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Peer Effects on Educational Aspirations

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1. INTRODUCTION

1.1. Peer Relations during Adolescence and Educational Outcomes

From early adolescence, young people tend to be more self-focused compared to younger children. During this stage of defining themselves, adolescents are highly social and are often more concerned about what others think of them or what they believe others think of them compared to adults (Lieberman, 2015). Around this time, the influence of peers becomes more significant compared to earlier stages of life (Berndt 1992; Berndt and Savin-Williams, 1993; Brown, 2004; Brown and Larson, 2009). Consequently, relationships between equals gain importance compared to hierarchical relationships. Therefore, 'peers are necessities, not luxuries' (Hartup, 2009, 3.) regarding adolescents' development. This dissertation examines the role of peers, particularly friends, in shaping the educational aspirations of Hungarian adolescents.

Peer relations play a crucial role in the development of cognitive skills and the improvement of social interactions for adolescents (Erwin, 1998). Peer relationships offer opportunities to experience intimacy, social support, and emotional buffering. Ties with equals also provide individuals with valuable insights into relationships and society. For example, peers establish standards that individuals can use as a reference point to evaluate themselves, aiding them in understanding their place in the world. The significance of peers as reference points for norms and behaviours becomes more pronounced during adolescence when compared to adults (Brooks, 2005). This phenomenon can be attributed to several reasons.

Firstly, adolescents are more likely to conform to the standards of their peers than other age groups. Secondly, the development of adolescents' brains is particularly influenced by their peers. During this life stage, the brain becomes more sensitive to the opinions and influence of others, especially their peers'. Third, adolescents seek to develop an identity, and peer relationships provide opportunities to experiment with this process, thus, increasing adolescents' susceptibilities to peer influences. In addition, the structural change in their education and schedule leaves adolescents more free time without adult supervision and greater autonomy, giving them opportunities to influence their peers (Laursen and Veenstra, 2021).

Empirical evidence has shown support for *behaviour contagion* among adolescent peers. This effect has been observed for a variety of behaviours, including antisocial, deviant, and health-risk behaviours. Additionally, there is substantial evidence supporting the influence of peers on adolescents' prosocial behaviours, such as academic motivation and adjustment (Brechwald and Prinstein, 2011, for a review). Friendships formed in educational institutions have a significant impact on how adolescents view themselves and their capabilities in relation to others (Brooks,

2005). As a result, these friendships can influence adolescents' educational goals, preferences, and decisions. Chapter 2.1 explores how a person's aspirations are always linked to their social environment, while Chapter 2.4 goes into detail about how peers can influence the educational ambitions, decisions, and outcomes of adolescents.

Brown (2004) emphasises the difference between *peer pressure* and *normative regulation*. Peers can influence each other by prescribing specific behaviours or norms, which is commonly known as peer pressure. Even so, peer influence often tends to be more subtle or unintentional. Reinforcement of norms can be achieved through informal discussions or gossip (normative regulation). Furthermore, peers can serve as role models for one another or create situations where opportunities are presented in ways that influence the behaviour and attitude of young people.

Social relationships and social networks can also provide individuals with access to resources that they wouldn't have access to otherwise (Coleman, 1988; Granovetter, 1973, 1983; Lin, 2001). This way, students can benefit from social connections created for other (e.g., emotional) reasons, such as friendships or a more comprehensive peer network.

Nevertheless, it should be noted that peers are not homogeneous entities with uniform importance or influence, but that they can be interpreted and assessed at different levels of society (Lerner and Steinberg, 2004). Firstly, interpersonal connections can be interpreted at the dyadic level, including friendships, romantic relationships, adversaries, desk mates, or roommates. Secondly, adolescents may also be members of small groups of peers who regularly interact, such as a clique, a study group, or a school class. Thirdly, there are some larger groups or aggregates in which young individuals are not personally acquainted.

Several peer associations overlap whereas others are distinct but adolescents' multiple social circles 'are interconnected and interdependent' (Erwin, 1998, p. 22.). For example, while friendship and help-seeking networks often go hand in hand, students may seek help in academic matters from individuals who are not necessarily their friends. In fact, high achievers tend to get approached for assistance more frequently (Wang et al., 2021; Zander, Chen and Hannover, 2019).

Among other relationships, friendships have a prominent place in the life of adolescents (Berndt 1992; Berndt and Savin-Williams 1993; Brown and Larson, 2009). Naturally, friendship ties are not universal in terms of the foundations they are based on, the characteristics of the exchange, or the strength of the bond between the participating actors. Notwithstanding their distinctive qualities, friendships during adolescence are of great consequence of the development of an adolescents' identity compared to friendships in earlier life stages (Hartup, 1996).

Transitioning from childhood to adolescence, the bond of friendship strengthens and becomes increasingly significant. This is primarily because the amount of time spent with friends is greatest during adolescence. In addition, the nature of friendship also changes during adolescence.

Intimacy, personal sharing, and emotional support become more important aspects of friendships for adolescents compared to younger children (Brooks, 2005; Hartup and Stevens, 1997).

It is widely acknowledged that there are similarities between individuals in dyadic relationships, especially friendships. This is in part because people often adjust their attitudes or behaviour to align with the attitudes and behaviour of those they consider important (Brown and Larson, 2009; Hartup and Stevens, 1997; Kelley, 1952; Merton, 1968a). Adolescents place importance on being similar to their peers because it indicates compatibility and strengthens the bond between them. This in turn provides stability to their friendships (Laursen and Veenstra, 2021).

Furthermore, people tend to choose friends who have similar characteristics to themselves. This phenomenon, known as social selection, is also supported by empirical evidence (Brown and Larson, 2009; Hartup and Stevens, 1997; McPherson, Smith-Lovin and Cook, 2001) and is particularly evident when it comes to traits that are important for social reputation (Hartup, 1996).

Social selection and *influence* can both result in the *similarity* of peers, and it is essential to consider those different mechanisms (Brown and Larson, 2009; Steglich, Snijders and Pearson, 2010; Ryan, 2001; Veenstra and Dijkstra, 2012). The dissertation explores the theoretical and methodological implications of analysing social selection and influence. These concepts are discussed in the methodological section (Chapter 4.2), as well as in the empirical analyses presented in Chapters 5 and 6.

Friendships between peers are usually seen as the most influential of adolescent peer relationships, however, this is not necessarily the case. Dyadic interactions usually occur within a larger group or a *broader social context*, such as a school or a specific classroom (Brown, 2004; Kwon and Lease, 2014). Children's socialization is arranged within organisational structures that allow them to form relationships with other children of their age. Those peer groups are more than just the aggregation of dyadic relationships and can affect the formation of ties on the dyadic level (Hartup, 2009).

Educational institutions are critical for peer relationships since children spend considerable time in these institutions, and teachers often make comparisons between them and their classmates. Some peers are determined by the educational context, like school classmates, while others, such as friendship ties, can be selected from within a social context (Hartup, 2009). Individuals who have similar demographic characteristics are often found in the same social contexts, which increases the likelihood of forming friendship ties (Hartup and Stevens, 1997; Manski, 1993). As a result, the initial homogeneity of the larger peer group affects the extent of homophily in friendship ties (Feld, 1982; Juvonen, 2018; Manski, 1993; McPherson and Smith-Lovin, 1987). For instance, ability

tracking can affect students' academic development and social relationships (Hallinan and Williams, 1990).

In addition, educational institutions offer a platform for individuals from diverse social backgrounds to connect with each other and learn from one another (Granovetter, 1973, 1983). Students' backgrounds play a significant role in shaping academic standards and values within a classroom. This, in turn, can impact the motivation, attitudes, and behaviour of their classmates. Being in the company of students from more privileged family backgrounds can provide valuable support in nurturing higher aspirations (Kertesi and Kézdi, 2009; Lannert, 2005).

Additionally, when students are exposed to the same teaching environment, those in the same educational context may have similar educational outcomes (Dollmann and Rudolphi, 2020; Kertesi and Kézdi, 2009; Manski, 1993). This means that school choice alone can have an impact on students' abilities and achievements (Hastings, Neilson, and Zimmerman, 2012; Hermann, 2013).

The expectations of teachers may differ depending on the composition of the student body, and these expectations can shape the educational opportunities available to students. If teachers are not compensated for working in a disadvantaged environment, it is possible that the underprivileged students may have teachers who are less qualified and less motivated (Kertesi and Kézdi, 2009). This could also impact their academic motivation and aspirations.

Peers are often easily accessible to researchers within a wider social environment, especially those who are affiliated with an administrative unit such as classmates, cohorts, or schoolmates. Research in the field of education economics often focuses on studying the impact of peer relationships on students' academic achievement. These studies typically explore how fellow classmates, students within a school, or peers in the same neighbourhood can influence a student's academic performance (e.g., Hanushek et al., 2003). Despite the growing attention to dyadic relationships, specifically friendships, in the field of social network analysis, studies still highlight the unique developmental importance of various relationships in an academic setting. This includes reciprocated friendships, interaction dyads, and peer groups (Cairns, Xie, and Leung, 1998; Molloy, Gest, and Rulison, 2011).

The current dissertation utilises a longitudinal dataset gathered from upper-primary school students in Hungary. The main aim of the data collection was to examine the social connections among classmates, such as liking, friendship, and bullying. By providing students with a roster of their classmates for each social network dimension, the dynamics of their self-reported social networks can be examined.

The research questions of the dissertation are based on the idea that peers become more significant during adolescence. They can have a crucial impact on students' educational

development and the formation of their academic goals. The scope of this dissertation is not the broader peer context, but rather dyadic peer relationships, particularly friendships. Nevertheless, Chapter 7 of the dissertation pays heed to the role of the larger peer setting by controlling for school class attributes when studying the association between students' and their friends' educational preferences.

Naturally, the impact of parents on an adolescent's development is still vital, despite the effects of peer relationships in a child's life. The connections between peers are affected by familial relationships and influences (Collins and Laursen, 2004). How parents bring up their children affects how they act amongst their peers, and which peers they form closer bonds with. Subsequently, the norms passed down by parents are frequently reinforced by their child's chosen social circle (Brown et al., 1993).

Influences from various relevant socialisers can add up and can intertwine with each other or with external factors (Vollet, 2017). Different types of peer effects can interact with each other, either supporting or amplifying each other's effects. There can also be an interplay between peer effects and students' parental background. Thus, the role of parents in the development of educational outcomes should not be neglected besides peer relationships. The influence of family background on the development of educational ambitions, choices, and outcomes is primarily discussed in Chapter 2.2, and briefly in Chapters 2.1 and 2.5.

1.2. Research Goals

On the basis of the presented argument for the growing importance of peer relationships, and in particular, friendships during adolescence (e.g., Berndt and Savin-Williams, 1993; Brown, 2004; Brown and Larson, 2009), the main aim of the dissertation is to investigate friends' role in the development of students' academic and educational aspirations.

Social network analysis has been employed to examine the simultaneous evolution of many different relations (e.g., Boda, Néray and Snijders, 2020; Kisfalusi, Pál and Boda, 2020; Vörös, Block and Boda, 2019) and the co-evolution of network ties and individual attributes or behaviours (e.g., Boda, 2018; Grow, Takács and Pál, 2016; Kisfalusi, Janky and Takács, 2019) among Hungarian adolescents during the last decade. Yet, studies paid less attention to peers' influence on students' educational outcomes in Hungary (a few exceptions exist: Keller and Takács, 2019; Keller, Takács and Elwert, 2021), especially while accounting for the possible confounding role of initial similarity in friends' aspirations or peer selection on the basis on homogeneous aspirations.

The studies in the dissertation differentiate between the influence of friends and the selection of friendships, with one study also examining the broader peer context. Furthermore, the dissertation explored different ways in which peers influence aspirations. This includes aligning

attitudes and behaviour with those of relevant others (e.g., Brown and Larson, 2009), accessing resources through one's social network that wouldn't be available otherwise (Coleman, 1988; Granovetter, 1973, 1983; Lin, 2001), and comparing one's abilities and prospects with others (Brooks, 2005; Erwin, 1998).

The current dissertation examines the impact of friends on the academic and educational aspirations of Hungarian primary school students. This may be important in the Hungarian educational context where secondary school tracks are highly stratified by adolescents' academic achievement and family background (Shavit and Blossfeld, 1993), and thus, may limit the opportunities for peer effects. The dissertation examines various aspects of aspirations through the empirical studies, considering academic ambitions for school subjects and secondary school track preferences.

The research questions are introduced in Chapter 3, and the hypotheses are presented in the respective empirical chapters.

1.3. Prior Research Concerning Hungarian Adolescents and their Peer Relations

Most of the previous research aimed at the social networks of adolescents in Hungary have used two longitudinal datasets collected by the 'Lendület' RECENS Research Group at the Hungarian Academy of Sciences (now Computational Social Science - Research Center for Educational and Network Studies, Centre for Social Sciences at the Eötvös Loránd Research Network).

Nonetheless, a few other studies applied different samples and investigated friendship and hostility between Roma and non-Roma students in Hungary concerning academic achievement (Hajdu, Kertesi and Kézdi, 2019; Hajdu, Kertesi, and Kézdi, 2021), or the role of network diversity in the formation of prejudices against the Roma (Váradi, Barna and Németh, 2021).

The RECENS data was first collected from secondary school students from 2010 to 2013, and the second sample was gathered from primary school students between 2013 and 2017. Both are panel datasets consisting of a non-random sample of schools and all school classes within those schools from the school grades of interest. These were the cohort of grade 9 students in 2010 in the secondary school sample and the cohort of grade 5 students in 2013 in the primary school sample. All students in the classes who gave their consent participated in the data collection. The use of panel data and the fixed assignment of primary and secondary schools in Hungary enabled a study of the parallel development in the social networks of students and their attributes.

The two samples had a higher proportion of Roma students than the percentage of Roma students in secondary and primary schools across Hungary. Therefore, the datasets supply a unique opportunity for investigating intra- and interethnic peer relations. Consequently, many studies based on the stated datasets concentrated their inquiry on ethnic perceptions and interethnic bonds.

Several studies contributed to the findings that ethnicity is a multifaceted social construct (e.g., Ladányi and Szelényi, 2001), applying a novel social network approach.

For instance, studies examined how ethnic self-identification and other's perceptions overlapped with social networks and social status perceptions (Boda, 2018; Grow, Takács and Pál, 2016; Kisfalusi, 2018a; Kisfalusi, Janky and Takács, 2019). Furthermore, studies provided insights into interethnic positive and negative relationships (Boda, 2019; Boda and Néray, 2015; Boda, Néray and Snijders, 2020; Kisfalusi, 2016) and dating choices (Lőrincz, 2016).

The RECENS datasets were extensively used for examining bullying, victimization, and gossiping behaviour in connection with ethnicity and extending beyond that (Kisfalusi, 2018b; Kisfalusi, Pál and Boda, 2020; Kisfalusi, Takács and Pál, 2019). Moreover, some studies focused on status characteristics and the interplay between status measures and positive and negative ties among adolescents (Bocskor and Havelda, 2020; Bocskor, 2021; Vörös, Block and Boda, 2019; Vörös and Snijders, 2017), or negative ties (Stadtfeld, Takács and Vörös, 2020).

Fewer studies focused on how peers can play a relevant role in adolescents' educational outcomes. An exception is Keller and Takács (2019), who showed that desk mates could positively influence students' reading test scores. Even less attention has been paid to peer effects on educational aspirations and choices. Based on a field experiment, peers did not impact secondary school track applications (Keller, Takács and Elwert, 2021). Nevertheless, the study concentrated only on the impact of peers with the most central position within a classroom, not on whom students nominated as relevant others for themselves. Therefore, the present dissertation investigates a less widely studied aspect of friends' effect in the abovementioned datasets: how friends could affect adolescents' academic motivation, plans, and choices while also considering the broader peer context.

1.4. Overview of the Dissertation

The dissertation includes the restructured and revised versions of three empirical manuscripts that were submitted to peer-reviewed journals (Chapter 5 and Chapter 6 with co-authors). The author of the dissertation was the first author of those manuscripts. These manuscripts can be found in Chapters 5, 6, and 7. The dissertation reorganises the content of the manuscripts by consolidating the main theoretical and methodological aspects into a single chapter.

Chapter 2 provides an overview of the theoretical context of the dissertation. This chapter is arranged in the following way. Chapter 2.1 explores the development of educational aspirations and how aspirations are embedded in the social context. Chapter 2.2 and 2.3 provide theoretical discussions and empirical evidence regarding the influence of family background and achievement-related beliefs on students' aspirations.

Chapter 2.4 focuses on the association between adolescents' and their peers' aspirations. In connection with the theoretical background, Chapter 4.2.1 deliberates on methodological considerations and challenges associated with measuring peer effects. Peers may be similar due to various causes, not always as the product of influence. Homogeneity might result from selecting friends based on shared traits and initial similarities in the social environment.

Chapters 2.4.1 to 2.4.4 provide an overview of how various mechanisms can contribute to the similarity of peers' aspirations, particularly those of friends. These mechanisms include adopting the attitudes of relevant peers, accessing the parental resources of relevant peers, considering peers' academic achievements, and selecting friends based on similarity in academic achievement and aspirations. At last, Chapter 2.4.5 reviews previous empirical studies on peer effects on educational aspirations, choices, and expectations, and defines the present dissertation's main contributions in relation to those studies.

The institutional and structural context students experience influences their educational decisions and choices. Thus, Chapter 2.5 presents an overview of the Hungarian educational context, the secondary school application process, and educational inequalities. The main research aims and questions of the dissertation are introduced in Chapter 3. The specific hypotheses are included in the empirical chapters. Chapter 4 presents the data and the analytical approaches applied in the dissertation. The data comes from the second, fourth, fifth, and sixth waves of the RECENS primary school database. These waves were collected between 2013 and 2017, when students were enrolled in the fifth, sixth, seventh, and eighth grades.

Chapter 5 through Chapter 7 present the hypotheses, data analysis, and main results of the three empirical manuscripts. Chapter 5 explores how friends' influence and the process of selecting friends contribute to the similarity in academic ambitions among friends. This is measured by their academic ambitions in two school subjects. Chapter 6 examines how friends influence the secondary school track preferences of adolescents. It investigates how factors such as friends' preferences, parental background, and academic achievement can shape these preferences. Additionally, the chapter addresses the potential impact of friendship selection based on these attributes. Last, Chapter 7 explores the relationship between students' preferences and their peers' preferences for secondary school tracks in their applications. This analysis takes into account both friends and classmates.

In Chapter 8, the empirical findings from the previous chapters are summarized. Additionally, the research objectives and queries are revisited. Chapter 8 also discusses the potential theoretical and policy implications of the dissertation as well as possible future research directions.

2. BACKGROUND

2.1. The Development of Educational Aspirations

This section of the dissertation outlines the theoretical and empirical aspects of defining and measuring educational aspirations. Aspirations encompass a variety of concepts including desires, preferences, choices, and calculations (Appadurai, 2004). Educational aspirations can either be thought of as objectives for the future (Quaglia and Cobb, 1996) or, more specifically, as the lowest outcome an individual considers acceptable (Castellani, Di Giovinazzo and Novarese, 2010).

Empirical studies in the present dissertation consider both ends of this range. Chapter 5 examines academic ambitions measured by aspired grades as the desired outcome for students in two academic disciplines. Chapter 6 focuses on the development of the preferences for secondary school tracks. It explores how these preferences are formed before the secondary school applications. Chapter 7 investigates peers' role considering the most preferred option in secondary school selection.

Possible selves allow individuals to utilise strategies that help them achieve their envisioned future selves (Oyserman and James, 2009). Aspirations are likely to play a significant role in facilitating this process. Educational aspirations play a mediating role in the relationship between school-related attitudes and behaviours (Abu-Hilal, 2000). They can encourage students to dedicate effort to academic tasks that are important for achieving their desired future selves or goals (Trebbels, 2015). Nonetheless, aspirations and attainment can be mutually reinforcing. People's current selves influence how they envision their future selves through their identities and expectations. At the same time, their visions of their future selves can influence their attitudes and behaviours in the present (Gutman and Akerman, 2008; Suckert, 2022; Zhang et al., 2011).

People make decisions about their educational path based on what they consider to be both desirable and attainable (Gottfredson, 1981, 2005). One's social background can impact their access to educational opportunities. Individuals from disadvantaged backgrounds have limited cultural and economic resources, lack information about education, and have limited exposure to different educational options. As a result, their ambitions are often limited to what they perceive as realistic possibilities based on these narrow perspectives (Appadurai, 2004; Gale and Parker, 2015).

Idealistic and realistic aspirations are often viewed as separate entities. The former refers to hopes and desires regarding educational achievement or outcomes, while the latter, often called *expectations*, refers to the anticipated educational outcomes that students believe they will achieve based on their assessed abilities (DeMoss, 2013; Haller, 1968). Both expectations of success and the value assigned to success can influence decisions, outcomes, and motivations related to

achievement (Eccles, 2009; Wigfield, 1994; Wigfield and Eccles, 2002). Moreover, these two factors are often intertwined since individuals tend to prioritize success in tasks or academic fields where they expect to succeed (Lauermann, Tsai, and Eccles, 2017). People's desires are often limited by societal constraints, which define the boundaries of what they can envision or hope for themselves (Tarabini and Curran, 2018). As a result, their aspirations and expectations are influenced by similar factors and tend to align (Bohon, Johnson and Gorman, 2006; Haller, 1968; Portes et al., 2010), even though the two concepts can be distinguished empirically (Khattab, 2014).

This dissertation investigates the impact of peers on academic ambitions and educational preferences. Nevertheless, since aspirations and expectations are often used interchangeably in research studies (e.g., Marjoribanks, 1998), previous studies examining the influence of peers on educational aspirations and expectations are included in the literature review. For the purpose of this dissertation, aspirations are seen as academic goals that require effort to be accomplished. Students understand that achieving these goals takes effort. In this context aspirations are different from mere wishes (Flechtner, 2017).

The microcontexts of family, friends, and other social relationships ingrained in a person's life are essential for development. These microcontexts also interact with one another (Bronfenbrenner and Morris, 2006). The way people assess their capabilities and opportunities is contingent upon a comparison of their past achievements within and across fields and is also affected by social comparison with relevant socialisers (Wan et al., 2021). Thus, educational aspirations cannot be solely attributed to personal factors but are also influenced by the individual's social context (Appadurai, 2004; Gale and Parker, 2015; Gutman and Akerman, 2008; Tarabini and Curran, 2018). How individuals perceive their position in society and their standing relative to others is influenced by comparison with others (Taylor, 2004) and also which educational choices they deem desirable, attainable, or appropriate for themselves (Archer, Hollingworth and Mendick, 2010; Bourdieu, 1990; Gale and Parker, 2015).

