta_3 = -0.032$, $p = 0.259$) significantly affected students' choice of an academic-track high school. The coefficients do not change in Panel B for friends (Model 4, $\beta_1 = 0.064$, $p = 0.100$) or for deskmates (Model 5, $\beta_3 = -0.020$, $p = 0.482$) when incorporating group-level unobservables in the form of classroom-fixed effects.

The direction of statistically insignificant peer influence concerning friends' and deskmates' GPA is different. While friends' GPA has a positive influence (β_1) on students' educational choices, deskmates' GPA has a negative (β_3) influence. In Model 3, the corresponding F-test of the difference between friends' and deskmates' GPA-effect shows that the two coefficients differ statistically ($F = 5.16$; $p = 0.032$). A possible substantial interpretation is that students only contrast their peers'

[8]In most cases, however, one single classroom participated from a given school in this study.

Table 2. Regression results

PANEL A: Models without classroom-fixed effects, SE clustered at the classroom level			
	(1)	(2)	(3)
Friends' GPA [β_1]	0.059		0.046
	(0.032)		(0.030)
Friends applied [β_2]	0.050		0.049
	(0.042)		(0.038)
DM's GPA [β_3]		−0.032	−0.041
		(0.027)	(0.028)
DM applied [β_4]		0.174**	0.167**
		(0.059)	(0.058)
Own GPA [β_5]	0.283**	0.298**	0.280**
	(0.022)	(0.022)	(0.020)
Female [β_6]	0.012	0.025	0.012
	(0.030)	(0.032)	(0.030)
Classroom-fixed effects [η_{cs}]	No	No	No
Constant	Yes	Yes	Yes
Observations	416	416	416
R-squared	0.412	0.422	0.429
PANEL B: Models without classroom-fixed effects, SE clustered at the school level			
	(4)	(5)	(6)
Friends' GPA [β_1]	0.064		0.064
	(0.038)		(0.039)
Friends applied [β_2]	−0.059		−0.057
	(0.046)		(0.047)
DM's GPA [β_3]		−0.020	−0.020
		(0.029)	(0.030)
DM applied [β_4]		0.036	0.030
		(0.063)	(0.065)
Own GPA [β_5]	0.270**	0.272**	0.270**
	(0.022)	(0.022)	(0.022)
Female [β_6]	0.002	0.011	−0.000
	(0.032)	(0.029)	(0.033)
Classroom-fixed effects [η_{cs}]	Yes	Yes	Yes
Constant	Yes	Yes	Yes
Observations	416	416	416
R-squared	0.492	0.489	0.493

In addition to the variables listed in the table, Model 1, Model 3, Model 4, and Model 6 contain a dummy variable indicating whether students listed friends in the survey. The estimated coefficients are not included in the table.
Standard errors are clustered at the school level. Robust standard errors in parentheses.
** $p < 0.01$, * $p < 0.05$.

educational choices if peers are weakly connected to them—as deskmates are. In contrast, in emotionally embedded and strong peer relationships, peers' abilities motivate students' educational choices. Nevertheless, more evidence is required to corroborate this explanation.

Peer-conforming educational choices—testing H2

Without controlling for classroom fixed effects (Panel A in Table 2), deskmates' endogenous educational choices (if they chose an academic-track high school instead of other secondary tracks) translated into

students' own choice of an academic-track high school (Model 2, $\beta_4 = 0.174$, $p = 0.007$). However, friends' endogenous educational choices do not affect students' educational choices (Model 1, $\beta_2 = 0.050$, $p = 0.248$). Therefore—and this is a new contribution to the literature—the results show that students' peer-conforming educational choices are not characteristic of all peer relationships. Model 3 reveals that the difference between the coefficients of friends (β_2) and deskmates' (β_4) endogenous educational choice is marginally significant ($F = 4.16$; $p = 0.052$). Results might suggest that the informational potential of deskmates drives students' peer-conforming educational choices, rather than normative pressure from friends.

Nevertheless, unobserved classroom differences erase the endogenous peer influence (Panel B in Table 2). Specifically, with classroom-fixed effects in Model 6, the impact of deskmates' endogenous conformity influence ($\beta_4 = 0.03$, $p = 0.647$) is smaller than without classroom-fixed effects in Model 3 ($\beta_4 = 0.167$, $p = 0.008$). The statistically significant difference between the two coefficients ($chi^2 = 20.14$; $p < 0.001$) indicates that the unobserved group-level confounders capture deskmates' endogenous direct peer influence. Thus, the beneficial effect of a deskmate's ambitious educational choice does not increase students' choice of an academic-track high school within the classroom, but only in the whole sample—i.e. comparing students to students in other classrooms. Therefore, the preferred fixed-effect model specifications support neither H2A nor H2B.