Throughout life, people form aspirations, which are then adjusted and modified based on feedback and the social context. This process is influenced not only by individual-level factors but also by the beliefs and behaviours of significant others (Archer, Hollingworth and Mendick, 2010; Elster, 1983; Haller, 1968; Gutman and Akerman, 2008; Karlson, 2015), because achievement-related beliefs, aims, and memories are also affected by the beliefs and behaviours of significant others (Eccles, 2009; Wigfield, Tonks and Klauda, 2009). Since aspirations can impact educational outcomes (e.g., Chowdry, Crawford and Goodman, 2011; Homel and Ryan, 2014; Gutman and Akerman, 2008), social influences can play a vital role in students' educational careers.

All in all, aspirations are relevant in educational research as they can have an impact on future academic achievement and educational attainment (Chowdry, Crawford and Goodman, 2011;

Haller, 1968; Homel and Ryan, 2014; Gutman and Akerman, 2008; Marjoribanks, 2003); fostering aspirations can lead to increased effort and motivation that supports higher achievement and attainment (Archer, Hollingworth and Mendick, 2010). Academic and educational aspirations are crucial as their inadequate level might trap talented students in low aspirations and performance (Keller, Takács and Elwert, 2021). This could accumulate disadvantages, particularly in highly stratified educational systems, where students must make essential track choices that largely determine their later labour market outcomes.

It has been argued that having low ambitions can be a barrier for students from disadvantaged backgrounds, preventing them from reaching their full potential. Therefore, there has been a strong focus on increasing students' aspirations (St. Clair, Kintrea and Houston, 2013) based on the assumption that interventions aimed at influencing attitudes and beliefs could help reduce educational inequalities (Chowdry, Crawford and Goodman, 2011). For example, a study conducted by Salikutluk (2016) found that the aspirations of young people of Turkish descent were more influenced by their desire for higher mobility compared to German students.

Nonetheless, it is important to note that having higher ambitions does not necessarily lead to higher attainment, as highlighted by Gutman and Akerman (2008). Aspirations can either perpetuate educational inequalities (Archer, Hollingworth and Mendick, 2010; Suckert, 2022) or alleviate disadvantaged socioeconomic circumstances (Suckert, 2022). High aspirations can only benefit disadvantaged students if they are given the necessary information and resources to achieve their goals (St. Clair, Kintrea and Houston, 2013). Flechtner (2017) stated that raising aspirations can be an effective policy tool for addressing educational inequality, but only in cases where low aspirations stem from a subjective adaptation. In other words, when individuals have opportunities available to them but are unaware of their potential to achieve them.

Solely having high aspirations is not enough to guarantee educational mobility. Students from immigrant backgrounds who do not have the parental resources to succeed tend to have high aspirations that are not backed up by adequate achievements (Engzell, 2019). Fishman (2019) shows that expectations have only a slight effect on educational attainment with unobserved family background characteristics accounted for.

Furthermore, having higher aspirations does not mean that those aspirations are always favourable. In some instances, opting for lesser aspirations can be a more reasonable alternative for an individual (St. Clair, Kintrea and Houston, 2013). Accordingly, policy interventions focusing on students' aspirations may be more effective in expanding their opportunities by diversifying the options they consider, rather than pushing them towards a single universal goal.

As mentioned before, aspirations are shaped by the social and relational environments of individuals (e.g., Tarabini and Curran, 2018). The following subchapters discuss how relevant socialisers – focusing on family background and peer relations– can shape educational aspirations.

Family background plays an important role in educational inequalities (e.g., Boudon, 1974; Breen and Goldthorpe, 1997). Furthermore, peers can offer students information, prospects, and norms that they may not have access to otherwise. For example, understanding the opportunities available or developing belief in social mobility could motivate students from less advantaged backgrounds to pursue higher goals (Browman, Svoboda and Destin, 2022; Destin and Oyserman 2009; Keller, Takács and Elwert, 2021).

The next section provides an overview of how a student's parental background can influence the development of one's aspirations. This is followed by a section that explores the ways in which peer relationships can also impact aspirations.

2.2. Family Background and Aspirations

Family background is among the most important factors in determining educational goals, expectations, and choices. This section reviews previous research on how parental background influences the aspirations of adolescents. Social inequalities in educational aspirations and attainment, which have persisted despite the growth in educational opportunities over the last few decades, can be partially attributed to family background.

Parental background can influence aspirations both directly and indirectly. Academic performance is often influenced by family background, which can, in turn, impact educational decisions. This is referred to as the *primary effect* of parental background. Nonetheless, parental background may also have an influence on educational outcomes beyond its effect on achievement (*secondary effects*) (Boudon, 1974).

The influence of family background on students' educational aspirations or choices can be attributed to the varying perceived advantages and disadvantages that students and their parents associate with different educational options (Boudon, 1974; Breen and Goldthorpe, 1997). Families make different assessments of the costs associated with education, including both direct costs like tuition fees and indirect costs such as missed earnings. Additionally, families have varying expectations regarding the benefits they will receive from investing in education (Boudon, 1974). Children from more privileged backgrounds often see higher education as a valuable investment, viewing its costs as relatively small in comparison to the potential benefits. Consequently, they are inclined to strive for higher educational attainment than children from families with lower social standing.

Students from disadvantaged backgrounds often face barriers that prevent them from having ambitious goals. More information about the opportunities available to them, or a stronger belief in upward mobility could encourage children from less privileged backgrounds to strive for higher goals (Browman, Svoboda, and Destin, 2022; Destin and Oyserman, 2009). Nonetheless, the strong belief in meritocracy and social advancement may serve to maintain structural inequalities (Destin, 2020).

In consideration of the secondary effects of parental background as suggested by Boudon (1974), Breen and Goldthorpe (1997) coined the term *relative risk aversion*. They posited that the primary motivation behind educational decisions was to avoid downward social mobility. Relative risk aversion suggests that parents desire for their children to attain a status equal to or higher than their own. Therefore, children from families with higher social status tend to pursue a higher level of education than children from a family with lower social status.

The higher aspirations of those with higher social status and the lower aspirations of those with lower social status get strengthened due to the class differences in resources that are needed to cover the costs of staying in education and the class differences in average ability levels that affect the expectation of future success (Breen and Goldthorpe, 1997). The avoidance of downward mobility in educational decisions is supported by empirical evidence (e.g., Becker, 2003; Holm and Jæger, 2008; Stocke, 2007). Students from a privileged background are more likely to maintain their higher aspirations over time, thus high and low aspirations tend to get locked-in (Valls et al., 2022).

Nevertheless, several studies suggest that the Breen-Goldthorpe model of educational attainment does not fully explain the influence of family background on educational choices (Becker, 2003; Holm and Jæger, 2008; Stocke, 2007). Regarding transitions from primary to secondary school in Germany, research suggests that family background has a significant impact on the inequality in teacher recommendations (Becker, 2003). On the other hand, the estimated costs associated with educational investments appear to have less influence on these transitions (Stocke, 2007).

Applying Breen and Goldthorpe's (1997) framework in a broader sense, considering the class-specific cultural preferences for educational options might provide a more comprehensive explanation compared to discrete choice models (Holm and Jæger, 2008). Additionally, students' educational aspirations are influenced not only by economic benefits but also by their desire to maintain social connections and relationships with peers (Jæger, 2007).

Boudon (1974) attributes the primary effects of parental background to the effect of the genetic traits of the family, the quality of the home environment, or the interaction style within the family on educational choices and attainment. Children with more privileged family backgrounds

have an advantage in school since they have access to resources that can improve academic performance. Therefore, they often have higher educational goals and achieve higher levels of education.

Cultural explanations suggest that the main influences of family background are not directly linked to inherent ability, but rather to the cultural codes or cultural capital that parents with greater resources can pass on to their children, and this cultural capital is recognized by the education system. The cultural capital of a family is linked to their participation in highbrow culture and all the cultural resources that provide educational advantages such as encouragement from teachers (Bourdieu, 2002; Lareau and Weininger, 2003; Sullivan, 2001). The school's positive feedback contributes to improved academic performance. Students who receive more encouragement from teachers and parents are more likely to set ambitious goals (Bourdieu and Passeron, 1977). Family background can also impact students' aspirations by influencing the educational options they view as accessible or suitable for them (Bourdieu, 1990).

Nonetheless, the cultural mobility explanation posits that cultural capital can also play a role in social mobility (DiMaggio, 1982). Children from lower and middle socioeconomic backgrounds may benefit more from their parents' cultural capital (measured by parents' reading behaviour) than children from more advantaged socioeconomic backgrounds (De Graaf, De Graaf and Kraaykamp, 2000).

The results show a mix of contributions from primary and secondary effects in relation to social inequalities in educational aspirations, choices, and attainment. All in all, it seems that both the primary and secondary effects of parental background are linked to educational inequalities. Some studies have emphasised how the primary effects of family background impact educational differences in PISA results in the United Kingdom and Sweden (Nash, 2003) and the transition to higher secondary education in the Netherlands between 1965 and 1999 (Kloosterman et al., 2009). Among the primary effects of parental background, parental education, cultural capital, economic resources, parental status, social class, and occupational aspirations seem to be relevant to educational inequalities (Barone, 2006; Bukodi, Goldthorpe, and Zhao, 2021).

There is also evidence of the increasing significance of secondary effects in the transition to tertiary education in Germany (Schindler and Lörz, 2012). Additionally, Jackson *et al.* (2007) concluded that secondary effects reinforced the primary effects in the English and Welsh education system when students were around 16 years old and had to make decisions regarding the qualifications required for university admission. Evidence recently obtained from England indicates that the secondary effects of parental background on educational transitions can be primarily attributed to parental education (Bukodi, Goldthorpe, and Zhao, 2021).

Nevertheless, parents can offer indispensable support for their children's education in addition to their financial, human, or cultural capital. Coleman (1988) emphasised the role of the family's social capital in the formation of human capital, granting the children access to their parents' human capital through the time spent together, independent of their monetary and human capital.

Other studies have also shown that creating a supportive environment for schooling at home, along with parental encouragement, recognition of the value of education, and high aspirations from parents, can contribute to educational aspirations and achievements. For example, previous research has indicated that how much parents encourage their children can impact their aspirations for tertiary education (Sewell and Hauser, 1972, 1993). Additionally, parents' own aspirations can influence their children's career aspirations by affecting their self-confidence (Bandura et al., 2001). Zhang *et al.* (2011) found a reciprocal relationship between students' educational expectations and their parents' expectations for their children. Moreover, the value that parents place on education can also play a role in a student's decision to drop out, even when their academic ability is taken into account (Foley, Gallipoli and Green, 2014).

Parents frequently depend on informal sources of information and social comparisons when it comes to their children's school choices. They also take into account relevant reference groups when making decisions for their children (Ball and Vincent, 1998). The way parents assess the information available to them, their parenting styles, and the investments they make in their children's development are influenced by subjective and rational considerations. These considerations can vary depending on their socioeconomic background (Cunha, 2015).

Lareau (2011) introduced the term *concerted cultivation* to describe the parenting style of middle-class parents. This refers to their active involvement in their children's schoolwork, participation in extracurricular activities that support their educational development, and the provision of educational resources at home. According to Lareau (2011), children from the middle class typically participate in organised activities. These activities help them develop skills that contribute to their success in school and other institutions, allowing them to maintain their privileged social status as adults. Several quantitative studies (e.g., Bodovski and Farkas, 2008; Cheadle and Amato, 2011) showed empirical support for concerted cultivation that was initially investigated on qualitative data.

In conclusion, children's family background can contribute to the educational decision-making process and the persistence of educational inequalities. Previous research investigating social disparities in educational aspirations and attainment has considered various aspects of family background. These studies have found that these explanations do not contradict each other, but

rather complement each other (Barone, 2006; Hermann, 2004; Van de Werfhorst and Hofstede, 2007).

2.3. The Role of Students' Assessment and Achievement-related Beliefs in the Development of their Aspirations

As students become older, their academic motivation shifts to more particular subjects, and they start to acknowledge their strengths and weaknesses in different academic domains (Wan et al., 2021). From ages 10 to 12, children become more aware of their capabilities, and their goals begin to align with what they believe they can achieve. Following this stage of development, their goals are likely to have a greater impact on their motivation and achievement (Dweck 2002; Helwig 2001).

Students' perceptions of the difficulty of a task and their confidence in their ability to handle that task can impact their motivation to engage and strive for success in that task (Eccles, 2009; Wigfield, 1994; Wigfield and Eccles, 2002). Individuals' beliefs about the ability or skills they possess in a particular domain or situation may directly affect students' aspirations and academic achievement; and their academic achievement can in turn influence their aspirations (Bandura et al., 2001; Wigfield and Eccles, 2000). The relationship between aspirations, expected success in a domain, and values attached to a domain may also develop reciprocally (Lauermann, Tsai and Eccles, 2017).

Students' subjective beliefs in relation to their abilities and prospects are prone to permanent changes (Barron and Hulleman, 2015; Wigfield, 1994). As a result of experiences of success or failure, people may alter their conceptions of themselves and their goals in an academic context (Preckel and Brunner, 2015). Students can develop positive beliefs about their academic abilities based on their previous academic achievements (*skill development model*), and positive beliefs may contribute to academic achievements (*self-enhancement model*) (Green et al., 2006).

Not only individual-level factors, but also the beliefs and behaviour of significant others influence the beliefs, goals, and memories related to achievement (Eccles, 2009; Wigfield, Tonks and Klauda, 2009). Adults in educational institutions may be one of those significant actors. Individuals tend to fulfil the expectations that others have of them - this phenomenon is referred to as the *Pygmalion effect*. Teachers' expectations of student success can be a self-fulfilling prophecy; these expectations can bring about a successful outcome (DeMoss, 2013; Rosenthal and Jacobson, 1968). Becker (2013) found that the Pygmalion effect was more powerful among those with lower achievement.

Furthermore, other students serve as benchmarks for social comparison (Erwin, 1998), and peers also become increasingly influential in shaping norms and behaviours during adolescence

(Brooks, 2005). Therefore, peers can also have an important impact on how students evaluate themselves and assess educational opportunities or paths. In the next sections, I will explore the different ways in which peers can influence adolescents' educational ambitions, expectations, preferences, and choices.

2.4. Peers and Adolescents' Educational Aspirations

Following, I will outline the main processes and mechanisms of peer effects on students' educational outcomes, with a specific focus on educational aspirations. Apart from the involvement of adults, peer relations can also play an essential role in the development of students' educational outcomes. As discussed in Chapter 1.1, peer relations, especially friendships, become more important during early adolescence compared to earlier developmental stages. These relationships can have an impact on various behaviours and attitudes (e.g., Berndt, 1992; Berndt and Savin-Williams, 1993; Brown, 2004; Brown and Larson, 2009).

The following sections introduce possible mechanisms of peer effects, and more precisely, within-classroom friends' effect on educational outcomes, focusing on motivation, preferences, and choices. Peers within a school class frequently collaborate on educational tasks and can take notice of each other's behaviour (Ladd et al., 2012). In Hungary, primary schools follow a fixed class assignment system for most classes. This means that students spend the majority of their time with their classmates, fostering the development of enduring and close relationships among them.

There are numerous reasons why similarity often manifests amongst students in social networks like school classes, study groups, or friendship networks. First, individuals in the same social setting can change their behaviour or attitudes in response to interactions. Adjustment to peers is not necessarily linked directly to their behaviour or attitudes (Sacerdote, 2011). Chapters 2.4.1 to 2.4.3 discuss various channels of such adjustments.

Adolescents often adopt the behaviour and attitudes of their peers (Brown and Larson, 2009; Kelley, 1952; Merton, 1968a) (Chapter 2.4.1.) and can access the resources of their peers' parents (Carolan and Lardier, 2018; Cherng, Calarco and Kao, 2013; Coleman, 1988; Crosnoe, 2004; Crosnoe, Cavanagh and Elder, 2003) (Chapter 2.4.2.). Furthermore, comparing their achievements with others' achievements can influence adolescents' attitudes and behaviour towards educational outcomes (Barron and Hulleman, 2015; Festinger, 1954; Mussweiler, 2009; Zell and Strickhouser, 2020) (Chapter 2.4.3.).

Friends' similar aspirations may not solely be attributed to social influence but can also be determined by friendship selection. People often prefer to socialize with others who have similar characteristics (Brown and Larson, 2009; McPherson, Smith-Lovin and Cook, 2001), especially when it comes to salient or visible characteristics (de Klepper et al., 2010; van Duijn et al., 2003).

Chapter 2.4.4 explores how individual attributes contribute to the formation of friendships in a school setting, with a particular emphasis on aspirations and academic achievement. The methodological aspects of this issue are discussed in more detail in the methodological section.

Generally, the social environments that people are a part of initially have similar compositions, which may lead to an overrepresentation of social connections based on similarity (Feld, 1982; Manski, 1993; McPherson and Smith-Lovin, 1987). For example, the formal and informal selection processes in the education system can lead to students within the same school or class being similar in terms of their parental backgrounds, academic performance, and the teaching environment they experience (Manski, 1993). These factors can also influence their future educational outcomes, including their aspirations. The empirical analysis in Chapter 7 accounts for those possible mechanisms.

Chapter 2.4.5 discusses how the present dissertation relates to other studies regarding peer effects on educational aspirations from a methodological and theoretical point of view. Throughout the following sections, I will restrict the usage of the term 'influence' to those cases in which social influence is directly distinguished from social selection effects. Nevertheless, I will also present empirical findings regarding peer effects on students' aspirations by applying different approaches.

2.4.1. Assimilation to Relevant Peers' Academic Motivation and Educational Aspirations

Social interactions can motivate individuals to adopt the attitudes or behaviours of relevant people in their lives (Brown and Larson, 2009; Kelley, 1952; Merton, 1968a; Molloy, Gest and Rulison, 2011). During adolescence, children become more vulnerable to the opinions and judgments of their peers compared to earlier stages of life (Laursen and Veenstra, 2021; Lieberman, 2015). Friendships can be incredibly influential in this regard (Berndt, 1992; Berndt and Savin-Williams, 1993; Brown and Larson, 2009), and therefore, the dissertation focuses mainly on friendship ties.

Different types of social influence processes can be identified, and it is possible for several of these to coexist simultaneously (Edwards, 1990). In certain situations, the influence is intentional. Adolescents can exert pressure on their peers to adopt a particular behaviour, reinforce this alignment of behaviour, use social sanctions to discourage undesirable behaviours, and serve as role models (Abrams and Hogg, 1990; Brown et al., 2008; Brown and Larson, 2009; Ryan, 2001). Peers can also create situations in which certain behaviours are encouraged even without making explicit attempts to influence others (Brown et al., 2008).

Edwards (1990) applies a more nuanced categorisation and distinguishes the following nine main influence processes: 'education, persuasion, imitation, induced counter-attitudinal action, conformity, compliance, conditioning, leadership, and obedience' (p. 3.). In the following, I will

briefly introduce these categories. However, not all of them are relevant in a school context among peers, and thus, in the context of the present dissertation.

Some of the abovementioned influence processes involve an intrinsic alteration in the person being influenced as a result of explicit or implicit reasoning. Education is the process of conveying information, knowledge, or skills to a recipient. Edwards (1990) defines persuasion as a similar process where a change in behaviour and attitude occurs as a result of accepting the reasoning presented by the influencer. This reasoning may be based on simple rules, heuristics, or the perceived expertise of the influencer. Furthermore, social influence can also occur when people are placed in situations where they have to face beliefs and actions that contradict their own.

In certain cases, the underlying justification holds little or no significance in social influence. Edwards (1990) defined imitation as copying the behaviour of others without any basis for reasoning, and conformity as the process by which the majority of the group's norms are accepted by the minority, either for the purpose of avoiding social punishment or because of a conviction. Instead of the majority, leadership positions can also cause a change in others. Further, compliance is accomplished by a direct request for individuals to alter their behaviour, whereas obedience is established through coercion from an authoritative figure. Not all of the processes mentioned above are relevant or applicable when interacting with peers in an academic setting. Despite any status divide that may exist among friends, this does not provide a basis for social influence in terms of leadership or obedience.

Some approaches to social influence emphasise that the primary distinction between processes of social influence is whether a person obeys an authority or finds reasons for agreeing with others and accepts a behaviour or attitude; these two processes can be labelled as normative and informational influence (Abrams and Hogg 1990; Smith, 2010a). Nevertheless, Turner (1991) challenges the distinction between informational and normative processes of influence as dual processes. He argues that informational influence includes norms, as the information that guides people's decisions conveys elements that indicate what is deemed acceptable or approved.

Consequently, the theory of referent informational influence states that rather than considering normative and informational influence as distinct processes, influence can be understood as a unified process that includes both normative and informational elements. According to this approach, people are more likely to trust information when it comes from someone they can relate to (Smith, 2010b).

The present dissertation introduces informational and normative elements of influence, but it does not aim to identify them as distinct categories of social influence processes. The dissertation recognises that information is a valuable resource that can be obtained through social relationships.

However, it does not suggest that accessing and accepting information is exempt from conforming to the norms that are shared by relevant others.

Educational aspirations, preferences, and the drive to succeed academically are often internal and not easily observed attributes. These qualities make it challenging to hold others accountable for them in a public manner. Therefore, it is likely that social influence on these phenomena arises from the acceptance of the behaviour and attitudes, rather than from pressure to conform (Abrams and Hogg, 1990). Consequently, social influence on aspirations can be related to adopting shared norms and values.

Relevant socializers can transmit academic values to students, which, in turn, can influence their academic motivation (e.g., Wigfield and Eccles, 2020). At the same time, people often take into account the social costs of their educational decisions (Jæger, 2007). They also tend to avoid the emotional burden of deviating from their friends' aspirations (Manzo, 2013).

Academic motivation and educational aspirations motivate action to help achieve desired goals (Trebbels, 2015). Thus, students can display behaviour in school that aligns with their ambitions and supports them in achieving their goals. Friends can influence each other's behaviour regarding school-related matters, such as studying, delinquency, or conformity. Adolescents often conform to the academic norms of their peers, which can either support or hinder their academic goals and adherence to school rules (Coleman, 1988; Crosnoe, Cavanagh and Elder, 2003; Kruse and Kroneberg, 2020; Ryan, 2001). This can result in the formation of norms for future educational plans, even without explicit discussion or enforcement (Berndt, 1992; Berndt and Savin-Williams, 1993; Brown and Larson, 2009).

A previous study conducted among middle school students found that when their friends engage in prosocial behaviour, it can have a positive effect on their own adjustment to prosocial behaviour (Wentzel, Barry, and Caldwell, 2004). Peer groups have been found to play a significant role in affecting the behaviour and emotional engagement of sixth grade students in school (Kindermann, 2007). Additionally, peer groups have been shown to impact students' beliefs about their competence and the importance they attach to meeting academic standards, as observed in a study conducted on fourth to sixth-grade students (Altermatt and Pomerantz, 2003). Moreover, Geven, Weesie, and van Tubergen (2013) found that Dutch secondary school students' problematic school behaviour, such as incomplete homework and lack of attention during classes, can be influenced by their friends.

Some academic values and school-related norms seem to be more prone to social influence than others. Shin and Ryan (2014) used social network analysis to investigate longitudinal data and showed that friends had an effect on sixth-grade students' enjoyment of an academic task, effortful and disruptive behaviour in school, and academic achievement. Reindl (2020), found that best

friends' values affected the perception of the importance of completing a task (*attainment value*) or the negative emotions associated with a subject (*emotional cost*). In contrast, the influence of best friends was found to be insignificant when it came to factors such as enjoyment of the task (*intrinsic value*) and the perceived importance of the task for future goals.

Ryan (2001) presented evidence of adolescent peer groups' impact on middle school students' intrinsic motivation (whether they liked or enjoyed school). An investigation conducted by Reindl, Gniewosz, and Dresel (2020) found that among German early adolescents, friends typically strengthened each other's internal academic beliefs. Moreover, they were also capable of instigating shifts in emotional and academic values. Concerning emotional academic values, Reindl, Tulis, and Dresel (2018) demonstrated a positive correlation between the domain-specific academic emotions of best friends in a group of German secondary school students. Regarding the differences between school subjects, Chow *et al.* (2018) argued that the transmission of values was particularly significant in academic subjects, such as language or mathematics, as these values were initially less salient than those in non-academic subjects, such as arts or exercise.

When discussing available career options and preferences, parents, peers, and friends can play a crucial role as influential sources of information (Ikonen et al., 2018; MKIK Gazdaság- és Vállalkozáskutató Intézet (GVI), 2020a; Vernon and Drane, 2020). These processes can be related to social influence processes identified as education and persuasion by Edwards (1990). Students may often turn to advice from individuals who appear to be successful within the educational system, such as high-achieving students or those with educated parents. Further, the salience of friends' dominant educational plans might drive adolescents toward the same option (Manzo, 2013).

Hungarian adolescents reported that, at the age of 14, their friends and peers were the third most important source of information when it came to choosing and applying to secondary school. More than 55 per cent of the respondents stated that friends and acquaintances were important sources in their decision-making process (GVI, 2020a, p. 31). Through such discussions, students may influence how their peers perceive and evaluate educational options. Informational elements of social influence on academic outcomes may be closely connected to the parental backgrounds of students. Therefore, the next subsection will discuss the role of parental resources of relevant peers.

2.4.2. Access to Relevant Peers' Parental Resources

As discussed in Chapter 2.2, parental material and immaterial means play an essential role in developing adolescents' aspirations (e.g., Bourdieu and Passeron, 1977; Breen and Goldthorpe, 1997). Schools serve as more than just educational institutions where learning materials are transmitted. They also provide social contexts, where social interactions take place and grant access to social capital that goes beyond what can be provided by families alone. Resourceful parents can

provide their children with educational advantages, which can also benefit others through peer relationships, especially friendships (Crosnoe, 2004).

Information, for instance, is a crucial resource accessible through social connections (Coleman, 1988; Lin, 2001). Adolescents can acquire knowledge from their peers about academic matters that they may not have access to within their families. In the context of the secondary school application process, friends with well-educated parents can provide valuable information and guidance. They can help explain the different types of secondary education tracks and their respective advantages, as well as provide insights into the admissions process and requirements. Adolescents can also influence their peers by sharing the expectations and norms about what constitutes a 'good school' or a 'good education' that they learned through their socialization (Bourdieu, 1990).

Previous studies have demonstrated that the social connections between parents could have a positive impact on students' academic performance (Carolan and Lardier, 2018; Coleman, 1988). Best friends who have highly educated parents have also been shown to positively affect students in completing college (Cherng, Calarco and Kao, 2013), and the educational level of friends' parents was found to be positively linked to the educational aspirations, expectations, and academic achievement of US high school students (McDermott et al., 2020). Nonetheless, the relationship between the resources available in families and schools can lead to social reproduction, rather than reducing educational inequalities. Students from advantaged backgrounds often benefit from additional resources provided by schools (Crosnoe, 2004).

2.4.3. How Friends' Academic Achievement Can Confound the Influence of Friends' Academic Aspirations on Adolescents' Aspirations

Individuals' abilities and success beliefs are constantly formed by self-evaluation based on both within-individual comparisons and comparisons with relevant others (Barron and Hulleman, 2015; Festinger, 1954; Mussweiler, 2009; Zell and Strickhouser, 2020). *Social comparison* mechanisms have an impact on how individuals assess their own performance and their expectations for future success in a task. This, in turn, can influence how they modify their aspirations. (Eccles and Wigfield, 2020). Therefore, comparison with their peers' academic achievement may affect adolescents' aspirations.

Students can directly observe the academic achievement of their classmates and compare their own performance to theirs. Being surrounded by high achievers can negatively affect self-evaluation, leading to a downward adjustment of aspirations (Alwin and Otto, 1977; Marsh, 1991; Rosenqvist, 2018). Social comparison can also offer an interpretative frame resulting in the

assimilation of adolescents' academic achievement to their relevant peers' achievement (Huguet et al., 2009).

Several studies have shown that the academic achievement of adolescents and young adults e can be positively influenced by the academic achievement of their friends (e.g., Altermatt and Pomerantz, 2005; Cook, Deng and Morgano, 2007; Fujiyama, Kamo and Schafer, 2021; Gutiérrez, 2023; Kretschmer, Leszczensky and Pink, 2018; Lomi et al., 2011; Ryan, 2001; Shin and Ryan, 2014). Consecutively, adolescents' academic achievement could affect how adolescents adjust their academic choices and, as a result, their educational aspirations (e.g., Breen and Goldthorpe, 1997; Sewell, Haller and Portes, 1969; Sewell, Haller and Ohlendorf, 1970; Wigfield, Tonks and Klauda, 2009).

The *negative contrast* and the *positive assimilation* effect of peers' academic achievement on aspirations can co-exist (Seaton et al., 2008); therefore, through negative social contrast effects, their peers' academic achievement can negatively influence adolescents' educational aspirations beyond its positive impact of affecting adolescents' academic achievement.

In the scope of the present study, those two mechanisms are not explicitly differentiated. Yet, by considering the impact of both peers' academic achievement and peers' aspirations on adolescents' aspirations, it is possible to account for the potential effect of peers' academic achievement on peers' aspirations.

Several previous studies have primarily looked at social comparison within the context of schools, grades, or classes (e.g., Alwin and Otto, 1977; Boyle, 1966; Jonsson and Mood, 2008; Rosenqvist, 2018). Meanwhile, the local dominance effect suggests that people tend to choose the most local comparison standards instead of more general ones when both types of comparisons are available (Zell and Alicke, 2010). Following, friends could be relevant comparison standards for self-evaluation in an academic context (Dijkstra et al., 2008; Lubbers, Kuyper and van der Werf, 2009).

Nevertheless, based on a longitudinal study of social networks, it was found that, once the school class's academic achievement was controlled for, friends' academic achievement did not affect whether adolescents adjusted how they evaluate their abilities and prospects in response to their friends' achievement (Jansen, Boda and Lorenz 2022). Therefore, the academic achievement of friends is not expected to directly have a negative effect on adolescents' aspirations. However, it is important to control for the potential impact of friends' academic achievement on their own aspirations.

With regard to educational aspirations, some previous studies have shown that the academic achievement of peers within a school cohort may negatively impact students' educational preferences (Jonsson and Mood, 2008; Rosenqvist, 2018). Nonetheless, there is also empirical

evidence supporting a positive effect of school classmates on students' educational aspirations (Smith, 2023). This suggests that the influence of peers' academic achievement on adolescents' educational aspirations may be specific to certain contexts or may vary depending on the level at which peers are measured.

2.4.4. How Educational Aspirations and Academic Achievement can Contribute to the Friendship Selection Process

Friendship ties are often chosen based on similarities between individuals along relevant dimensions (Brown and Larson, 2009; McPherson, Smith-Lovin and Cook, 2001). Therefore, to accurately measure the influence on the similarity between friends, it is essential to differentiate between the effect of choosing friends based on shared educational aspirations and academic achievement, and the impact of social influence (Brown and Larson, 2009; Steglich, Snijders and Pearson, 2010; Ryan, 2001; Veenstra and Dijkstra, 2012).

The extent to which individual characteristics are observable for others can determine their impact on social influence and selection processes (de Klepper et al., 2010; van Duijn et al., 2003). Attributes that are not easily noticeable by others can still be influenced, but they may not impact the selection of social relationships because they are not salient. Contrary to non-observable characteristics, observable attributes can be relevant for friendship selection.

Conclusions regarding the role of different norms and values in social influence and selection in a school setting are mixed. Wang *et al.* (2018) showed that when it comes to choosing friends, students primarily consider the indicators of the easily observable behaviour engagement rather than the emotional and cognitive aspects of school engagement. Nevertheless, a study on a sample of students in a girls' school in the United Kingdom found that both a growth mindset and perseverance were influenced by friends and also played a role in selecting friendships. In contrast, the overall value of learning was only a significant factor in friendship selection (Burgess et al., 2020).

On one hand, aspirations may directly contribute to friendship selection. Adolescents can discuss their future educational plans and aspirations (GVI 2020a; Ikonen et al., 2018). Those discussions can affect not only their aspirations but also their friendship dynamics. For example, individuals who aim to get into schools with strict admission requirements may spend time studying or discussing information related to admissions. This can help them form or strengthen a bond with each other. Students from affluent backgrounds may possess a form of 'collective intelligence', which refers to their shared knowledge of the education system and how to effectively navigate it (Nash, 2005).

On the other hand, aspirations may play a role in friendship selection indirectly. Aspirations require work and focus to achieve the objectives individuals set for themselves (Trebbels, 2015). Students may display observable behaviours in relation to schoolwork, such as good behaviour, active participation in classes, and completing homework, which can be an indication of shared aspirations. Since salient behaviours can play a role in the selection of friendships (de Klepper et al., 2010; van Duijn et al., 2003; Wang et al., 2018), aspirations may indirectly affect friendship ties through noticeable behaviours in school that serve as indicators of students' aspirations.

Moreover, academic achievement can be considered as an observable attribute for classmates through several mechanisms. In Hungarian primary schools, students spend the majority of their school classes with the same group of peers because of the fixed class assignments. Students are often required to give oral reports in front of their classmates, who can hear the feedback on their performance. Similarly, students can easily view their peers' test scores. When midterm and end-term reports are distributed, high-achievers are publicly recognized for their exceptional performance.

Furthermore, like ambitions, academic achievement is often accompanied by observable behaviours related to schoolwork, such as class participation or completing homework (or the lack thereof) (Green et al., 2012). Academic achievement, being a noticeable attribute, can indicate traits that are not easily observable but may be significant for choosing friends (Lomi et al., 2011; Torlò and Lomi, 2017).

Several previous studies have shown that academic achievement can play a role in the process of selecting friends (Crosnoe, Cavanagh and Elder, 2003; Flashman, 2012; Gremmen et al., 2017; Lomi et al., 2011; Rambaran et al., 2017; Torlò and Lomi, 2017; Smirnov and Thurner, 2017). Nevertheless, popularity norms and the performance of both popular and non-popular students may contribute to determining the extent to which friendship selection is influenced by academic achievement in the class (Laninga-Wijnen et al., 2019).

Some studies have shown that students often dissolve friendships with friends whose achievements become different from their own, rather than adjusting their own achievements to match their friends' (Flashman, 2012; Smirnov and Thurner, 2017). More specifically, Gremmen et al. (2017) highlighted how academic achievement plays a significant role in the selection of friends when new groups are formed. Regarding Hungarian adolescents, a study conducted by Hajdu, Kertesi, and Kézdi (2019) found that the academic achievement of other students in the same school class influenced the formation of interethnic friendship connections, while the less observable test scores did not have the same effect.

2.4.5. Previous Studies Concerning Peer Effects on Educational Aspirations

This section examines empirical studies concerning the impact of peers on academic or educational aspirations. Identifying the main limitations of previous research, this section explains how this dissertation contributes to the existing body of research. Peer effects on educational aspirations gained attention among sociologists in the United States when Coleman (1961) published 'The Adolescent Society', emphasising the role of peers, teachers, and the school environment in an educational context. The accompanying data underwent extensive analysis in the 1960s and 1970s.

The Wisconsin model of status attainment was introduced during the same period. It was based on a longitudinal study that began in 1957 and included high school students in Wisconsin (e.g., Sewell and Hauser, 1993). In 1964, a follow-up study was conducted on one-third of the initial sample. The model was innovative because it took into account the impact of interpersonal factors like parents, peers, and teachers, as well as the use of socioeconomic and ability measures to model social status. The results demonstrated a strong correlation between the educational plans of friends and college plans, which subsequently influenced the level of educational attainment. Additionally, the educational plans of friends also directly affected educational attainment.

Following the Wisconsin study, most subsequent studies focused on US secondary school students. These studies examined the impact of having a best friend on one's aspirations (e.g., Alexander and Campbell, 1964; Cohen, 1983; Davies and Kandel, 1981; Duncan, Haller and Portes, 1968; Hallinan and Williams, 1990; Kandel, 1978; Kandel and Lesser, 1969). Some studies have found that the effect of best friends on aspirations was not very strong (Cohen, 1983), particularly when compared to the influence of mothers' aspirations for students (Kandel and Lesser, 1969). Other studies have highlighted that the association was more noticeable in case of reciprocated friendship ties (Alexander and Campbell, 1964; Hallinan and Williams, 1990).

Subsequent research expanded the scope of peer effects on aspirations beyond best friends. Those measures include the effect of friends in general (e.g., Burgess and Umaña-Aponte, 2011; Mora and Oreopoulos (2011), friendship groups (e.g., Kiuru et al., 2007) or the combined influence of friends, friendship groups, and the broader peer context (Raabe and Wölfer, 2019). Some studies did not have information about the interactions between individuals, so they determined the influence of peers on students' educational aspirations based on students' own perceptions of their friends' aspirations (e.g., Carolan, 2018; David-Kacso, Haragus and Roth, 2014; Picou and Carter, 1976; Roth, 2017; Sewell and Hauser, 1972; Zimmermann, 2018) or their perceptions of their friends' aspirations for them (Buchmann and Dalton, 2002).

One of the main problems with many previous studies in this field is that they didn't properly distinguish between two important processes that could result in friends having similar educational aspirations: social influence and the selection of friends based on shared aspirations

(Brown and Larson, 2009; McPherson, Smith-Lovin, and Cook, 2001; Mouw, 2006).To accurately understand the impact of social influence on educational aspirations, it is important to separate this mechanism from social selection (Brown and Larson 2009; Steglich, Snijders and Pearson 2010; Ryan 2001; Veenstra and Dijkstra 2012). Although several studies have found a significant positive association between students and their peers' aspirations (Carolan, 2018; Raabe and Wölfer, 2019; Roth, 2017; Zimmermann, 2018), they have not focused on the role of friendship selection in determining the similarity of educational aspirations among friends.

The latter strain of research has gained more attention recently applying longitudinal social network analysis models (Kretschmer and Roth, 2021; Lorenz et al., 2020; Mundt and Mundt, 2020). There is some empirical evidence for social influence on attributes that are closely related to educational aspirations such as enjoyment of an academic task or effortful and disruptive behaviour in school (Shin and Ryan, 2014). Furthermore, some studies have shown that educational expectations can be influenced by peers, even after taking into account the potential confounding effect of friendship selection (Kretschmer and Roth, 2021; Lorenz et al., 2020). Nevertheless, those studies solely examined post-secondary educational expectations, which may differ from the coevolution of friendship dynamics and aspirations prior to entering secondary education.

Several studies focused on the role of the broader peer group students were exposed to regarding the development of adolescents' school engagement, academic achievement, or aspirations (Alwin and Otto, 1977; Boyle, 1966; Choi et al., 2008; Nelson, 1972; Nieuwenhuis and Chiang, 2021; Rosenqvist, 2018; van Ewijk and Sleegers, 2010). These effects may be particularly substantial regarding those peers with whom students regularly interact in school classes rather than the peers of the same class or cohort (van Ewijk and Sleegers, 2010).

Nonetheless, there is vast empirical evidence concerning the importance of the broader peer context as well. The socioeconomic composition of individuals' neighbourhoods can affect the opportunities they considered feasible for themselves (Furlong, Biggart and Cartmel, 1996). Some studies have suggested that the composition of the school (Boyle, 1966) or the overall aspirations of the school cohort (Rosenqvist, 2018), the educational preferences and academic achievement of classmates (Smith, 2023), or various aspects of peer composition (such as high achievement, advantaged family background, and high educational aspirations) (Dickerson, Maragkou and McIntosh, 2018) were positively related to the aspirations of adolescents. The school cohort can also have negative effects on students' aspirations by comparing one's abilities to others in the same environment (Alwin and Otto, 1977; Marsh, 1991; Nelson, 1972; Rosenqvist, 2018). These positive and negative effects of the school environment can also offset each other (Alwin and Otto, 1977).

Little is known about the disentangled effect of friendship ties and the broader peer context on educational aspirations (exception is Raabe and Wölfer, 2019, to my knowledge). Previous

studies have mostly focused on either one of these factors. Nevertheless, friendship relations are always embedded in the broader social context, thus the school class composition affects the opportunities for friendship formation within the class (Brown, 2004; Kwon and Lease, 2014; Manski, 1993; McPherson and Smith-Lovin, 1987). Therefore, the present dissertation addresses this issue by accounting for the broader peer context besides friends' effect on students' aspirations in Chapter 7.

The extent to which students' aspirations are affected by their peers may vary (e.g., Smith, 2023; Steinberg and Morris, 2001). Therefore, the present dissertation examines peer effects on students from varied backgrounds. Students from a less privileged family background can particularly benefit from the educational resources of their peers (Burgess and Umaña-Aponte 2011; Lessard and Juvonen 2019; Smith, 2023; Sokatch 2006; Wohn et al., 2013).

Preceding research concerning peer effects on educational aspirations focused on several measures of educational goals, preferences, and academic motivation. Most previous studies have considered the highest desired or anticipated level of education (e.g., Kretschmer and Roth, 2021; Lorenz et al., 2020). Among those studies that examined peer effects regarding the next decision point in the educational system (e.g., Burgess and Umaña-Aponte, 2011; Mora and Oreopoulos, 2011; Kiuru et al., 2007; Rosenqvist, 2018; Roth, 2017; Sewell and Hauser, 1972; Smith, 2023; Zimmermann, 2018), studies that focused on aspirations before students entered secondary education were mainly concerned with peers in the same school cohort or class (e.g., Jonsson and Mood, 2008; Rosenqvist, 2018; Smith, 2023; Zwier et al., 2023). For Hungary, Keller (2023) did not find evidence for friends' and desk mates' effect on adolescents' effect on secondary school track choice.

Although several studies have examined the influence of peers on educational outcomes in an educational setting, such as measuring motivation (for example, Reindl, Gniewosz, and Dresel, 2020; Reindl, Tulis, and Dresel, 2018; Ryan, 2001), less emphasis has been placed on academic aspirations and motivation with a focus on immediate academic results. It can be argued that students are more likely to understand and relate to aspirations regarding their next assessment or the level of educational attainment they are aiming for, rather than focusing on the highest level of education. Therefore, besides educational aspirations with regard to school types, the dissertation is also concerned with such outcomes in the empirical analysis in Chapter 5.

Comparative studies using international data have shown that the level of stratification in the secondary school system can affect how peer influences shape aspirations. In educational systems where early ability tracking is implemented, the connection between students and their friends' aspirations after tracking can weaken or even disappear (Buchmann and Dalton, 2002; Raabe and Wölfer, 2019). With regard to the German educational system characterized by early ability

tracking, Lorenz *et al.* (2020) suggested that friends could only influence educational expectations in schools with diverse educational tracks.

Secondary education in Hungary involves tracking, which has a significant impact on future aspirations due to the selection mechanisms for secondary education (GVI, 2020a; Lannert, 2009; Nagy, 2004; Sáska, 2014; Schumann, 2009). Therefore, this dissertation focuses on primary school students and examines the influence of peers on various types and measures of educational aspirations. These aspirations are studied within a time frame of a few years. Further, the present thesis also addresses various mechanisms through which peers can influence each other: adjustment to friends' aspirations, access to friends' parental resources, and social comparison mechanisms.

2.5. The Hungarian Educational Context

Peer effects on educational outcomes may not be independent of the characteristics of the educational system such as the age at which ability tracking occurs (Buchmann and Dalton, 2002; Raabe and Wölfer, 2019). In this chapter, I summarise the characteristics of the Hungarian educational system and of the secondary school application process. In the present dissertation, peer effects are investigated in the upper-primary school context, before students transition to secondary school.

The compulsory school-leaving age in Hungary is 16. Nonetheless, in order to obtain the secondary school-leaving qualification necessary for access to postsecondary education, students need to continue their education for a longer period of time. Primary education typically lasts for eight years, followed by three to five years of secondary education in various educational paths or tracks. Educational reforms after the regime change also re-introduced early tracking options for students. This means that it is possible to transition to six-year and eight-year grammar school tracks after completing the fourth and sixth grades of primary education, respectively. This marked a shift towards early tracking in the educational system (Fehérvári and Híves, 2017; Fehérvári, Híves and Szemerszki, 2021; Sáska, 2014). An overview of the Hungarian educational system is depicted in *Figure 1*.

The secondary school tracks are the following: vocational track, vocational secondary school track, and grammar school track. Schools can offer education in multiple tracks at the same time (Andor and Liskó, 2000). The homogeneity within school classes and schools is increased when students are sorted into different secondary school tracks (e.g., Lannert, 2009; Schumann, 2009). Placement in secondary school tracks is strongly associated with postsecondary aspirations. Students in the most academic-oriented secondary school track (grammar school track) students are usually more likely to pursue higher education after graduation than students in secondary school tracks with vocational elements. (GVI, 2020b; Lannert, 2009; Schumann, 2009).

Vocational secondary schools provide a combination of both academic and vocational instruction. They prepare students for the secondary school leaving examination. Additionally, they incorporate pre-vocational components, allowing students to qualify for tertiary education or to further pursue vocational education at an advanced level. Vocational secondary schools lost their position as the top choice for eighth-grade students in secondary education, being surpassed by grammar schools from the academic year 2015/2016 to 2020/2021. Nevertheless, when it came to admissions, vocational secondary schools remained more popular than grammar schools (Oktatási Hivatal, 2021).