In Panel B, the impact of friends' endogenous choices on students' track choices becomes negative (in Model 6, $\beta_2 = -0.057$, $p = 0.237$), but it is positive in Panel A (in Model 3, $\beta_2 = -0.049$, $p = 0.211$). The reason for this is not fully understood. One explanation is that the negative correlation between friends' and students' outcomes is mechanistic once all classroom-level confounding factors are controlled for. If some students in the classroom (the five best friends) applied to an academic-track high school, then the chance of finding another student from the same classroom who applied to that track naturally decreases. A theoretical explanation of this non-significant negative coefficient cannot be provided yet.

Discussion

This study investigated various types of peer influence in relation to upper-secondary track choice in Hungary. In a tracked and stratified

educational system such as Hungary's (Horn, Keller, and Róbert 2016), peer influence may result in students being diverted from choosing socially 'prescribed' upper-secondary tracks. Thus, peers might operate as a policy lever that could open otherwise closed gates to the least advantaged students.

The paper asks how peers influence students' application behavior regarding the most demanding, academic, and college-bound secondary track. This question has particular importance in Hungary, where the grammar school track gives students the highest probability of entering tertiary education and the economic returns to tertiary education are the highest in the OECD.

The analysis distinguished between the two types of direct peer influence: contrast and conformity, which influence students' educational choices in opposite directions. It hypothesized that peers' GPA has a negative effect, and peers' endogenous educational choices have a positive effect on whether students choose the academic track instead of less demanding secondary tracks.

As a new contribution to the literature, I explored various mechanisms of students' peer-conforming educational choices. In particular, the paper examines peers' normative pressure and information potential in two different types of peer relationships: self-selected friends and randomly assigned deskmates.

Students may adapt their educational choices to their friends' choices because they do not want to lose emotionally important friendships, leading to normative pressure. In addition, since students and their self-selected friends have a concordant background and academic interests, they may access the same factual information about school choice. Thus, friends' educational plans might encourage students to keep to already established plans. However, friends' information potential might be limited in channeling new information about educational choices beyond students' reach.

By contrast, students and their randomly allocated deskmates have discordant backgrounds and academic interests. These features give students access to information beyond that which they would be exposed to in their close networks. Nevertheless, since the deskmate relationship is instrumental, the deskmate's educational choices do not translate into normative pressure that drives students to conform to their behavior.

This paper contributes to a deeper understanding of peer influence in upper-secondary track choice in two respects. First, the results show that after controlling for classroom-level confounders (correlated effects),

there is no evidence for a direct peer-to-peer influence in upper-secondary track choice. Notably, the nil results indicate that the influence of peers cannot derail socially determined educational choices. Therefore, peers' ability does not constrict students' ambitious educational choices, but at the same time, peers' ambitious endogenous educational choices do not motivate students to make ambitious educational choices themselves. Thus, neither undesired peer-contrasting nor desired peer-conforming social influences affect students' educational choices in Hungary.

Second, concerning the mechanisms of peer-conforming educational choices, peers' informational potential outweighs peers' normative pressure. Access to relevant information is important in upper-secondary track choice and boosts students' educational choices; Deskmates' endogenous choices affect student application behavior (at least in models without classroom-fixed effects). However, normative pressure seems to be less relevant in upper-secondary track choice since friends' endogenous choices did not influence students' choice of secondary school track—even in models without classroom-fixed effects.

As a practical contribution to educational policy and education practitioners, the results suggest that the arrangement of seating charts does not create an additional advantage in track choice relative to students' classroom belonging. Peers' information potential is part of the unobserved school heterogeneity that makes peer quality differ between classrooms. Therefore, having contact with a deskmate who is potentially outside of a student's micro-level, self-selected social network does not give students an additional advantage in upper-secondary track choice relative to other classmates. Thus, the purposeful design of within-classroom seating charts is not a policy lever that can shape students' educational choices over and above the unobserved classroom-level influence.

There are several potential explanations for the nil peer influence result in Hungary. First, empirical research shows that parental background strongly determines students' educational choices in Hungary. The children of low-educated Hungarian parents are the least likely in Central Europe to favor an academic-track high school—they prefer the vocational track (Kogan, Gebel, and Noelke 2012). Therefore, when parental background influences students' educational choices as much as it does in Hungary, there is less opportunity for peer influence (Arcidiacono and Nicholson 2005; Buchmann and Dalton 2002).