The vocational track lasts for three years and does not provide the opportunity to take the secondary school final examination. There were some changes in vocational education in 2013. These changes included a reduction in the duration of instruction to 3 years and a decrease in the number of general contact hours in the curriculum. This made it more difficult to transition from vocational schools to any kind of post-secondary education than it was previously. An empirical investigation revealed that the reforms had a detrimental effect on the mathematics and reading abilities of vocational school students (Hermann, Horn and Tordai, 2020).

Over the past decade, there has been a decrease in the number of eighth-grade students who have applied for and been accepted into vocational school programs (Oktatási Hivatal, 2021). The students who enrol in vocational school track programs often come from more disadvantaged family backgrounds when compared to the other two secondary school tracks (Fehérvári and Híves, 2017).

Grammar school curricula prioritize academic subjects in comparison with the other two tracks. The organisation of instruction in grammar school tracks is well-suited to preparing students for admission to tertiary education. In the last few decades, there has been an increasing interest in grammar school tracks (Fehérvári, Híves and Szemerszki, 2021; Sáska, 2014) and grammar school track programs have the highest rate of filling up spots for the ninth grade, while the six-year and eight-year grammar school tracks have the highest application rates among educational programs in general (Oktatási Hivatal, 2021).

The secondary school application process is centrally managed, allowing students to apply to multiple educational programs. The ranking of the applications on students' forms indicates their preferences. Schools are not aware of the preferred order of students, and this order can be changed for a certain period of time. Students apply to educational programs, not to schools (specialisations and tracks within schools) (Oktatási Hivatal, 2021).

Applying to a school does not guarantee entry, but the application is a necessity for admission. Admission to a secondary school program can be based on three factors: the results of the central application test, the grades in main subjects, and an oral exam at the school. Schools

inform students in advance about the specific combination of these elements they will use. The placement of students is centrally controlled, with an algorithm assigning students to their most preferred educational program out of those they have been admitted to (Kóczy, 2010).

Generally, 60 per cent of all eighth-grade students who apply for secondary education participate in the central examination. The most competitive schools require the results of the central test, the primary school grades, and an oral exam. None of the vocational schools require participation in the central application test or oral exams. However, it is worth noting that while many vocational secondary schools focus solely on academic achievement, about a third of them do require the results of the central application test or oral examination. The highest percentage of schools that consider all three methods of assessing applicants (central test results, grades, and oral exam) is found among grammar schools (Oktatási Hivatal, 2021).

Following the regime change, the schools in Hungary had to face the challenge of a declining birth rate while adhering to a normative school support system. In such conditions, schools that offer educational programs with the expectation of students being accepted into tertiary education could increase their student population. The eight-year-long and six-year-long grammar school programs, as well as the four-year programs with a specialization in a specific area of study such as humanities or mathematics, served that purpose (Andor, 2003).

Andor (2003) noted that during the socialist era, there were already subtle forms of stratification through informal information sources about schools. Nevertheless, with the segmentation of secondary school education, the gap between tracks based on academic achievement and socioeconomic background became even wider. Grammar school students, in particular, come from more privileged family backgrounds (e.g., Lannert, 2009; Schumann, 2009). Students in six-year-long and eight-year-long grammar schools have an even higher socioeconomic status than students in regular grammar school classes (Andor, 2003).

Nevertheless, Hungarian primary schools already show a substantial variation in the family backgrounds of students. (Kertesi and Kézdi, 2005; Kertesi and Kézdi, 2009). The Hungarian educational system has several mechanisms that contribute to and exacerbate social inequalities in educational outcomes, even prior to the selection process for secondary schools. According to Berényi, Berkovits and Erőss (2008), segregation at the primary level of education is maintained because of parents' free school choice within certain limits, and schools have the right to choose among the children in certain situations. Classes with a specific focus, such as music or sports, as well as schools run by foundations or religious organisations, may admit students based on their talent, ability, or religious behaviour.

Classes with a specific focus, such as music or sports, as well as schools run by foundations or religious organisations, may admit students based on their talent, ability, or religious behaviour.

These schools have better access to financial resources compared to public schools. Additionally, their ability to select students based on certain criteria, often lead to a hidden selection process that favours students from more advantageous backgrounds (Bazsalya and Hörich, 2021; Velkey, 2019).

The parents of students from lower socioeconomic backgrounds are often less inclined to select 'prestigious' courses or schools for their children. They often have limited information and are not familiar with school environments, or they may not consider 'prestigious' options as a viable choice for their children (Berényi, Berkovits and Erőss, 2008; Velkey, 2019). Meanwhile, middle-class families often choose to send their children to schools with a more privileged student body, even if it means longer travel times (Kertesi and Kézdi, 2014; Zolnay, 2018). Sometimes less advantaged students are the ones who commute to be segregated (Zolnay, 2018). Residential segregation usually affects school choice to a lesser extent in cities than in smaller towns or villages because of the lower commuting costs (Kertesi and Kézdi, 2014).

Because parents have the freedom to choose schools and schools have the ability to select students under some circumstances, inequalities in the educational system can already be observed at the primary level (Kertesi and Kézdi, 2005; Kertesi and Kézdi, 2009; Tóth, Csapó and Székely, 2010). Disadvantaged students are often concentrated in certain schools or classes, resulting in them receiving a lower quality of education compared to students from more privileged backgrounds (Kertesi and Kézdi, 2005; Kertesi and Kézdi, 2009). The homogeneous composition of schools regarding family background is partly responsible for the profound effect of cultural capital on test scores in Hungary (Radó, 2007). High aspirations are also commonly found in schools or classes that have students from privileged backgrounds (Lannert, 2005). As students progress to higher grades, especially in secondary education, these tendencies become even more noticeable (Andor and Liskó, 2000; Tóth, Csapó and Székely, 2010).

The impact of family background on academic achievement leads students to be directed towards schools that are academically more homogeneous as they progress through the education system (Fehérvári and Híves, 2017). Family background has a significant impact on students' aspirations and admissions to secondary schools. It also has an indirect influence through its effect on students' academic achievement (Hermann, 2004; Lannert, 2009; Schumann, 2009). As a result, secondary school tracks are highly differentiated based not only on students' abilities and achievements but also on their family backgrounds, which influence both their track preferences and admissions (Andor, 2003, 2005; Hermann, 2004; Lannert, 2005; GVI, 2020a).

As mentioned before, students who choose and attend grammar schools generally perform better academically and come from more privileged family backgrounds compared to students who choose other types of secondary schools (GVI, 2020a). Additionally, students in the grammar

school track are more likely to claim that they had planned their secondary education well in advance of the application deadline (GVI, 2020b).

Students with more educated parents are more likely to have access to important information about secondary schools and different types of schools (Hermann, 2004). They also tend to depend more on informal sources and information from social connections rather than traditional sources when making educational decisions (Andor, 2005; GVI 2020a). Besides the effect of parental background on the individual level, having peers with advantaged parental backgrounds may provide additional benefits in Hungarian schools.

Classes with many students whose parents are educated tend to achieve higher academically. This is partly due to the higher expectations set by their parents. In addition, students from school classes with more supportive parents may inspire one another or establish norms to strive for high goals (Lannert, 2005). Additionally, schools that have a more advantaged student body tend to attract more motivated or more qualified teachers (Kertesi and Kézdi, 2005; Kertesi and Kézdi, 2009; Lannert, 2005). Schools with a more advantaged student body rarely face a problem with finding teachers who meet the necessary educational standard (Varga, 2009).

Segregation based on socioeconomic background often coincides with ethnic segregation in the Hungarian educational system (Kertesi and Kézdi, 2009). There is often a connection between ethnic background, socioeconomic background, and students' ability. Roma students are more likely to come from disadvantaged backgrounds. As a result, there is a significant disparity in the test scores of Roma and non-Roma students (Kertesi and Kézdi, 2012). These differences in test scores also have an impact on the future educational aspirations of Roma students (Szalai, 2008).

Szalai (2008) explains that Roma students, upon leaving primary school, have lower expectations of themselves compared to their non-Roma peers. The differences in future aspirations between Roma and non-Roma students are not only influenced by their academic achievement but also by internalized labels. While non-Roma students tend to prefer secondary schools that offer graduation, Roma students are more likely to opt for vocational schools.

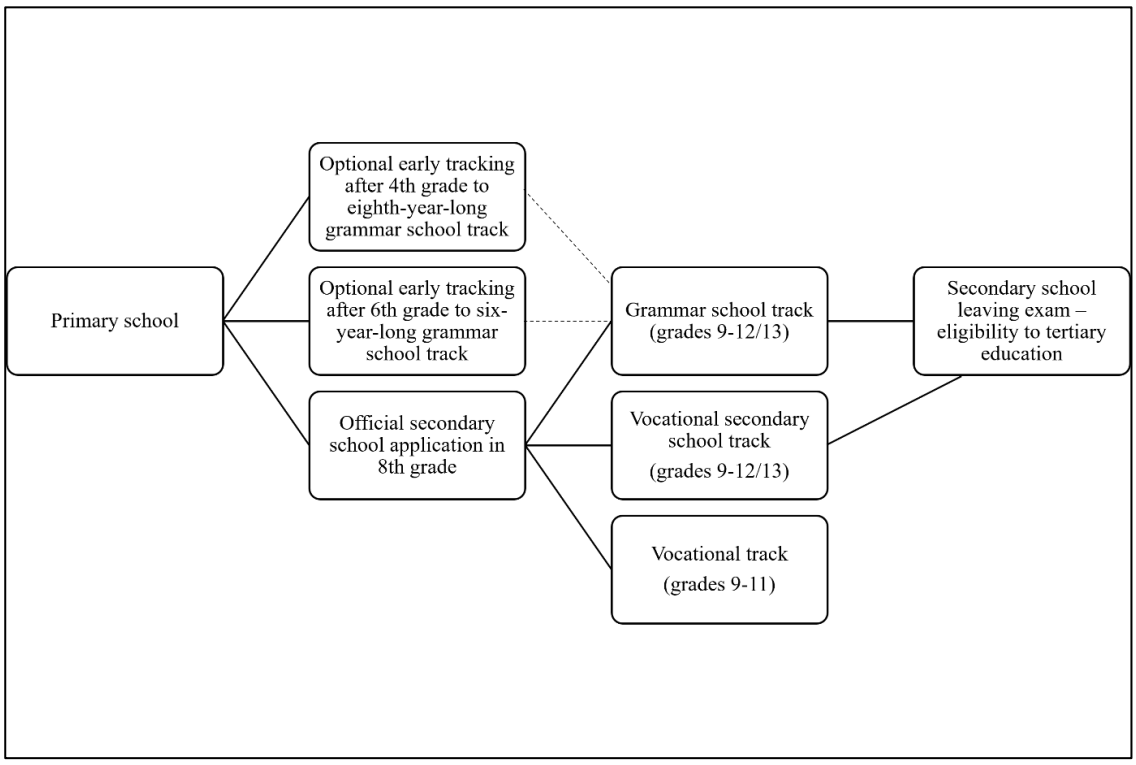
Some structural changes occurred regarding secondary education since the data collection (2013-2017), but those did not affect the overall organisation of the system. For instance, the compulsory school-leaving age was lowered from 18 to 16 years for students starting grade 9 in September 2012 or later (2011. évi CXC. tv.). The measure raised concerns that students from disadvantaged families were more likely to drop out of school early (Fehérvári and Híves, 2017). First short-term results show that reducing the minimum age for leaving school did lead to an increase in the number of young people aged 16-18 who left school early. This was observed among eighth-grade students in the 2011 and 2012 cohorts. However, it did not result in a decrease in the

completion of secondary school. Thus, the reform mainly affected students who might have dropped out of school later but still without a completed secondary education (Hermann, 2020).

To conclude, secondary schools have a high dispersion in students' ability (test scores), academic achievement, and family backgrounds (Hörich, 2019; GVI, 2020b; Lannert, 2005). Secondary school tracks can exacerbate these differences, as more demanding secondary education programs also have a beneficial effect on students' academic performance (Hermann, 2013).

The secondary school track has a substantial effect on post-secondary school opportunities and aspirations (GVI, 2020a; Lannert, 2009; Schumann, 2009). Students from more privileged family backgrounds tend to plan on attending grammar schools, while students from grammar schools are more likely to pursue higher education compared to those from other secondary schools (Lannert, 2009). This indicates that the unequal participation in tertiary education starts with the process of selecting and self-selecting into various secondary school tracks (Nagy, 2004; Sáska, 2014).

Figure 1: Overview of the Hungarian educational system on the primary and secondary level



Notes. Own edition

3. RESEARCH QUESTIONS

This dissertation examines how peers in Hungarian primary schools can influence each other's academic and educational aspirations. The empirical studies in this thesis aim to build upon existing knowledge about the relevance of peers to students' aspirations. The studies provide a thorough examination of this topic from multiple perspectives. First, the thesis aims to demonstrate whether different types of aspirations are influenced differently by peers and if they contribute differently to the selection of friendships. Second, the social context in which students are immersed, and where they can form friendships within their school class, may also be important (Feld, 1982; Manski, 1993; McPherson and Smith-Lovin, 1987). Nevertheless, friendship ties are the primary focus of the dissertation.

Third, it is important to distinguish mechanisms of how friends can influence students' aspirations. This includes factors such as adjusting to the norms, values, and attitudes shared by friends, access to their parental resources, and considering friends' academic achievements. Fourth, secondary schools are largely stratified based on socioeconomic background and academic achievement. Subsequent educational aspirations, choices, and opportunities are drastically impacted by the transition to secondary school. Consequently, peers' influence on aspirations prior to tracking can be meaningful and have profound implications for students' academic trajectories.

The primary goal of the first empirical investigation in Chapter 5 is to examine if students' peers can have an impact on their academic ambitions, expressed as grades in mathematics and Hungarian literature. The analysis disentangles social influence on academic ambitions from friendship selection based on similar academic ambitions and achievement.

Chapter 6 explores how the preferences of friends, along with their parental backgrounds and academic achievements, can influence adolescents' secondary school track preferences before they apply to secondary schools. The study also takes into consideration the potential influence of friendship selection on the similar educational preferences of friends. The empirical analysis also investigates whether the impact of friends' parental backgrounds differs depending on the students' own parental backgrounds.

Chapter 7 explores the connection between students' preferences for the grammar school track in their secondary school applications and the preferences of their friends and classmates. The study examines the impact of friends and school classmates, considering the potential effect of friendship selection. It distinguishes between the influence of stable friends' educational preferences and the preferences of all friends. In addition, the study investigates the direct and

indirect effects of different characteristics of peers. The empirical study also examines if the connection with friends' preferences differs depending on the student's parental background.

The hypotheses for the empirical studies can be found in the chapters that cover each study.

Table *1* contains a summary of the research questions addressed in the empirical chapters.

Table 1: Research questions for the empirical chapters

Main research questions	Chapter 5	Chapter 6	Chapter 7
Do peers affect adolescents' educational aspirations?	x	x	x
Does social selection, social influence, or both contribute to friends' similar educational aspirations?	x	x	-
Do academic achievement, educational aspirations, or both contribute to friendship selection?	x	-	-
Do peer effects on educational aspirations vary by students' parental backgrounds?	-	x	x

4. DATA AND METHODS

4.1. Data

The dissertation utilises data from the second, fourth, fifth, and sixth waves of the MTA 'Lendület' RECENS research project 'Competition and Negative Ties' (e.g., Kisfalusi, Janky, and Takács, 2019). Not every chapter utilises all the mentioned waves. Chapter 5 uses the fourth, fifth, and sixth waves; Chapter 6 applies the second, fourth, and fifth waves, while Chapter 7 uses the fifth and sixth waves. The explanation of the inclusion of specific waves is provided in each empirical chapter.

The data collection included all students who gave their consent from the school classes included in the sample. The study began in autumn 2013 when students from the sample started fifth grade in primary school. It concluded in spring 2017, which was their last semester in eighth grade. The data collection was primarily aimed at analysing the network and behavioural dynamics within the selected school classes. Students who left school classes involved in the study were excluded from the sample, while those who joined the classes later were included if the student and their parents provided consent.

The project's initial stage included four data waves that were collected once each semester when the students were in fifth and sixth grades. The four initial data collection waves were extended to two more waves, which included a smaller sub-sample of schools during the spring semesters when students were in seventh and eighth grade. The author of this dissertation was involved in either the data collection process or provided support from the background in all waves.

The datasets are not representative of Hungarian primary school students. The sample included students from primary schools in Northern and Central Hungary. Some of the main interests of the study were interethnic relationships between Roma and non-Roma students, the development of relational integration or segregation based on ethnicity, and the emergence of status dynamics related to ethnicity. Therefore, schools that had a larger number of Roma students were overrepresented in the sample. As a result, students from disadvantaged backgrounds and those who scored lower on the National Assessment of Basic Competencies were also overrepresented.

The collected data contains information about various aspects of the student's network, such as friendships, preferences, ethnicity, and incidents of bullying. Moreover, there is data available on students' school-related attitudes, educational aspirations, and school performance. Homeroom teachers' assessments of the individual students and the school classes can also be matched to the student datasets.

Parents and children were provided with written information about the research prior to the study. The participation of the students required the consent of both the students themselves and their parents. Most of the students in the sample agreed (ranging from 87 to 97 per cent over the years) and completed the questionnaire (between 81 and 91 per cent in different waves), as shown in *Table 2*. Nevertheless, not all participating students answered all questions. Research assistants supervised the completion of questionnaires on tablets during students' regular school classes. Students were assured that their answers would be kept confidential, and their identities would remain anonymous in the data analysis.

Table 2: Participation in the study by waves

Wave	Level	Number of classes	Number of schools	Number of students	Consent (%)	Filling out the questionnaire (%)
1st	5th grade, autumn semester	61	35	1183	87%	81%
2nd	5th grade, spring semester	58	35	1131	92%	88%
3rd	6th grade, autumn semester	53	34	1073	96%	90%
4th	6th grade, spring semester	53	34	1054	97%	90%
5th	7th grade, spring semester	39	26	743	95%	89%
6th	8th grade, spring semester	37	25	663	96%	91%

Notes. Own calculations.

The average class sizes, gender composition of the sample, and students' average age in the different waves are shown in *Table 3*.

Table 3: Students within the sample

Wave	Level	The average number of students within a class (SD)	Gender composition	Students' average age in years (SD)
1st	5th grade, autumn semester	20.56 (4.85)	Male: 54.0% Female: 46.0%	11.02 (.73)
2nd	5th grade, spring semester	20.73 (5.06)	Male: 53.7% Female: 46.3%	11.69 (.78)
3rd	6th grade, autumn semester	21.37 (4.93)	Male: 51.6% Female: 48.4%	12.07 (.75)
4th	6th grade, spring semester	21.02 (4.90)	Male: 50.9% Female: 49.1%	12.72 (.81)
5th	7th grade, spring semester	20.09 (4.69)	Male: 51.3% Female: 48.7%	13.63 (.71)
6th	8th grade, spring semester	19.17 (4.97)	Male: 50.1% Female: 49.9%	14.57 (.65)

Notes. Own calculations.

Table 4 shows the descriptive data on students' aspirations in the different data collection waves. Chapters 5 to 7 apply various measures to study peer effects on adolescents' aspirations. These measures vary in terms of their proximity and whether they can be considered informal or formal aspirations. Chapter 5 uses the most immediate measures, focusing on students' ambitions in two school subjects for the upcoming end-year report. Most students aimed for good or excellent grades in Hungarian literature and mathematics in each wave. Only a small minority of students expressed a desire to achieve the lowest two grades (the exact wording of the questions was: *'Which grade would you be satisfied with for Hungarian literature/mathematics at the end of the semester/school year?'*).

Chapters 6 examines the development of track preferences for secondary school before the submission of applications, while Chapter 7 analyses students' applications and whether they indicated a preference for grammar school track education as their first choice. Overall, 26.9 per cent of students in the sample in eighth grade (the spring semester of the 2016/2017 school year) preferred grammar school track in their secondary school applications, which was around 13 percentage points lower compared to the applications of all eighth-grade students in Hungary at the same time (39.89 per cent) (Oktatási Hivatal, 2021).

This could be due to the sampling procedure, which resulted in a student body that is more disadvantaged compared to primary school students in Hungary as a whole. During the previous waves, preferences for the grammar school track ranged from 23.2 to 29.2 per cent. A significant number of students were unsure about their preferences for their secondary school track during the fifth and sixth grades. This proportion decreased in seventh grade as students neared the application process.

The secondary school track preferences students expressed were relatively stable between the sixth and seventh grades, however, the preferences were also susceptible to adjustment (*Table 5*). Sixth-grade students who were uncertain about their plans for secondary school were similarly likely to express preferences for the grammar school and vocational secondary school tracks a year later, although a significant portion of them (40 per cent) were still undecided. Further, many of those students who reported grammar school aspirations in the spring semester of seventh grade continued to prioritise a grammar school education when applying in eighth grade (*Table 6*).

Table 4: Aspirations in the entire sample over the years

Wave	1st	2nd	3rd	4th	5th	6th
Level	5th grade. autumn semester	5th grade, spring semester	6th grade, autumn semester	6th grade, spring semester	7th grade, spring semester	8th grade, spring semester
Ambitions: grades in Hungarian literature						
%						
1 - Insufficient	.1	.1	.3	.5	.2	.0
2 - Sufficient	2.0	2.3	1.7	2.0	1.5	1.5
3 - Satisfactory	7.7	10.3	9.4	13.4	12.9	13.7
4 - Good	24.7	29.7	29.7	30.5	35.4	38
5 - Excellent	65.4	57.6	58.9	53.5	50.1	46.8
Average (SD)	4.53 (.73)	4.57 (.78)	4.35 (.76)	4.42 (.83)	4.37 (.77)	4.45 (.76)
Median	5.0	5.0	5.0	5.0	5.0	5.0
N	946	984	965	937	653	592
Ambitions: grades in mathematics						
%						
1 - Insufficient	.4	.5	.3	.4	.6	.2
2 - Sufficient	1.8	3.3	1.6	2.8	2.1	2.7
3 - Satisfactory	5.7	11.1	12	18.1	21.8	28
4 - Good	24.2	30.6	33.5	37.2	35.0	34.3
5 - Excellent	67.9	54.6	52.6	41.5	40.5	34.8
Average (SD)	4.57 (.72)	4.35 (.84)	4.42 (.78)	4.37 (.85)	4.45 (.87)	4.17 (.87)
Median	5.0	5.0	5.0	5.0	5.0	4.0
N	946	984	965	938	657	592
Preferences: secondary school track (%)						
Grammar school	23.8	25.4	23.2	24.6	29.2	
Secondary vocational school	30.4	30.3	36.6	33.5	40.4	
Vocational school	7.1	4.9	5.2	6.5	8.3	
Don't want to attend secondary education	1.0	.9	.5	1.1	.5	
Don't know yet	37.8	38.4	34.6	34.3	21.6	
N	934	979	963	934	648	
Applications: grammar school track at all (%)						41.7
Applications: grammar school track in the first place (%)						26.9
N						616

Notes. Own calculations.

Table 5: Changes in the preferred secondary school track between the spring semester of sixth and seventh grade by the preferences in sixth grade

Seventh grade	**Grammar school**	**Secondary vocational school**	**Vocational school**	**Don't want to attend secondary education**	**Don't know yet**
Sixth grade					
Grammar school	59.0%	27.0%	4.1%	.8%	9.8%
Secondary vocational school	19.9%	62.2%	6.6%		11.2%
Vocational school	5.9%	44.1%	32.4%		17.6%
Don't want to attend secondary education					100.0%
Don't know yet	25.1%	25.1%	8.5%		41.2%

Notes. N=554. Own calculations.

Table 6: Preferred secondary school track in the spring semester of seventh grade and whether grammar school track was the most preferred in the applications in eighth grade

	Applied to grammar school track in the first place	
Preferred secondary school track	**No**	**Yes**
Grammar school	37.2%	62.8%
Secondary vocational school	86.7%	13.3%
Vocational school	100.0%	
Don't know yet	81.6%	18.4%

Notes. N=566. Own calculations.

Table 7: Sample drop-out because of early tracking in school classes included in the sample in both wave four and wave five (of total %)

		Attending any school within the sample in wave 5	
		No	**Yes**
Applied to 6-year grammar school track (wave 4)	**Yes**	4.80	9.80
	No	8.50	76.90

Notes. N=705. Own calculations.

The data shows that there was no substantial sample drop-out between waves 4 and 5 (the spring semester of sixth grade and the spring semester of seventh grade) due to students being admitted to six-year grammar school track education. Considering the school classes included in the smaller subset after wave 4, only 4.8 per cent of students reported applying to a six-year grammar school and subsequently leaving the school between waves 4 and 5 (*Table 7*).

4.2. Methods

The next sections are arranged in the following manner. Chapter 4.2.1 connects theoretical and methodological aspects and explores the challenges faced when measuring peer effects. It also reviews the solutions proposed in past empirical studies to address these issues. Chapter 4.2.2 introduces Stochastic Actor-Oriented Models while Chapter 4.2.2.1 focuses on their multilevel application in *sienaBayes()* in R (Ripley et al., 2021). The effects of the models employed in the empirical analysis of the present dissertation are detailed in Chapter 4.2.2.3 subsections. Chapter 4.2.3 introduces Generalized Structural Equation Models which is the analytical approach used in Chapter 7.

4.2.1. Methodological Considerations and Challenges in the Measurement of Peer Effects

Various studies showed interest in modelling and estimating the effect of the interaction among peers on students' educational outcomes. Nevertheless, the correlation between individual and group behaviour cannot be considered causal (Angrist, 2014; Mouw, 2006).

The present section discusses the methodological challenges that arise regarding the measurement of peer effects focusing on the academic context. The word 'group' in this context refers to 'a number of individuals assembled or having some unifying relationship' ('Group', n.d.) ranging from small units like dyads or cliques to larger entities like school classes. In sociological and economic research, a variety of analytical approaches have been used to analyse peer effects, and their results are often divergent. The current chapter heavily relies on the findings of studies concerning students' ability or performance, as these findings have broader implications for understanding peer effects.

One of the most common and straightforward approaches to measuring peer effects in econometrics is the linear-in-means model. This model assumes that all peer effects are universal and are transmitted through the average of peers' characteristics (Sacerdote, 2011). A modified version of this model is the leave-out mean, where the individual's value is excluded from the group mean (Angrist, 2014).

In addition to linear-in-means models, there are other models that consider homogeneous peer effects. These models assume that a disruptive or excellent student can have negative or

positive consequences for all students in a group. These models also assume that group homogeneity or heterogeneity can be beneficial for everyone in the group. Simultaneously, nonlinear models suggest that the intensity of peer influences varies according to individual characteristics. For example, peers who perform better academically can have a negative impact on certain outcomes. Furthermore, the positive impact of high-achieving peers may become stronger in response to an individual's own achievements (Sacerdote, 2011).

One of the main challenges in measuring peer effects is that the influence of peers on each other is an endogenous social effect that is influenced by the individuals themselves. This creates a situation where individuals are part of a group, and the impact of that group is measured on the individuals. Separating the 'influencer' from the 'influenced' presents a challenge because of the reflection problem it entails (Manski, 1993; Mouw, 2006; Sacerdote, 2011).

Furthermore, it is a well-known phenomenon that people who are connected to each other tend to be similar in various ways (e.g., Kandel, 1978; Manski, 1993; McPherson, Smith-Lovin and Cook, 2001). This phenomenon can be explained by various mechanisms, one of which is socialization theory. People can be impacted by those they are associated with because of assimilation, contagion, or influence. The present dissertation refers to this mechanism when using the term *influence* in the empirical chapters.

Individuals with similar characteristics may be connected to each other for two other reasons: either they choose to associate with people who are like them (known as *homophily* or *social selection*), or they are more likely to meet and form connections due to structural constraints (also known as *context*). Contextual homophily, also known as baseline homophily, suggests that the composition of a group can result in an overrepresentation of connections between individuals who are similar to each other (Feld, 1982; Manski, 1993; Steglich et al., 2010).

Studies often control for self-selection into groups by applying fixed or random effects (e.g., schools, school classes, students), or structural equation models (Mouw, 2006; Sacerdote, 2011). Instrumental variables can provide similar advantages. These variables are associated with the independent variable that measures peer effects, but they are not related to the error term of the outcome variable. Yet, it is often difficult to prove the adequacy of an instrument (Mouw, 2006).

Some studies eliminate some of the abovementioned statistical problems by including fixed effects and 'lagged' peer outcomes (time of observed focal student outcomes-1) in relation to students' outcomes (e.g., Gutiérrez, 2023). Another approach involves the use of quasi-experimental designs or peer contexts where individuals are randomly assigned. For example, if roommates or dorm mates are chosen centrally (Mouw, 2006; Sacerdote, 2011).

Focusing on peer effects on aspirations, some previous studies controlled for students' self-selection into institutions or school classes. For example, to achieve this goal, researchers have used

techniques such as school and family fixed effects, as well as including time-varying peer and teacher characteristics (Rosenqvist, 2018). Another approach has been to use the previous school cohort peers of students' peers as an instrument (Dickerson, Maragkou, and McIntosh, 2018). Multilevel models with school fixed effects have been applied to estimate the effect of classmates on aspirations which account for the nested nature of the collected data and for heterogeneity between schools at the same time (Smith, 2023).

Turning to dyadic relationships and the social selection problem, Burgess and Umaña-Aponte (2011) attempted to keep selection mechanisms under control by concentrating on friendships that existed before aspiration measures using a sample of 15-17-year-old adolescents from the Avon area of England. Carolan (2018) applied an instrumental variable approach to analyse how friends' college plans affected adolescents' educational expectations. Raabe and Wölfer (2019) accounted for between-group variances and initial sorting in the data with peer-level controls and contextual-level predictors when investigating the effect of friends' and friendship group members' educational aspirations on adolescents from Germany, The Netherlands, and Sweden.

Although traditional econometric approaches can account for self-selection into peer groups, they are unable to directly separate the adjustments individuals make to their peers from social selection based on individual attributes. A few previous studies used longitudinal data to distinguish between the impact of friendship selection and social influence (Cohen, 1977; Kandel, 1978). Nevertheless, these studies primarily focused on examining bivariate associations.

The advancements in the analysis of longitudinal social networks provide a powerful tool for addressing the reflection problem and distinguishing between social influence and social selection processes. Meanwhile, longitudinal social network models can also account for individual covariates and endogenous network processes that can affect the emergence of ties within a network (e.g., Lomi et al., 2011; Steglich, Snijders and Pearson, 2010; Veenstra and Dijkstra, 2012). A few studies have recently investigated peer effects on aspirations applying this approach (Kretschmer and Roth, 2021; Lorenz et al., 2020; Mundt and Mundt, 2020). Chapter 4.2.2 introduces the longitudinal social network models utilised in the present dissertation.

4.2.2. Stochastic Actor-Oriented Models

For the empirical analyses presented in Chapter 5 and Chapter 6, Stochastic Actor-Oriented Models (SAOM) are applied to analyse the coevolution of network ties and attributes. SAOM estimate the interdependent effect of network processes and individual characteristics on the evolution of two dependent variables, namely network ties and individual behaviour. This approach helps distinguish the effects of social selection and influence. The models disentangle the social *selection* and

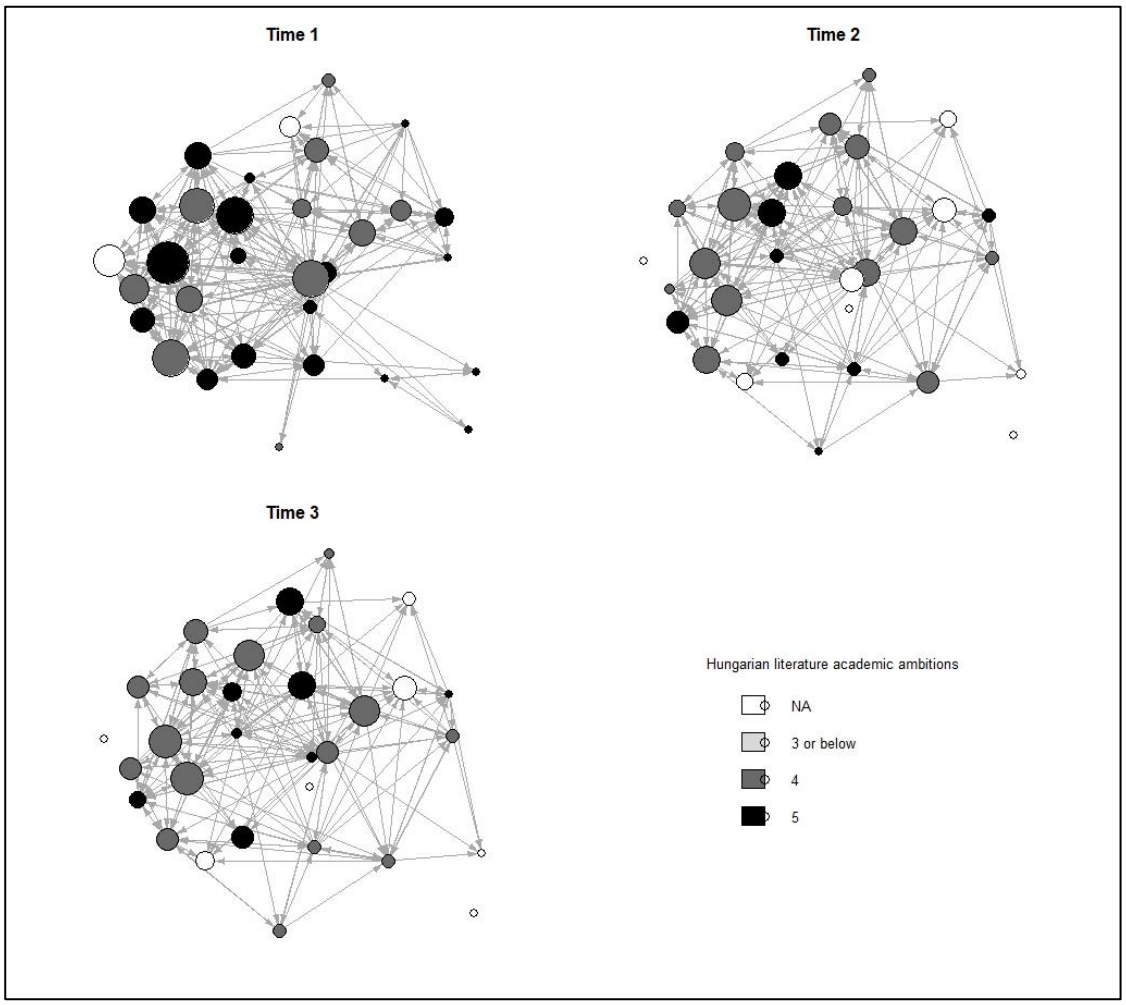
influence effects concerning social selection mechanisms under the actors' control (the maintenance, dissolution, or creation of ties) (Steglich et al., 2010; Veenstra and Dijkstra, 2012).

The implemented Stochastic Actor-Oriented Models can be applied to four main types of analysis: the evolution of one- and two-mode networks, the evolution of individual behaviour, and the co-evolution of networks (one- or two-mode) and individual behaviours (Ripley et al., 2021, p. 11.). SAOM for disentangling social selection from influence model two outcome variables; a *network* and a *behaviour*. Both variables are assumed to be susceptible to change.

The outcome variables are modelled to evolve as a function of each other, meaning that they can mutually influence each other. The term behaviour is used broadly; it refers to an individual attribute that is expected to change over time. In the present dissertation, behaviour dependent variables are academic ambitions measured by ambitioned grades in mathematics and Hungarian literature (in Chapter 5) and the preferred secondary school track (in Chapter 6).

The change of friendship ties and aspirations is illustrated for one school class in Figure *2*.

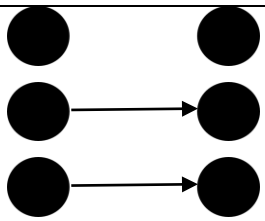
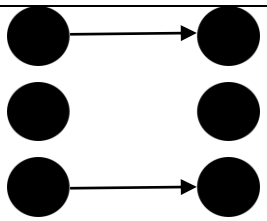
Figure 2: Example for the development of friendship ties and aspirations over time



Notes. Friendship networks and aspirations in one school class (N=31) over three data collection waves. Circles mark students within the school class and arrows mark the directed friendship nominations among students. The placement of students on the graphs is fixed over time. The size of the circles is proportional to students' incoming nominations within a certain data collection wave.

Network dependent variables in the present dissertation are friendship ties. Changes between measurements in a directed friendship network among students can include: the formation or termination of a tie, or no change at all (*Table 8*). Actors may adjust their value on the behaviour dependent variable (in this case, various measures of aspirations) by either increasing or decreasing it by one unit or keeping it unchanged.

Table 8: Possible changes concerning ties

Time 1	Time 2	Type of change
		Creation of a tie
		Dissolution of a tie
		Maintenance of a tie (no change)

Notes. Own edition based on Ripley et al. (2021)

In the ministeps, actors' decisions to change their network ties or their behaviour are always based on their current unobserved state assuming conditional sequential independence (Markov assumption). Consequently, the model does not have a 'memory' for past events or states (Steglich et al., 2010; Veenstra et al., 2013).

The procedure models the transitions between observed measurements simulating ministeps for unobserved changes. Changes between ministeps alter the context for the actors, and thus, they can represent the feedback process between network ties and actors' behaviour outcomes. Because the changes between ministeps that result in the observed measurements are unobserved, simulation-based inference is used to estimate the model parameters (Steglich et al., 2010; Veenstra et al., 2013).

Network and behaviour changes have two subprocesses. The probabilities of change depend on the underlying objective functions, while the frequencies are governed by stochastic waiting times (Steglich et al., 2010; Veenstra et al., 2013). The expected values of these waiting times are determined by the rate functions (Steglich et al., 2010; Veenstra et al., 2013).

The actors' choices for network changes and behaviour changes are represented by the objective functions for network and behaviour, respectively. Objective functions gather information that actors use to determine whether to modify their network connections or behaviour. These functions also represent the appeal of each possible outcome. The network and behaviour rate functions indicate the anticipated frequency at which actors can modify their network or behaviour, respectively (Steglich et al., 2010; Veenstra et al., 2013).

SAOM assume that actors make decisions with the goal of maximizing their objective functions. They base these decisions on complete information about the network structure (Veenstra et al., 2013). Regarding network evaluation, the maximisation of the objective functions may be influenced by some of the structural effects and covariates either on the actor or dyadic level, and dynamics of another network (only applicable in the case of multiple networks).

Behaviour evolution can also be influenced by various factors. These factors include the behaviour itself, the value of the behaviour in the network, and the values of other actor covariates or covariates in the network (Ripley et al., 2021). Earlier, behaviour outcomes could only be measured as integers (Steglich et al., 2010), but recently an implementation for continuous behaviour outcomes had been developed (Niezink, Snijders and van Duijn, 2019).

The dataset used in this dissertation includes multiple groups (school classes) that have their own distinct network structure. It is important to consider these differences when obtaining global estimates for the entire sample. Therefore, a random coefficient multilevel SAOM implemented in the *sienaBayes()* function in the *RSienaTest* package 1.2-30 in R is applied, which allows for modelling the coevolution of friendship ties and various measures of aspirations for the whole sample while also accounting for heterogeneity across classes (Ripley et al., 2021). Heterogeneity regarding network processes is considered by letting effects related to network processes vary randomly across groups. In contrast, other parameters are fixed, assuming they do not vary (meaningfully) between groups.

The convergence of multilevel random coefficient Siena analysis can be assessed by running multiple chains in parallel with the Markov Chain Monte Carlo (MCMC) procedure (Koskinen and Snijders, 2022). In the present dissertation, this is achieved by running four independent sequences of the same model configuration, each consisting of 3,000 main iterations. These sequences are then compared using the *rstan* package (Stan Development Team, 2020). The comparison is based on monitoring the $\hat{R}$-values (the ratio of within and between chain variance) on the array of iterations by chains and by parameters on the four models. Models are considered converging if all $\hat{R}$ values are ≤ 1.1 for each parameter of interest and the estimated equivalent sample size under independent sampling should be ≥ 5 times the number of chains (in this case, 20), as suggested by Gelman et al. (2014). Results presented in the present dissertation met this requirement. Results presented in the main text met the more rigorous criteria of $\hat{R}$ values being ≤ 1.05.

Several studies addressed whether adolescents could influence various aspects of each other's behaviour and attitudes while accounting for social selection by applying Stochastic Actor-Oriented Models for the coevolution of networks and individual behaviour. For example, researchers have examined how peers influence deviant behaviours like smoking, alcohol and substance use (de la Haye et al., 2013; Mundt, Mercken and Zakletskaia, 2012; Osgood et al.,

2013), emotional state or psychological functioning (van Workum et al., 2013; Van Zalk et al., 2011), as well as academic outcomes (Gremmen et al., 2018; Rambaran et al., 2017; Shin and Ryan, 2014). Applying random coefficient multilevel Siena analysis has been less widespread (e.g., Boda, 2018; Lorenz et al., 2020; Lorenz, Boda and Salikutluk, 2021). No previous study has applied random coefficient multilevel Siena analysis to study the coevolution of Hungarian primary school students' various educational aspirations and friendship ties.

The present dissertation argues that by applying SAOM in Chapters 5 and 6, it is possible to distinguish social influence from social selection. This does not mean that SAOM can provide a solution to every causal problem and can eliminate all other possible explanations, such as issues related to unobserved confounders (Lomi et al., 2011). Neither are traditional regression techniques immune to these issues, however, they can be tackled to some extent by research that is grounded in theory. The dissertation only argues that SAOM can examine how social influence and selection can contribute to the similarity between the actors in a social network, who share ties, and hence, can provide information about the mechanisms that contribute to the similarity of connected individuals.

Goldthorpe (2001) offers three different understandings of causality: causation as robust dependence, causation as consequential manipulation, and causation as a generative process. Causality as a robust dependence implies that, although statistical associations are not sufficient to establish causal relations, they are still necessary. The second approach is based on the notion of experimental design, in which the causes must result from some treatment under controlled conditions. Lastly, the concept of causality as a generative process emphasises the importance of the subject matter input in establishing the process that leads to a causal relationship. Goldthorpe (2001) suggests that sociology should prioritize causation as a generative process.

Considering Goldthorpe's (2001) three different understandings of causality, this dissertation focuses primarily on the generative processes that can lead to social influence. Nonetheless, the statistical methods applied through the dissertation establish causation as robust dependence with some constraints. This means that by using SAOM, it is possible to determine if the similarity between friends' educational outcomes is due to social selection or social influence while also controlling for potential confounding factors.

The empirical analysis in Chapter 7 uses a different methodological approach. It considers the unobserved differences between school classes by including school class fixed effects. This means that any relationship between students' aspirations and the characteristics of their classmates and friends can be attributed to factors beyond the initial sorting of students into school classes. Further, the study in Chapter 7 focuses on those friendship ties that exist at two adjacent measurements, and therefore, control for friendship selection in that observed period. The details of

the methods used for the empirical analysis in Chapter 7 are introduced in Chapter 4.2.3 and in the respective empirical chapter.

4.2.2.1. Estimation in Random Coefficient Multilevel Siena Analysis

As mentioned before, two of the empirical studies in the dissertation utilise random coefficient multilevel Siena analysis. The method offers a way to apply Stochastic Actor-Oriented Models to datasets that have multiple groups, considering both group-specific parameters and parameters assumed to be the same across all groups. Bayesian estimation is used for this analysis. This means that inferences are made based on an alternative assumption to the frequentist approach, where the parameters are considered random and follow a probability distribution. The joint probability of the parameters and data is modelled 'as a function of the conditional density of the data given the parameters, and the prior distribution of the parameters' (Kaplan and Depaoli, 2013, p. 410.).

The estimation includes three phases: the initialization, the warming, and the main phase. The initial parameter values and the proposed covariance matrices are obtained in the first phase. The initialization phase begins with a Method of Moments estimation for multiple groups, if all parameter vectors do not vary across groups. The Method of Moments estimates are derived by groups as a second step of the initialization phase. The initialization phase is followed by the warming, and finally, the main phase in which the varying and non-varying parameters are sampled along with the global mean and covariance matrix of the varying parameters (Ripley et al., 2021).

Some parameters are assumed to vary from network to network according to a multivariate normal distribution, while other parameters are kept constant for all groups, following the logic of hierarchical linear models. The decision to set certain parameters as varying and others as non-varying depends on the research question. Usually, structural effects for network dynamics are assumed to vary across networks. Other parameters, especially those related to the research questions, are considered as non-varying through the estimation process (Koskinen and Snijders, 2022). In this dissertation, the main approach is to set the structural effects for network dynamics as varying parameters complemented with some other effects for convergence reasons.

Prior means and variances are necessary inputs for the varying parameters in the model. Weakly informative priors are used in the present dissertation that have as little influence on the inference as possible (Gelman et al., 2008). Following the suggestions of Koskinen and Snijders (2022), this involves using the default data-dependent priors for the network and behaviour rate parameters. There is no need for any specification in case of the fixed (non-varying) effects to which improper constant prior distributions are applied.