Teachers' informal recommendations might provide a second potential explanation for the nil peer influence. Unlike in other educational systems, teachers in Hungary do not provide formal, binding track recommendations to students. Informally, however, students and parents often ask for teachers' recommendations. In our follow-up teacher survey conducted in Summer 2021 among 413 teachers, 78% said they informally recommended upper-secondary schools to students.[9] Teachers' recommendations might therefore override the peer influence in educational choices.

Third, since the admission process to secondary schools takes the form of a competition in which students fight for places with their peers, students might not inform or help each other with their choices for strategic reasons. However, given that students are only 14 years old when they choose an upper-secondary school, this argument remains theoretical.

While previous studies used large sample sizes (Jonsson and Mood 2008; Rosenqvist 2018), the small sample size in this study limits the generalizability of results and invites more research in two respects.

First, the sample used in this paper might not be appropriately powered to detect a substantially small peer effect. Future studies should investigate whether the insignificant peer influence in upper-secondary track choice in Hungary is explained by the small sample consisting exclusively of rural schools.

For example, concerning peer-conforming educational choices, Rosenqvist (2018) found that a one standard deviation change in the share of peers applying to an academic upper-secondary track translated into a 2.7-percentage-point increase in students' applications to the same track. Furthermore, concerning peer-contrasting educational choices, Rosenqvist (2018) found that a one standard deviation change in peers' grades triggered a 1.7-percentage-point decrease in the probability of applying to an academic track, while the same figure was a 3 percentage-point decrease in Jonsson and Mood's (2008) study.

The result of this recent study shows similar effect sizes. In Model 6, a one standard deviation change in deskmates' applications to the academic upper-secondary track translated into a 1.3 percentage point increase in students' applications to the academic upper-secondary track. Furthermore, a one standard deviation change in deskmates'

[9]The figure is calculated for 383 teachers, since 30 teachers (7.26%) did not answer the question.

GPA translated into a 1.8 percentage point decrease in students' outcomes. Thus, similar to those prior studies, the Hungarian results demonstrate similar-sized, substantively small peer effects.

Second, previous examples of peer influence in upper-secondary choice concerned the Swedish educational system (Jonsson and Mood 2008; Rosenqvist 2018), which is less selective and stratified than the Hungarian educational system. Since peer influence can only affect students' educational choices when facilitated by the institutional context (Buchmann and Dalton 2002), future studies should clarify the role of the institutional context in the absence of peer influence in upper-secondary track choice in Hungary.

In the Swedish system, the transition to upper-secondary school occurs at age 16, two years later than in Hungary. Furthermore, Swedish students are admitted to the secondary school that offers their preferred track and is closest to their home. Thus, most students have guaranteed enrollment into upper-secondary education in their residential municipality, while students' grades only play a role in admission when there is a shortage of places. By contrast, grades play a crucial role in students' admission to schools in Hungary, and track choice occurs at a younger age—at age 14.

In conclusion, the present study finds that various classroom peers do not influence upper-secondary track choices in the stratified and meritocratic Hungarian upper-secondary application system, after controlling for classroom-related unobserved contextual attributes that might simultaneously affect students' and peers' educational choices. Within a classroom, peers' ability does not decrease students' choice of the academic upper-secondary track, and peers' ambitious endogenous educational choices do not increase it. Thus, students' socially determined educational plans cannot be derailed via peer influence. The lack of peer effects in upper-secondary track choice may lead to the reproduction of pre-existing social inequalities in track choice.

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Ethics

Research was approved by the Ethics Review Committee of the Centre for Social Sciences, Budapest, Hungary. I confirm that all methods were carried out in accordance with relevant guidelines and regulations.

Notes on contributor

Tamás Keller, Ph.D., is a senior researcher at the Centre for Social Sciences in Budapest and at the Institute of Economics in the Center for Economic and Regional Studies in Budapest. His research explores the drivers of educational inequality, such as parental background, peer effects, and the role of non-cognitive skills. His recent publications appeared in Social Forces, Applied Economics Letters, Quality & Quantity, and PLOS One.

ORCID

Tamás Keller http://orcid.org/0000-0001-6943-0955

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Appendix

Table A1. Covariate balance; association between students and deskmates' baseline characteristics

VARIABLES	(1) Girl	(2) GPA
Deskmate's baseline	0.009	0.033
	(0.030)	(0.033)
Leave-one-out mean	−10.887**	−10.809**
	(1.169)	(1.118)
Constant	5.796**	40.621**
	(0.566)	(3.805)
Observations	416	416

Classroom-fixed effects are included in all models. Standard errors are clustered according to schools. Robust standard errors in parentheses: ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$