Regarding structural effects for the network dependent variables, priors utilise some information about friendship networks without too much influence on the results. As people tend to

be selective about who they connect with, it is recommended to set the prior mean of the outdegree effect at a negative value. Further, individuals reciprocate nominations, and therefore, it is advised to set the prior mean for the reciprocity at a positive value (Koskinen and Snijders, 2022). The main theoretical considerations behind those effects, among others, are discussed in Chapter 4.2.2.3 in detail. For this present dissertation, the prior mean for the outdegree parameter was set at -1, the prior mean for the reciprocity parameter was set at 1.5 and all other prior means were set at 0. The prior variances were defined in a matrix with diagonal values set to 0.01.

The inference in random coefficient multilevel Siena analysis in sienaBayes() is based on summaries derived from the sampled posterior distributions. Sampling from the posterior probability distribution is based on the Markov Chain Monte Carlo (MCMC) procedure. If the model can be considered as converged, results can be interpreted based on posterior means, posterior standard deviations, 95% credibility intervals, and one-sided posterior p-values that correspond to estimates, standard errors, confidence intervals, and p-values in the frequentist approach (Kaplan and Depaoli, 2013; Ripley et al., 2021). One-sided posterior p-values test whether the parameter is positive or negative, giving the mass of the posterior distribution on the right side of zero. Values close to 1 indicate that the parameter is positive, while values close to 0 suggest that the parameter is negative.

Random coefficient multilevel Siena analysis is not the only method for generalizing the coevolution of network and behaviour dynamics to a population of networks. The primary challenge of applying the random coefficient multilevel Siena analysis implemented in the function *sienaBayes()* in R is the very time-consuming computation process. The higher the number of iterations in the main phase, the longer the computation time. Meanwhile, increasing the number of iterations in the main phase may help with convergence.

Multi-group Stochastic Actor-Oriented Models can be applied to multiple groups (networks), assuming that the same dynamics characterize all groups and that all estimated parameters are identical across groups (Ripley et al., 2021). This assumption is risky because network dynamics are often influenced by various mechanisms, which can result in models that do not converge or converge with a poor goodness of fit. Multigroup models on data used in the present dissertation did not converge, accentuating the need for another approach.

Further, meta-analysis can be applied to SAOM run on networks independently from each other (Ripley et al., 2021). The meta-analysis approach requires that the SAOM converges for all groups being analysed, and this can often not be fulfilled. In addition, when it comes to small groups, the models often do not have sufficient statistical power to produce significant results (Boda, 2018). Regarding the data used in this dissertation, models for individual groups did not converge, highlighting the necessity of adopting a network combination approach.

4.2.2.2. Missing Data in Social Network Analysis and in SAOM

Paying attention to missing information in social network analysis is crucial to distinguish between the absence of links between actors (usually represented as a zero in the adjacency matrix) and the lack of information about the network ties of the actors (missing information). There are two main sources of missing data in longitudinal network analysis on complete social networks. The first is the nonresponse of certain actors within a network, and the second is the change in network composition due to individuals joining or leaving the network (Huisman and Steglich, 2008; Ripley et al., 2021).

In this dissertation, nonresponse missingness refers to students who did not participate in the data collection either because their parents or themselves did not agree, or because they were absent during the data collection and did not return the paper-based questionnaire afterwards. Network composition missingness refers to the absence of certain students who were part of a network (school class) in some data collection waves, but not in others. The two categories can also overlap, such as late joiners who did not agree to participate.

Although missing data poses challenges in social sciences, it has even more severe implications for social network analysis. This is because information about an actor's network connections relies on the network ties of other actors within the network. For example, if person A nominates person B as a friend, but there is no information available about B's nominations, it is unclear whether A's nomination is one-sided or reciprocated (Huisman and Steglich, 2008).

SAOM implemented in R allow for the inclusion of missing data in the analysis. Furthermore, SAOM can distinguish between structural zeros and unit non-response. Missing network data over 20 per cent is usually considered problematic for the estimation (Huisman and Steglich, 2008), although excluding networks with over 25 per cent missing cases in the social network data is also an applied threshold (Boda, 2018). The networks (school classes) for the empirical analysis in the present dissertation were selected considering these criteria (the sub-samples are introduced in the respective empirical chapters).

Missing values are treated within the framework of the SAOM in the following way. Simulations are performed by imputing missing values, but target statistics are calculated only for non-missing data minimizing the effect of imputed values on the estimation. For the simulations, if there is no tie observed, it is considered as a missing tie at the first observation. For subsequent observations, the previous value (whether a tie existed or not) is carried forward. Alternatively, if there is still no tie observed, it is assumed to be absent (Huisman and Steglich, 2008; Ripley et al., 2021).

Item nonresponse is also present in the sample because students who filled out the questionnaires did not always answer all questions. The same imputation method is used for the

simulations' behaviour dependent variable as for the network dependent variable. If previous values are available, they are used for imputation. Otherwise, the mode is used for imputation. For any other variables, missing values are filled in by using the global mean value (Huisman and Steglich, 2008; Ripley et al., 2021).

4.2.2.3. Main effects for the Coevolution of Friendship Networks and a Behaviour Outcome and the Theoretical Considerations behind these Effects

The present section focuses on the main effects considered for the coevolution of networks and behaviour outcomes. Dynamics can vary in different dyadic relationships, so it is important to consider the specific structural effects of each network. Among network ties, this section concentrates on friendship networks.

Although friendships are commonly seen as mutual, the psychological and sociological literature makes a distinction between reciprocated and unreciprocated friendship ties. Therefore, in the context of this dissertation and social network analysis, reciprocity is not assumed to be an inherent aspect of friendship relations (Hartup, 1996; Vaquera and Kao, 2008). In the context of SAOM with network and behavioural outcomes, the model specification may encompass structural effects for network dynamics, effects of network dynamics on covariates, and effects on behavioural dynamics (Ripley et al., 2021).

4.2.2.3.1. Effects for Network Dynamics

4.2.2.3.1.1. Structural Effects for Network Dynamics

The choice of structural effects relies on the theoretical assumptions about the network dependent variable(s) of the model. The *outdegree effect* can be interpreted as an intercept expressing the general tendency within a network to create, maintain, and terminate ties with other actors. The coefficient for the outdegree effect is usually negative because individuals often perceive the costs of sending nominations to others as greater than the benefits associated with it. Besides the general tendency to create, maintain, or terminate ties, reciprocity and clustering are the most critical endogenous mechanisms that drive friendship formation and dissolution processes (Block, 2015; Snijders, van de Bunt and Steglich, 2010; Veenstra et al., 2013).

Reciprocity is an ancient and widely acknowledged pattern in human social life (Laursen and Hartup, 2002). Individuals are more likely to form friendships with those who have selected them as friends. Thus, the coefficient for the reciprocity effect is usually positive (Block, 2015; Snijders, van de Bunt and Steglich, 2010). The *reciprocity effect* expresses actors' general tendency of reciprocating ties, and various mechanisms can generate it.

First, social exchange theory suggests that individuals consider the material and immaterial costs and benefits of their relationships. They are more likely to engage in interactions that reward the investments they make in their friendships (Homans, 1958; Rusbult and Buunk, 1993). Second, the intrinsic symmetrical intensity of social contacts is also an essential part of social relationships and is 'inherently' reciprocal (Newcomb and Bagwell, 1995).

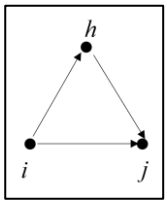
Regarding friendship ties, *clustering* is the process by which indirect friendships become direct connections. This implies that if two individuals have a mutual friend, they are likely to become friends themselves (Block, 2015; Snijders, van de Bunt and Steglich, 2010). From a theoretical standpoint, clustering is connected to balance theory (Heider, 1946). To avoid tension, individuals prefer balanced relationships over imbalanced ones. This means that they either become friends with the friends of their friends or end one of the relationships. Thus, three signed edges in a non-directed triad are balanced if all three edges are positive or if only one edge is.

Stochastic Actor-Oriented Models provide various options for capturing clustering in social networks. It is recommended to include at least one network closure effect in the analysis. This can be achieved by examining transitive triplets, transitive ties, or GWESP (geometrically weighted edgewise shared partners). These effects are often paired with the transitive reciprocated triplets effect and/or the 3-cycles effect (Ripley et al., 2021). The selection of the effect that represents transitivity is typically based on the convergence and fit of the model.

The most often applied structural effect for closure is the transitive triplet effect. A transitive triplet exists between three actors (i, j, and h in the present example) in a directed network if the following ties exist: $i \rightarrow j$, $j \rightarrow h$, and $i \rightarrow h$ (*Figure 3*) (Ripley et al., 2021; Snijders, van de Bunt and Steglich, 2010). Ripley *et al.* (2021) suggest including the use of the transitive triplet effect along with other network closure effects, such as the transitive ties effect or the transitive reciprocated triplets effect. Transitive reciprocated triplets can be interpreted as the interaction effect between reciprocity and transitive triplets. Transitive ties help understand how the presence of indirect connections affects the formation of network closure. because this effect considers an individual i's both direct and indirect connections to other actors (Ripley et al., 2021; Snijders, van de Bunt and Steglich, 2010).

The gwespFF effect can be used as an alternative to transitivity effects. Initially, the effect was developed for tie-oriented network models, but the application in RSiena is adapted to actor-oriented models. GWESP effects have five variations implemented for directed networks in RSiena. For the gwespFF effect, 'edgewise partners' refer to the number of actors (j) in the network to which the individual (i) sends a tie, and there are precisely k other actors h for which the ties from i to h and from h to j exist (*Figure 4*) (Ripley et al., 2021).

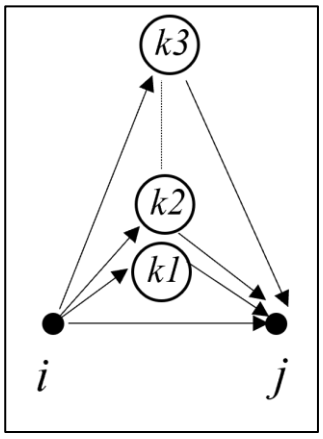
Figure 3: Transitive triplet



Notes. Own edition, based on Ripley et al., 2021, p. 130.

In the present dissertation, the empirical analyses presented in Chapter 5 and Chapter 6 applied the gwespFF effect and interaction effect between the gwespFF effect and the reciprocity effect to measure transitive closure. These effects are often more prone to lead to converging results than the transitive triplets specification.

Figure 4: gwespFF effect



Notes. Own edition, based on Ripley et al., 2021, p. 130.

Degree-related processes can also play an essential role in the formation of friendship ties. Indegrees represent the number of connections individuals receive, while outdegrees represent the number of connections they send. The 'Matthew effect' suggests that individuals tend to form relationships with people who are already popular (Merton, 1968b). Popularity effects model this process, while activity effects model the tendency of befriending individuals who are already eager to send friendship nominations (Veenstra et al., 2013).

Indegree-related popularity models actors' tendency to send ties to already popular individuals. The positive effect of indegree-related popularity expresses the reinforcing nature of popularity. Outdegree popularity models the effect of the activity in outgoing nominations on popularity regarding incoming nominations. Its positive effect demonstrates the alignment between incoming and outgoing nominations. Degree-related activity effects mirror the degree-related

popularity effects modelling whether a higher number of incoming or outgoing nominations leads to increased outgoing activity (Snijders, van de Bunt and Steglich, 2010; Veenstra et al., 2013).

Concerning degree-related effects, empirical analyses presented in Chapter 5 and Chapter 6 include indegree popularity and outdegree activity effects. Outdegree -related popularity effects did not converge. The present dissertation applies the squared root form of the indegree and outdegree effects.

4.2.2.3.1.2. Effects for Network Dynamics Associated with Covariates

There are three main types of effects that model how covariates impact network dynamics. Some effects consider the covariate value of the sender of a tie (Ego), while others focus on the covariate value of the receiver of a tie (Alter). Those effects model whether actors with specific characteristics are more likely to send or receive nominations. In addition, certain studies examine how similar or dissimilar the sender and receiver of a tie are in relation to a covariate (Snijders, van de Bunt and Steglich, 2010; Veenstra et al., 2013).

Individuals' tendency to seek relations with similar others is one reason behind the homogeneity of those who share ties with each other (McPherson, Smith-Lovin and Cook, 2001). Including similarity effects in a network-behaviour coevolution model ensures that selection and influence effects are disentangled regarding a certain covariate (Steglich, Snijders and Pearson, 2010; Veenstra and Dijkstra, 2012).

The tendency to seek relationships with similar individuals can be expressed by actors preferring to form ties with others who share similar values on a covariate. In addition, these preferences can also be represented by individuals forming connections with others who share the same values on the covariate (for categorical covariates), or by individuals with high values on a covariate preferring to form connections with other individuals who also have high scores (Ripley et al., 2021; Veenstra et al., 2013).

For the present dissertation, homophily-related effects were specified in relation to the social influence effects on behaviour dynamics. This means that when social influence effects were related to the tendency of becoming similar to one's alters, social selection effects on network dynamics were specified by the similarity scores between them (simX). Meanwhile, when social influence effects on behaviour dynamics were related to the tendency to adjust one's behaviour to the average behaviour of their Alters, social selection effects on network dynamics were specified by the interaction between Ego's and Alter's value.

Ego effects for aspirations, academic achievement, or parental background did not converge in the models presented in Chapter 5 and Chapter 6. As a result, these effects were excluded from the models. This meant that not only did the parameters of the ego effects fail to meet the

convergence criteria, but also the inclusion of ego effects violated the convergence criteria for other parameters. Excluding a few individuals who have nominated at least half of the class or more than two-thirds of the class from the analysis did not solve this issue. The similarity effects for the same covariates are still accounted for, controlling for the impact of social selection on homogeneity among friends in terms of their aspirations and academic achievement. Nevertheless, it is important to interpret these similarity effects with caution due to the absence of ego effects.

4.2.2.3.2. Effects for Behaviour Dynamics

The linear shape effect functions as the intercept for the behaviour dependent variable and should always be included as it represents the general tendency of individuals to modify their behaviour. The quadratic shape effect represents the reinforcing effect of the behaviour on itself. The two shape effects are collinear for binary behaviour dependent variables. Therefore, the latter should not be included if the behaviour dependent variable is binary (Veenstra et al., 2013).

4.2.2.3.2.1. Social Influence Effects on Behaviour Evolution

Social influence on individuals' tendency to adjust their behaviour can be modelled in various ways, and it is usually chosen based on theoretical or methodological (convergence and model fit) considerations. The tendency to become similar to one's friends over time is associated with social norms. Changing one's behaviour to a higher value when their friends have higher values is related to social contagion processes (Veenstra et al., 2013).

The average similarity effect refers to how people tend to adjust their behaviour to become more similar to their friends. It is measured by calculating the average centered similarity scores between individuals and their alters (in the present context, friends). The concept of the total similarity effect operates on the same logic but weights the influence effect in relation to the number of individuals they are connected to (Ripley et al., 2021; Veenstra et al., 2013).

The average alter effect shows how individuals are influenced by the average behaviour of their friends. It determines whether they are more likely to adjust their own behaviour upwards if their friends have higher values. The total alter effect represents this mechanism with a weight based on the number of individuals to whom alters are tied (Veenstra et al., 2013). There are several similar variations of these effects that are comparable to the ones introduced. For example, the maximum and minimum alter effects model whether individuals adjust their behaviour based on the highest or lowest value of their alters' behaviour (Ripley et al., 2021).

In the empirical analysis in Chapter 5, the influence of friends on students' aspirations was measured by examining whether students adjusted their academic ambitions in two school subjects to become more similar to the ambitions of their friends (average similarity). This effect can be

connected to the adoption of social norms (Veenstra et al., 2013). The study in Chapter 6 aimed to assess the impact of friends on students' preferences by examining how the preferences of students changed in relation to the average preferences of their friends (average alter effect). Average alter effects that may be connected to social contagion processes (Veenstra et al., 2013).

Average similarity effects did not converge for the analysis in Chapter 6. For Chapter 5, average similarity effects were included because the analysis focused on the overall tendency of aligning academic ambitions with those of friends, rather than on the specific change to higher ambitions in response to friends' ambitions. It is important to note regarding all the abovementioned effects that behaviour dependent variables and covariates are centered in RSiena (for an example see, *Appendix M*).

4.2.2.3.2.2. Effects for Behaviour Dynamics Associated with Covariates

Individual-level covariates can affect changes in people's behaviour. Those effects indicate whether a change in one's covariate can be associated with behavioural changes. Further, the effect of actors' position in the network (e.g., indegree, outdegree) on behaviour change can also be included (Ripley et al., 2021).

It is also possible to model the effect of friends' covariate value on behaviour change. The most widely applied configurations of those effects model whether alters' covariate average, total, maximum, or minimum, contribute to changing individuals' behaviour (Ripley et al., 2021). For instance, in the present dissertation alters' average academic achievement (Chapters 5 and 6) and parental background (Chapters 6) is included in the models.

4.2.3. Generalized Structural Equation Models

As mentioned in the previous section, disentangling social selection and influence effects requires longitudinal social network data. Nonetheless, one aspiration measure of this dissertation is cross-sectional: the most preferred secondary school track listed in students' secondary school applications. Consequently, SAOM are not suitable for modelling the peer effects on those choices. There was an attempt to merge secondary school track preferences in eighth grade with previous preferences related to that choice into a behavioural outcome in SAOM, but those models did not converge.

Therefore, the study analyses the development of secondary school track aspirations in previous years and the eighth-grade applications separately. The analysis of the former is done using SAOM in Chapter 6, while the analysis of the latter is done in Chapter 7 using Generalized Structural Equation Models (GSEMs). The analysis in Chapter 7 examines the relationship between

whether students' prefer to attend a grammar school track, as indicated by their secondary school applications, and the preferences of their friends and classmates for the same track.

SEMs are often presented using path diagrams. These diagrams illustrate the assumed relationships between variables, with paths representing these relationships. The path coefficients in the diagram can be interpreted as regression coefficients. Those paths can be either direct or indirect. Together, the models establish a system of regression equations. The models can include both observed and latent variables. Observed variables are those that are measured and included in the dataset used for analysis, while latent variables are unobserved variables. SEM models can include both endogenous and exogenous variables. Endogenous variables are the dependent variables in the model, meaning they have at least one path directed towards them from other variables in the model. In contrast, exogenous variables are defined outside those equations (Gunzler et al., 2013).

Unlike regular SEMs, Generalized Structural Equation Models (GSEMs) can deal with various types of outcomes, such as binary, ordered, or count responses. The outcome variable for the study in Chapter 7 is binary, therefore, GSEMs implemented in Stata are applied for the analysis (Huber, 2013). The main outcome variable measures the secondary school track choice listed as the first preference on students' applications, more specifically, whether their first choice was education in grammar school track.

SEM is commonly used in mediation analysis (Gunzler et al., 2013). Nonetheless, structural equation models may not be sufficient for accurately determining the unbiased effect of mediation. This is because there is often a covariance between the factors that influence the outcome and those that affect the mediator (Bullock and Ha, 2011).Therefore, the current analysis does not assert a mediation effect when the effect of a variable on an endogenous variable is measured by its effect on another endogenous variable. Nevertheless, the models presented in this dissertation can demonstrate how a variable directly and indirectly influences an outcome.

GSEMs have some shortcomings in estimating peer effects on students' aspirations. GSEMs are unable to separate the effects of selection and influence. Therefore, in this dissertation, the analysis in Chapter 7 controls for friendship selection based on students' similar preferences in their top choice of applications. To do this, two types of friendship nominations are distinguished from each other. Stable friendships are friendships that existed during the semester of the applications and one year prior, and all friendships, which include all friendship ties at the time of the applications.

Another problem with using GSEMs on social network data is that the observations are interdependent. This means that when one individual is the focal actor in one observation, they are also included as a peer in other individuals' observations. Therefore, the standard errors are

clustered on the school class level considering the interdependence of observations within a network (school class).

Nonetheless, analysing students' secondary school track preferences using GSEMs can help gain insights into crucial aspects of peer relationships and educational outcomes. Secondary school track preferences profoundly affect later educational attainment, and therefore, it is relevant to understand the extent to which they are associated with peers' preferences.

Moreover, the analysis in Chapter 7 provides a deeper understanding of how different types of peer relationships, such as friendship choice and the classroom context, are linked to students' preferences when considered separately. The variables and model specifications of the empirical investigation are presented in Chapter 7.

5. Friends Can Help to Aim High: Peer Influence and Selection Effects on Academic Ambitions and Achievement

5.1. Introduction

Early adolescence is a crucial stage for the development of self-conceptions and academic motivations. Around the ages of 10 and 12, ability conceptions and future ambitions or goals become more coherent, and their impact on students' motivation and academic achievement becomes more noticeable (Dweck 2002; Helwig 2001). Consequently, academic ambitions are highly significant during this stage of life, as they play a major role in determining effort, diligence, and academic performance. These factors are crucial in making early decisions about educational paths and have a lasting impact on career opportunities later in life (Chowdry, Crawford and Goodman 2011; Haller 1968; Gutman and Akerman 2008; Marjoribanks 2003).

During early adolescence, friendships become more important than in earlier stages of life and friends can have an impact on a variety of behaviours and attitudes (Berndt 1992; Berndt and Savin-Williams 1993; Brechwald and Prinstein, 2011). Adolescents frequently modify their academic aspirations, motivation, and behaviour to align with the academic standards upheld by their peers (Coleman, 1988; Crosnoe, Cavanagh and Elder, 2003; Kruse and Kroneberg, 2020; Ryan, 2001; Wang et al., 2018; Wigfield and Eccles, 2020).

Having ambitious friends can motivate adolescents to increase their own ambitions, while having friends with lower ambitions may pull back their aspirations and negatively impact their performance. Nevertheless, comparing one's academic achievements with those of friends can also influence the academic ambitions of adolescents by providing them with a standard for evaluation (Molloy, Gest and Rulison, 2011).

Assessing the effect of social influence on academic ambitions is difficult because it might be concealed by concurrent social selection processes (Steglich, Snijders and Pearson 2010), as friendship ties might be selected along certain individual characteristics (Brown and Larson 2009; McPherson, Smith-Lovin and Cook 2001) that are closely related to academic ambitions. Hence, similar academic ambitions can be the cause as well as the outcome of friendship ties.

Social selection processes typically occur based on noticeable and observable individual characteristics. Meanwhile, characteristics that cannot be directly observed are more likely to be influenced (de Klepper et al., 2010; van Duijn et al., 2003). Therefore, this study suggests that adolescents' academic ambitions may be influenced by their friends within the classroom. Meanwhile, academic achievement which is a characteristic easily observable by classmates may contribute to the selection of friends.

The analysis aims to test whether friends can influence adolescents' academic *ambitions* while also accounting for the effect of similar friendship selection based on similar academic *ambitions* and *achievement.* To achieve this, multilevel Stochastic Actor-Oriented Models are applied to model behaviour-network coevolution on longitudinal data.

The present study aims to contribute to the existing research in the following way. Previous studies that applied SAOM for analysing friends' influence on educational aspirations while taking the possible confounding effect of friendship selection into account (e.g., Kretschmer and Roth, 2021; Lorenz et al., 2020; Mundt and Mundt, 2020) concentrated on secondary school students and their aspirations or expectations regarding the distant future (usually the targeted highest level of education).

Academic achievement and ambitions in the last years of primary education are very important regarding the students' secondary-level education and their future academic careers. Once students are assigned to stratified secondary school tracks, the track they are placed in has a strong association with their post-secondary school opportunities and ambitions (Schumann, 2009). Secondary school tracks vary based on students' academic achievement and parental background (Shavit and Blossfeld, 1993). Consequently, the exposure to peers before tracking becomes especially important.

Moreover, this study focuses on ambitions targeting a proximate outcome: academic achievement in two school subjects in the next semester. Ambitions regarding these outcomes may be easier for adolescents to understand and more within their control compared to long-term educational choices. Therefore, primary school students may be influenced by their peers when it comes to their academic ambitions, even though their parents typically have the final say in their formal educational decisions.

5.2. The present study

The present study examines academic ambitions as desired outcomes, specifically the lowest outcome that an individual considers acceptable (Castellani, Di Giovinazzo, and Novarese, 2010). This concept incorporates various factors, including desires, preferences, choices, and calculations (Appadurai, 2004). Academic aspirations play a crucial role in students' educational achievements by boosting their motivation (Abu-Hilal 2000; Trebbels, 2015).

In addition, ambitions and achievements can mutually reinforce each other (Gutman and Akerman, 2008; Zhang et al., 2011). Low ambitions can create a negative cycle for talented students, leading to low achievement and even lower ambitions (Keller, Takács, and Elwert 2021). This can result in cumulative disadvantages, especially in educational systems where tracking heavily influences outcomes in later education levels and the labour market.

The beliefs and behaviours of significant others play a role in how individuals perceive academic challenges and their ability to handle them (Eccles, 2009; Taylor, 2004; Wigfield, Tonks and Klauda, 2009). They also influence how students value academic success and specific academic results (Archer, Hollingworth, and Mendick, 2010; Eccles, 2009; Gale and Parker, 2015; Wigfield, Tonks and Klauda, 2009).

While parents play a role in shaping their children's social identity and goals by providing them with resources to succeed academically (e.g., Bandura et al., 2001; Coleman, 1988; Sewell and Hauser, 1993), it can be argued that during early adolescence, peers, particularly friends, become influential socializing agents (Berndt and Savin-Williams 1993). These peers may impact the development of academic expectations, values, and ambitions.

In the following, the study discusses how adolescents can adjust their own academic ambitions to their friends' ambitions and achievements. The hypothesised model regarding the formation of adolescents' academic ambitions is shown in *Figure 5.*

Adolescents can directly convey academic expectations and values to one another (Wentzel et al., 2010). They can also reinforce or reject specific academic behaviours or attitudes (Brown and Larson, 2009; Wentzel and Muenks, 2016). Additionally, adolescents can serve as role models, providing behaviour that others can imitate, or they can help each other understand the patterns of behaviour and attitudes that are available (Brown and Larson, 2009).

Students' friends can influence their academic ambitions by impacting their attitudes and values towards education. For instance, classmates can share their perspectives on the significance of academic achievement in various subjects, or they can exhibit behaviours that either support or impede academic success, like studying for classes or actively participating in classes.

There is extensive empirical evidence that friends can influence each other's academic values, norms, or effort (Eccles 2009; Hamm et al., 2011; Reindl, 2020; Reindl, Gniewosz and Dresel, 2020; Shin and Ryan, 2014; Wigfield and Eccles 2020), as well as adolescents' overall attitude towards school, and the adoption of school-related norms, beliefs, and prosocial behaviour (Wentzel, Barry, and Caldwell, 2004). The transmission of such norms and values can particularly be observed in academic subjects like languages and mathematics, which may be intrinsic compared to the values of the more salient non-academic subjects like arts or physical education (Chow et al., 2018).

Because the values associated with academic tasks can affect individuals' motivation to succeed, friends can influence the academic ambitions of adolescents by aligning with their friends' academic values and norms (e.g., Wigfield and Eccles 2020). Friends can also play a crucial role in shaping adolescents' academic motivation directly (Altermatt and Pomerantz, 2003; Molloy, Gest and Rulison, 2011; Nelson and DeBacker, 2008; Ryan, 2001).

Adjustment Hypothesis: Adolescents adjust their academic ambitions to their school friends' academic ambitions.

The adjustment of adolescents' academic ambitions is influenced by how they perceive their abilities and their beliefs about success (Eccles and Wigfield, 2020). These perceptions are constantly shaped through comparisons made within themselves and with others who are relevant to them (Barron and Hulleman, 2015; Festinger, 1954; Mussweiler, 2009; Zell and Strickhouser, 2020). Therefore, it is important to consider the academic achievement of friends when analysing the impact of their ambitions on students' ambitions.

Peers' high academic achievement can influence the academic ambitions of adolescents in two ways. Firstly, it can have a negative contrast effect on their self-evaluation, causing them to lower their own ambitions. Alternatively, it can lead to positive assimilation, where adolescents align their academic achievement with those of their high-achieving peers, which can boost their ambitions. (Alwin and Otto, 1977; Huguet et al., 2009; Marsh, 1991; Rosenqvist, 2018).

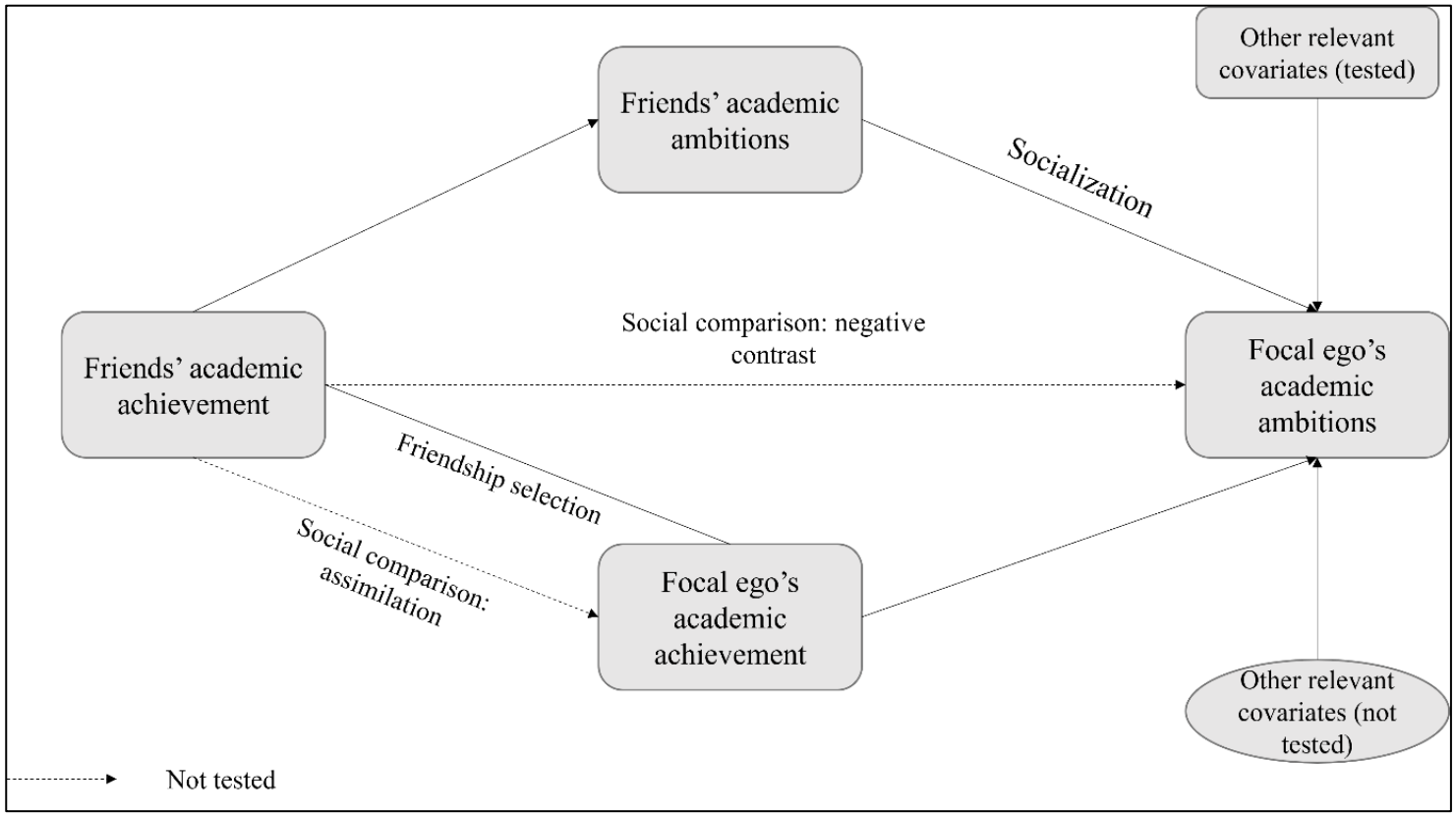
It is also possible for negative contrast and positive assimilation processes to coexist (Seaton et al., 2008) and the present study does not aim to directly disentangle these two processes. The achievement of friends may not have an impact on adolescents' self-evaluations beyond the achievement of their classmates (Jansen, Boda, and Lorenz 2022). Friends' ambitions may be affected by their academic achievement (Wan et al., 2021). Thus, the academic achievement of friends may indirectly affect adolescents' academic ambitions by influencing the academic ambitions of those friends.

Meanwhile, academic achievement, as an attribute that can be observed, may affect the selection of friends among classmates (de Klepper et al., 2010; van Duijn et al., 2003). Several previous studies have provided evidence that academic achievement influences the process of selecting friends (Flashman 2012; Gremmen et al., 2017; Lomi et al., 2011; Rambaran et al., 2017; Torlò and Lomi, 2017; Smirnov and Thurner, 2017).

Some studies have shown that students are more likely to end friendships with friends whose academic performance differs from theirs, rather than trying to match their friends' achievement (Flashman, 2012; Smirnov and Thurner, 2017). More specifically, Gremmen *et al.* (2017) emphasised the importance of academic achievement for choosing friends, particularly when forming friendships in new social circles.

Selection Hypothesis: Academic achievement affects the creation and maintenance of friendship ties.

Figure 5: A hypothesized model predicting adolescents' academic ambitions



Notes. Own edition.

5.3. Data and Methods

5.3.1. Data

The analysis is based on data collected as part of the Competition and Negative Ties research project conducted by the 'Lendület' Research Center for Educational and Network Studies (RECENS) at the Hungarian Academy of Sciences (HAS) (e.g., Kisfalusi, Janky and Takács, 2019). The fourth, fifth, and sixth waves of the data were used for the present analysis collected during the spring semester of the 2014/2015 academic year ($N_{schools}$=34, $N_{classes}$=53, $N_{students}$=1054), the 2015/2016 academic year ($N_{schools}$=26, $N_{classes}$=39, $N_{students}$=743), and the 2016/2017 academic year ($N_{schools}$=25, $N_{classes}$=37, $N_{students}$=663), respectively. Students were enrolled in the sixth, seventh, and eighth grades of primary education in these waves.

The reason for restricting the present analysis to the last three waves of data collection is related to the fact that these final years are critical in the development of academic aspirations and achievement; thus, they have a notable impact on school careers at the secondary level. Including earlier waves in the study would also lead to higher drop-out rates and a smaller number of networks available for longitudinal social network analysis.

The study used a smaller subsample of the dataset. The steps involved in this process are described below. Between the fourth and fifth waves, the number of classes in the sample was intentionally reduced from 53 to 39. In addition, two more school classes dropped out of the study, bringing the final total to 37 classes in the sixth wave. Some minor changes also occurred due to a decrease in student turnout. The present investigation was restricted to the classes present in the study in all three waves (N = 37 classes).

Furthermore, the investigation excluded classes with a participation rate of less than 75 per cent in any of the consecutive waves. Classes that had a composition change of more than 20 per cent between any of the measurement points were also excluded from the analysis. Two additional classes were excluded from the analysis because there were no changes in academic ambitions between any two waves. This decision was made because the applied models require that there be some change in academic ambitions for all groups and time periods. This latter criterion was applied differently for the two school subjects, resulting in 19 shared classes for both subjects (N=407 students).

Participants included in the analysis do not differ significantly from participants in the excluded classes in terms of academic ambitions and academic achievement, except for achievement in Hungarian literature at the first measurement with a .2 difference in mean academic achievement between included and excluded participants (*Appendix A*).

Additional tables and statistical models include data from 407 students in the 19 intersecting classes. However, not all students answered all questions during each measurement.

Table 9 displays the descriptive statistics of the friendship networks.

Table 9: Friendship network descriptive statistics

Network	Size	Density			Average outdegrees (SD)			Jaccard similarity index	
		Time 1	Time 2	Time 3	Time 1	Time 2	Time 3	Time 1 to Time 2	Time 2 to Time 3
#1	31	.29	.34	.30	8.10 (6.79)	6.71 (6.19)	6.58 (6.79)	.41	.50
#2	31	.24	.31	.26	5.45 (4.03)	6.87 (4.67)	5.23 (4.17)	.42	.40
#3	19	.36	.44	.43	4.79 (4.12)	6.37 (4.67)	6.42 (5.25)	.49	.56
#4	17	.24	.3	.38	3.41 (2.69)	3.24 (3.25)	4.71 (3.85)	.36	.44
#5	19	.32	.36	.33	4.26 (3.87)	4.79 (3.79)	4.42 (2.81)	.69	.61
#6	26	.24	.33	.24	3.88 (3.14)	5.77 (4.19)	4.31 (3.31)	.52	.48
#7	18	.26	.28	.43	3.50 (3.05)	4.22 (3.23)	4.89 (4.21)	.45	.37
#8	17	.48	.46	.46	6.24 (4.34)	7.00 (5.07)	5.76 (5.15)	.64	.62
#9	21	.21	.14	.10	3.10 (5.22)	1.24 (1.51)	1.00 (1.14)	.52	.53
#10	27	.21	.24	.22	4.31 (4.60)	5.07 (4.93)	3.52 (3.43)	.37	.31
#11	18	.38	.42	.48	4.44 (4.40)	3.83 (3.78)	5.28 (5.32)	.53	.56
#12	18	.2	.22	.29	2.78 (2.71)	2.78 (2.84)	3.44 (3.45)	.48	.34
#13	18	.41	.41	.39	6.28 (5.32)	6.06 (5.21)	5.11 (3.43)	.51	.41
#14	22	.42	.41	.43	7.00 (4.72)	5.45 (5.03)	6.00 (6.63)	.51	.39
#15	23	.15	.19	.17	2.13 (2.28)	2.22 (2.30)	1.52 (1.86)	.39	.52
#16	24	.23	.22	.27	3.54 (4.46)	3.42 (2.65)	3.88 (4.25)	.32	.56
#17	17	.2	.18	.29	2.00 (2.09)	2.53 (1.81)	2.88 (3.12)	.46	.35
#18	22	.32	.25	.36	4.95 (3.82)	3.82 (4.01)	3.64 (3.46)	.69	.53
#19	19	.36	.38	.39	6.26 (4.17)	5.53 (2.91)	5.53 (3.63)	.54	.53

Notes. Total N = 407. Own calculations.

5.3.2. Measures

5.3.2.1. Dependent Variables

Academic ambitions. Assuming that academic motivation is related to specific subjects (Green, Martin, and Marsh, 2007), academic ambitions were measured separately for mathematics and Hungarian literature. Students were asked the following question to assess their satisfaction: '*What grade would you be satisfied with in Hungarian literature/mathematics?*' The students could answer on a scale from 1 to 5, according to the Hungarian grading system, where 1 means '*Insufficient*' and 5 means '*Excellent*'. Because the percentage of the students who chose 1 or 2 was very low in both school subjects (ranging from 1.5 per cent to 3 per cent at each measurement), those answers were merged with 3, resulting in three ordered categories.

The distribution of academic ambitions on the original scale is shown in *Table 10*.

Friendship. Friendship was represented using an adjacency matrix with binary values. The students could rate their classmates on a scale of 1 to 5. Those marked with the highest value (5, labelled as 'a good friend of mine') were coded as friends (1 = 'friends', 0 = 'not friends'). Ties might be either unilateral or reciprocated.

While students may have friends and other peers outside of their school classes, early adolescents in Hungary primarily spend their days in school interacting with their classmates and being evaluated in comparison to them. Therefore, it can be argued that within-class friends comprise an important part of adolescent friendship relationships.

Table 10: The distribution of academic ambitions

	1	2	3	4	5	N
	Academic ambitions (%)					
Hungarian literature						
T1	.52	1.56	13.25	32.99	51.69	353
T2	-	1.91	12.81	37.06	48.23	340
T3	-	1.67	16.39	37.50	44.44	332
Mathematics						
T1	.52	2.08	18.18	36.10	43.12	353
T2	.82	2.18	22.34	35.15	39.51	340
T3	-	3.33	28.33	33.06	35.28	331

Notes. Own calculations.

5.3.2.2. Independent Variables

Individuals make comparisons with their previous achievements within and across domains and those comparisons affect how they evaluate their future options (Wan et al., 2021). Therefore, the models take into account adolescents' own academic achievement in Hungarian literature/mathematics, as well as their academic achievement in comparison to the other domain.

Academic achievement. Academic achievement in mathematics and Hungarian literature was assessed based on self-reported grades using a 5-point scale from the previous mid-year review, which typically takes place at the end of January or early February. This assessment was conducted prior to measuring ambitions in the questionnaire (spring).

Cross-domain comparison. Individuals often compare their achievements in different areas and tend to focus on and value domains in which they perform better (Möller et al., 2016). Therefore, a dichotomous variable was included to measure whether students' achievement in one school subject was higher compared to the other (1 for 'Yes', 0 for 'No'). This means that for Hungarian literature ambitions, cross-domain comparison with mathematics achievement was included and vice versa.

Gender is an important attribute for the creation and maintenance of friendship ties and the development of academic ambitions. Adolescent friendships tend to be highly gender-segregated (e.g., Kretschmer et al. 2018). Additionally, there may be gender differences in ambitions related to various school subjects (Belinsky et al. 2020). Therefore, gender was included as a control variable for adjusting one's ambitions and friendship selection.

Since parents have a strong influence on students' academic performance, their motivation, their beliefs about their abilities, and their aspirations (Bandura et al. 2001; Sewell and Hauser 1993), students' perceptions of their *parents' satisfaction with their overall academic achievement* was included as a control variable in the models (Bandura et al. 2001; Sewell and Hauser 1993). *Parental background* can also have an impact on adolescents' goals and ambitions (Boudon 1974; Breen and Goldthorpe 1997) as well as their academic achievement (e.g., Sirin 2005 for a review); therefore, a covariate for parents' educational background is included.

In Hungary, ethnicity, family socioeconomic status, and student ability are often interconnected due to the disadvantaged family background of Roma students, on average (Kertesi and Kézdi, 2012). Moreover, Roma students tend to have lower expectations for themselves in comparison to their non-Roma peers as a result of the internalization of labelling mechanisms (Szalai 2008). Therefore, self-reported ethnic identity was included as a control variable to account for its potential impact on adolescents' academic ambitions.

Descriptive statistics for both the dependent and independent variables can be found in *Table 11*.

Table 11: Descriptive statistics of the dependent and predictor variables

Dependent variables					
Friendship	**Range**		**Time 1**	**Time 2**	**Time 3**
Average densities across networks ($n_{network\ s}$= 19) (SD)	0 'None of the potential ties exist in the network' 1'All of the potential ties exist in the network'		.29 (.09)	.31 (.10)	.33 (.10)
Mean of academic ambitions (SD) *(missing cases)*	1 'Insufficient, sufficient, or satisfactory' 2 'Good' 3 'Excellent'	Mathematics	2.22 (.77) *(54)*	2.14 (.79) *(67)*	2.04 (.82) *(76)*
		Hungarian literature	2.36 (.73) *(54)*	2.34 (.72) *(67)*	2.26 (.75) *(75)*

Predictor variables					
			Mean (SD) *(missing cases)*		
	Range		**Time 1**	**Time 2**	**Time 3**
Academic achievement in the previous mid-term review (changing covariate)	1 'Insufficient' 5 'Excellent'	Mathematics	3.32 (1.16) *(57)*	3.19 (1.18) *(71)*	3.21 (1.19) *(79)*
		Hungarian literature	3.44 (1.12) *(55)*	3.50 (1.08) *(68)*	3.55 (1.03) *(78)*
Cross-domain comparison (changing covariate)	1 'Higher achievement in the school subject measured in the dependent variable' 0 'Higher achievement in the other school subject'	Mathematics dependent	.23 (.42) *(63)*	.14 (.35) *(82)*	.11 (.32) *(88)*
		Hungarian literature dependent	.29 (0.45) *(63)*	.41 (0.49) *(82)*	. 38 (0.49) *(88)*
Parents' perceived satisfaction with students' academic achievement in general (changing covariate)	1 'Not satisfied at all' 5 'Completely satisfied'		3.75 (.97) *(60)*	3.66 (.95) *(74)*	3.68 (1.0) *(91)*
Parents' highest level of education (constant covariate)	0 'None of the parents completed tertiary education' 1 'At least one of the parents completed tertiary education'			.25 (.43) *(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'			.38 (0.49) *(17)*	
Gender (constant covariate)	1 'Female', 0 'Male'			.48 (.50) *(0)*	

5.3.3. Analytical Strategy

Stochastic Actor-Oriented Models (SAOM) were applied to analyse the coevolution of network ties and attributes in the longitudinal network data. SAOM estimate the interdependent effect of network processes and individual attributes on the evolution of two dependent variables, namely network ties and individual 'behaviour'. This makes it possible to disentangle the effects of social selection and influence (Steglich et al. 2010). The term 'behaviour' is used in a broad sense here, referring to an individual attribute that is expected to change over time —in this case, the students' academic ambitions.

The study focuses on understanding the influence and selection effects on adolescents' academic ambitions and their friendship networks. It does so by modelling the changes in these factors over time, taking into account the perspective of the students themselves who make decisions about their friendships and adjust their ambitions based on their network (school class) dynamics (Ripley et al., 2021).

The data consists of multiple groups, each with its own network structure. To obtain global estimates for the combined sample, random coefficient multilevel Stochastic Actor-Oriented Models were applied. These models allow certain parameters to vary across groups, while assuming others to be consistent across all groups.

The inferences were based on Bayesian estimation implemented in *sienaBayes()* modelling the joint probability of the parameters and data 'as a function of the conditional density of the data given the parameters, and the prior distribution of the parameters' (Kaplan and Depaoli, 2013, p. 410; Ripley et al. 2021). This way, the effects of the main variables of interest were modelled for the entire sample, taking into consideration the variations in network processes across different classes.

The data and models meet the requirement of sienaBayes, which states that all groups must have the same number of time points and identical model specifications. Structural effects for network dynamics were let vary randomly across groups. Further, gender and ethnicity-related effects were assumed to be random for both parts of the model to cope with convergence issues, while all other parameters were set as fixed, assuming that they did not vary across groups (Ripley et al., 2021).

Four independent sequences of the same model configuration were each run for 3,000 iterations. Convergence was assessed using the *rstan* package (Stan Development Team, 2020). Convergence was determined by monitoring the $\widehat{R}$ values across the iterations of chains for the parameters in the four models. The models converged when all the $\hat{R}$ values were $\leq$1.05 for each parameter of interest and the estimated equivalent sample size under the independent sampling was

≥ 5-times the number of chains (in this case 20), as suggested by Gelman *et al.* (2014). All presented results met this requirement.

5.3.4. Model Specification

The model results represent the probabilities of changes in friendship ties and academic ambitions between two observations. These results should be interpreted as log odds ratios in logistic regression models. Regarding the dynamics of ambitions, the influence of friends on ambitions was modelled by the tendency of assimilating one's academic ambitions towards friends' average ambitions. Furthermore, the impact of friends' average academic achievement on an individual's propensity to increase, maintain, or decrease their academic ambitions was modelled alongside the effect of the individual's previous academic achievement and the comparison of their achievements in mathematics and Hungarian literature.

Regarding friendship dynamics, it is important to consider how similarities in academic ambitions and achievement impact the formation and maintenance of friendships among adolescents. Similarity in gender, ethnicity, and parents' highest level of education were considered as potential confounding factors for the similarity of friends in academic ambitions or achievement.

Alter effects, which examine whether individuals with higher ambitions or achievement are more likely to be nominated as friends, were included as control variables. Unfortunately, the models did not converge when including ego effects related to the same covariates. This issue could not be resolved by incorporating time variation, random variation of ego effects, or excluding nodes with high out-degree centrality compared to their network size (nominating more than half or two-thirds of students in the class) from the data. Thus, while evaluating the selection hypothesis, it is important to note that ego effects were not controlled for.

Structural effects were also included to model general tendencies for creating and maintaining friendship ties, regardless of individual characteristics such as reciprocity or popularity based on the number of incoming connections. All effects are listed in *Table 12* and *Table 13.*

Table 12: Effects for friendship dynamics

Effect name (RSiena effect name)		**Modelling the tendency of…**
Friendship dynamics		
Structural effects		
	Outdegree (density)	creating and maintaining friendship ties
	Reciprocity (recip)	reciprocating friendship ties
	Transitive triplets (gwespFF)	creating and maintaining friendship ties with friends of friends
	Indegree popularity – sqrt (inPopsqrt)	creating and maintaining friendship ties with those actors who have more incoming ties
	Outdegree activity – sqrt (outPopsqrt)	those actors with more outgoing ties creating and maintaining friendship ties
Alters academic ambitions (altX)		creating and maintaining friendship ties with those who have higher academic ambitions
Similarity in academic ambitions (simX)		creating and maintaining friendship ties with those with similar academic ambitions measured by the centered similarity scores between an actor and those whom that actor is tied to
Alter's academic achievement (altX)		creating and maintaining friendship ties with those who have higher academic achievement
Similarity in academic achievement (simX)		creating and maintaining friendship ties with those with similar academic achievement measured by the centered similarity scores between an actor and those whom that actor is tied to
Similarity in parental background (simX)		creating and maintaining friendship ties with those with similar parental background measured by the centered similarity scores between an actor and the actors that actor is tied to
Gender similarity (simX)		creating and maintaining friendship ties based on gender similarity measured by the centered similarity scores between an actor and the actors that actor is tied to
Ethnic similarity (simX)		creating and maintaining friendship ties based on ethnic similarity measured by the centered similarity scores between an actor and the actors that actor is tied to
Similarity in parental educational background (simX)		creating and maintaining friendship ties based on similarity in parental educational background measured by the centered similarity scores between an actor and the actors that actor is tied to

Notes. Own edition, based on Ripley et al. (2021)

Table 13: Effects for behaviour dynamics

Effect name (RSiena effect name)	**Modelling the tendency of…**
Behaviour dynamics	
Linear (linear)	educational ambitions changing (increasing or decreasing) over time
Quadratic shape	The effect of academic ambitions on itself
Average similarity (avSim)	students' assimilating their academic ambitions to their friends' average academic ambitions measured by the centered average similarity scores between an actor and the actors that actor is tied to
Alters (friendship) average academic achievement (avXAlt)	Cross-behaviour influence: the tendency of adolescents to change their ambitions in response to friends' academic achievement
Ego's academic achievement (effFrom)	students' academic achievement adapting (increasing or decreasing) their academic ambitions
Cross-domain comparison (effFrom)	students' academic achievement compared to the other school subject adapting (increasing or decreasing) their academic ambitions
Parents' expectations (effFrom)	parents' expectations adapting (increasing or decreasing) their academic ambitions
Having at least one parent with a tertiary educational level (effFrom)	Students with at least one parent who has tertiary education level adapting (increasing or decreasing) their academic ambitions
Being a girl (effFrom)	girls adapting (increasing or decreasing) their academic ambitions
Being Roma (effFrom)	Roma students adapting (increasing or decreasing) their academic ambitions

Notes. Own edition, based on Ripley et al. (2021)

5.4. Results

5.4.1. Descriptive Results

Table 14 demonstrates a strong correlation between current ambitions and previous ambitions, as most students did not alter their ambitions between two measurements. However, a considerable percentage of students (30 and 32 per cent in Hungarian literature, 28 and 29 per cent in mathematics during the first and second periods, respectively) changed their ambitions over time, typically shifting by one category. There was a clear association between academic achievement and academic ambitions at all measurements (*Table 15*). On average, students were found to have a stronger similarity with their friends in terms of their academic ambitions and academic achievements compared to their other classmates, as shown in *Table 16*.

Table 14: Academic ambitions by previous ambitions (proportions).

	Hungarian literature				Mathematics			
	Ambitions							
	Decreased by 1/2	**Maintained**	**Increased by 1/2**	**N**	**Decreased by 1/2**	**Maintained**	**Increased by 1/2**	**N**
	From T1 to T2 by T1 ambitions							
3 or below	-	.66	.32 /.02	44	-	.75	.20/.05	65
4	.15	.61	.24	108	.22	.60	.18	111
5	.22/.02	.76	-	155	.19/.05	.76	-	131
	From T2 to T3 by T2 ambitions							
3 or below	-	.66	.32 /.02	41	-	.83	.13/.04	71
4	.21	.59	.20	116	.30	.59	.11	110
5	.21/.03	.76	-	152	.20/.04	.76	-	127

Notes. Own calculations.

Table 15: Spearman Rank correlation between students' academic achievement and ambitions

	Mathematics	**N**	**Hungarian literature**	**N**
Time 1	.71	350	.65	352
Time 2	.77	336	.70	339
Time 3	.76	327	.69	328

Notes. Own calculations.

Table 16: Average dyadic similarities by academic ambitions and academic achievement among school class friends and non-friend school classmates

		Academic ambitions		Academic achievement	
		Mathematics	**Hungarian literature**	**Mathematics**	**Hungarian literature**
Time 1	**Friends (N_{dyads}=1903)**	.70	.72	.78	.78
	Non-friends (N_{dyads}=4811)	.64	.64	.74	.74
Time 2	**Friends (N_{dyads}=1919)**	.70	.72	.83	.83
	Non-friends (N_{dyads}=4315)	.61	.64	.77	.78
Time 3	**Friends (N_{dyads}=1816)**	.66	.70	.84	.86
	Non-friends (N_{dyads}=3927)	.62	.64	.81	.83

Notes. Own calculations. 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 from 1 (Ripley et al., 2021).

5.4.2. Random Coefficient Multilevel Siena model Results for Social Influence

Table 18 and *Table 19* report the posterior means, posterior standard deviations, and posterior *p*-values of the final models. The tables are divided into two parts, but both the results of social selection and social influence belong to the same model for school subjects. *Table 17* displays social influence effects by various levels of academic ambitions. The results are reported for the 19 classes that were suitable for analysing both Hungarian literature and mathematics ambitions.

P-values close to 1 indicate a high probability that the parameter is positive, based on the data, model specification, and priors. Conversely, *p*-values close to 0 suggest a high probability that the parameter can be interpreted as negative, based on the same factors. Posterior parameters with p-values ranging between either .975 and 1.00 or .00 and .025 are marked in bold, indicating sufficient evidence to accept that the effects are positive or negative, respectively. Nevertheless, incorporating these thresholds aligns with the frequentist approach, meaning that results that slightly deviate from these thresholds are still taken into consideration.

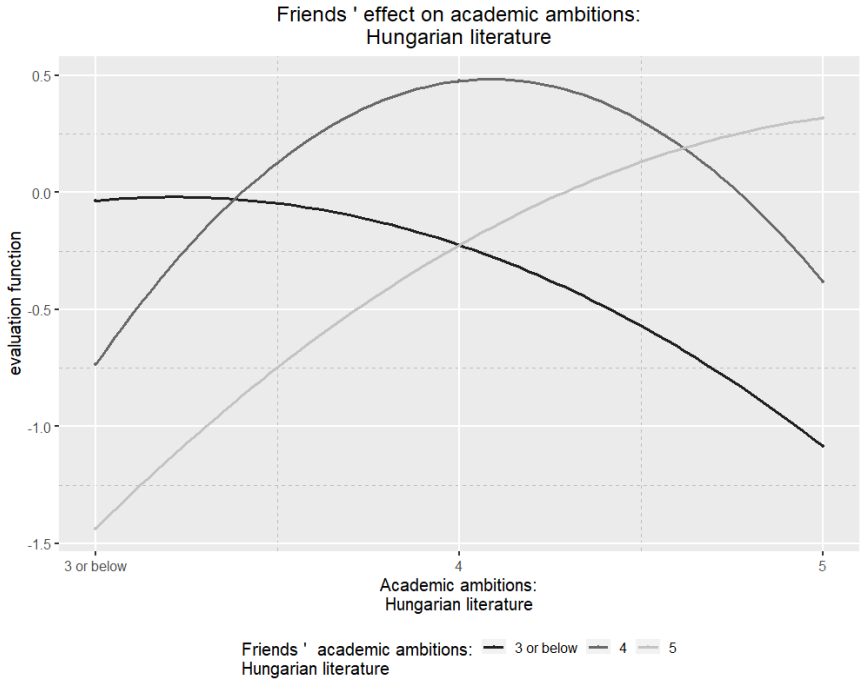
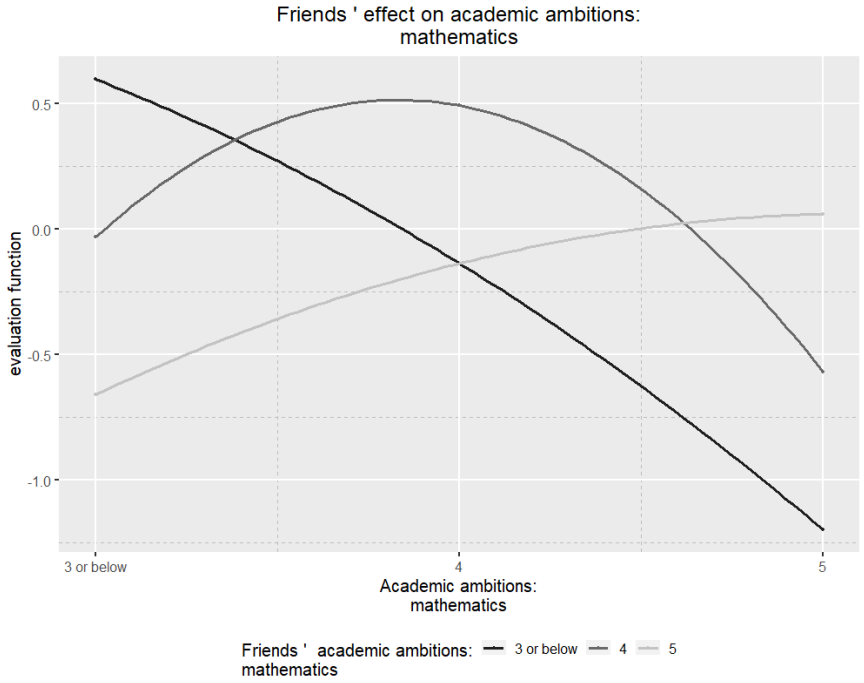
The general tendency to adjust academic ambitions was somewhat different for the two school subjects. In general, students tended to lower their ambitions in mathematics, as indicated by the negative linear shape effect (θ =-.31, *SD*=.11, p =.00). Nevertheless, the adjustment of ambitions in Hungarian literature seemed to be self-correcting, as shown by the negative coefficient of the quadratic shape effect (θ =-.33, *SD*=.17, p =.03). This means that for decreasing ambitions in Hungarian literature, the push toward lower ambitions became smaller (Ripley et al., 2021).

With regards to academic ambitions, the overall results support the *Adjustment Hypothesis* for both school subjects (*Table 18*). However, the *p*-value for mathematics falls slightly outside the accepted threshold. The positive coefficient of the average similarity effects ($\theta_{Hungarian}$ = 1.40, $SD_{\text{Hungarian}}$ = -.71, $p_{Hungarian}$ = .98, $\theta_{Mathematics}$ =1.26, $SD_{\text{Mathematics}}$ =.70, $p_{Mathematics}$ =.97) show that students aligned their academic ambitions with those of their friends. This suggests social influence on academic ambitions among friends, as the models separated the influence of friends from the tendency to form ties based on similar academic ambitions.

Nevertheless, the influence tables reveal different tendencies for the two school subjects behind the observed average similarity effects (*Table 17*). The graphs generated from the influence tables display the relative desirability of adopting different levels of common academic ambitions among friends. With a tendency towards similarity, it is assumed that the maximum value in each row is the diagonal (Ripley et al., 2021). Thus, influence tables and graphs can show whether the tendency of students to adopt their friends' academic ambitions varies by their friends' common ambitions.

In this case, the graph based on the influence table for Hungarian literature shows that the inclination towards similarity was more associated with the appeal of friends who had moderately high (4) or high ambitions (5), rather that of friends with low ambitions (3 or below). Thus, social influence on Hungarian literature ambitions was related to the shift towards more favourable academic values. Meanwhile, in the field of mathematics, a different trend became apparent. The inclination to become like one's friends was more strongly associated with having friends who had either low ambitions (3 or below) or moderately high ambitions (4), rather than friends with high ambitions (5). Thus, if their friends have low ambitions in mathematics, it can negatively impact students' ambitions too.

Table 17: Influence tables for the two school subjects

School subject	
Hungarian literature	
Mathematics	

Notes. Own edition based on the influence tables.

Comparison with the academic performance of friends did not appear to have an impact on whether students adjusted their academic ambitions. This is indicated by the high uncertainty of the coefficients for friends' average academic achievement in both Hungarian literature ($\theta_{Hungarian}$ = -.01, $SD_{\text{Hungarian}}$ = .25, $p_{Hungarian}$ = .50) and mathematics ($\theta_{Mathematics}$ =.01, $SD_{\text{Mathematics}}$ =.24, $p_{Mathematics}$ = .50).

Regarding the control effects for the adjustment of academic ambitions, the higher the grades the students received, the more likely they were to raise their ambitions upwards in both school subjects ($\theta_{Hungarian}$ = .53, $SD_{\text{Hungarian}}$ = .14, $p_{Hungarian}$ > .99, $\theta_{Mathematics}$ =.52, $SD_{\text{Mathematics}}$ =.14, $p_{Mathematics}$ > .99). Making comparisons across different domains did not appear to have an impact on students' academic aspirations in mathematics ($\theta_{Mathematics}$ =.10, $SD_{\text{Mathematics}}$ =.23, $p_{Mathematics}$ =.68). Nevertheless, there was some weak evidence suggesting an effect on their aspirations in Hungarian literature ($\theta_{Hungarian}$ = .44, $SD_{\text{Hungarian}}$ = .26, $p_{Hungarian}$ =.96). Thus, achieving higher grades in Hungarian literature than in mathematics appeared to somewhat increase students' ambitions in Hungarian literature.

Girls seemed to aspire higher than boys, but only in Hungarian literature ($\theta_{Hungarian}$ = .64, $SD_{\text{Hungarian}}$ =.20, $p_{Hungarian}$ > .99, $\theta_{Mathematics}$ =.21, $SD_{\text{Mathematics}}$ =.19, $p_{Mathematics}$ = .86). This phenomenon can be explained by the impact of gender socialization on achievement motivation (Meece and Agger, 2018). Additionally, research has shown that girls in Hungary typically demonstrate more advanced reading skills compared to boys (Belinsky et al., 2020).

5.4.3. Random Coefficient Multilevel Siena Model Results for Social Selection

Students with high ambitions were not more likely to receive friendship nominations than those with lower ambitions, in either of the subjects and ambitions did not affect friendship selection. The results showed a difference between the two school subjects when it came to the tendency to create and maintain friendships in relation to academic achievement (*Table 19*).

The *Selection Hypothesis* is supported only for Hungarian literature, not for mathematics. In the case of Hungarian literature, similarity in academic achievement had a positive effect on creating or maintaining friendship ties ($\theta_{Hungarian}$ = .19, $SD_{\text{Hungarian}}$ =.09, $p_{Hungarian}$ = .98), but not in mathematics ($\theta_{Mathematics}$ =.10, $SD_{\text{Mathematics}}$ =.10, $p_{Mathematics}$ =.83). The students were more inclined to become and/or maintain friendships with other students who had similar academic achievement in Hungarian literature. This remained true even when taking into account similarities in ambitions, gender, parental educational background, or ethnic background. Results from the preliminary stage of the analysis suggest (Model 2 in *Appendix B* and *Appendix C*) that without the similarity effects for academic achievement, academic ambitions played a role in friendship selection. This implies that that friendship selection based on these two attributes may not be independent from each other.

The selection tables based on the final models indicate that friendship selection based on similar achievement in Hungarian literature was related to the fact that those who had moderately high or high achievement preferred befriending students who also had similarly high achievement (*Appendix E*). Although the *p*-values for the similarity effects for academic achievement and ambitions in mathematics fall outside the accepted thresholds, the selection tables suggest similar processes (*Appendix D* and *Appendix E*).

Regarding the structural and control effects on friendship dynamics, students showed a greater inclination to form and maintain friendships with peers of the same gender, rather than with those of the opposite gender. Additionally, they preferred friends who belonged to the same ethnic group when it came to the distinction between Roma and non-Roma ethnicity. Concerning the structural effects, the results were substantially the same regarding academic ambitions in both subjects. The negative coefficient of the outdegree effects show that the students were selective in their friendship choices. The positive reciprocity effects indicate that the students were inclined to reciprocate incoming friendship ties, while the positive transitivity effect suggested a tendency toward triadic closure.

Table 18: Random coefficient multilevel Siena model results part 1 (social influence)

Behaviour (ambitions) dynamics	Hungarian literature					Mathematics					
	θ	SD	Credible from	Credible to	p-value	θ	SD	Credible from	Credible to	p-value	Varying across classes
Linear shape	-.03	.12	-.26	.20	.42	**-.31**	**.11**	**-.52**	**-.11**	**.00**	No
Quadratic shape	*-.33*	*.17*	*-.68*	*.01*	*.03*	-.16	.16	-.48	.14	.14	No
Social influence											
Average similarity to friends' ambitions	**1.40**	**.71**	**.01**	**2.85**	**.98**	*1.26*	*.70*	*-.07*	*2.68*	*.97*	No
Friends' average academic achievement	-.01	.25	-.52	.48	.50	.01	.24	-.47	.50	.50	No
Individual-level covariates											
Academic achievement	**.53**	**.14**	**.27**	**.80**	**1.00**	**.52**	**.14**	**.24**	**.80**	**1.00**	No
Cross-domain comparison	*.44*	*.26*	*-.06*	*.94*	*.96*	.10	.23	-.35	.54	.68	No
Parents' expectations	.12	.12	-.11	.37	.83	.10	.13	-.15	.35	.79	No
Being a girl	**.64**	**.20**	**.27**	**1.05**	**1.00**	.21	.19	-.16	.59	.86	Yes
At least one parent has a tertiary educational level	.31	.27	-.21	.84	.88	.16	.24	-.31	.63	.75	No
Being Roma	-.12	.21	-.54	.29	.28	-.27	.20	-.67	.13	.10	Yes

Notes. Results from *sienaBayes*. 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 that the parameter is positive; values close 0 indicate that the parameter is negative.

Table 19: Random coefficient multilevel Siena model results part 2 (social selection)

Network (friendship) dynamics	Hungarian literature					Mathematics					
	θ	SD	Credible from	Credible to	p-value	θ	SD	Credible from	Credible to	p-value	Varying across classes
Structural effects											
Outdegree	**-2.55**	**-.20**	**-2.94**	**-2.15**	**.00**	**-2.49**	**.20**	**-2.89**	**-2.11**	**.00**	Yes
Reciprocity	**2.24**	**-.17**	**1.90**	**2.59**	**1.00**	**2.20**	**.18**	**1.86**	**2.58**	**1.00**	Yes
Transitive triplets	**1.91**	**-.12**	**1.69**	**2.14**	**1.00**	**1.92**	**.13**	**1.66**	**2.18**	**1.00**	Yes
Transitive reciprocated triplets	**-1.09**	**-.13**	**-1.34**	**-.84**	**.00**	**-1.07**	**.14**	**-1.35**	**-.82**	**.00**	Yes
Indegree popularity – sqrt	**-.32**	**-.07**	**-.46**	**-.17**	**.00**	**-.32**	**.08**	**-.47**	**-.17**	**.00**	Yes
Outdegree activity – sqrt	.05	-.04	-.04	.14	.88	.04	.05	-.05	.13	.81	Yes
Alters academic ambitions	.01	-.05	-.08	.10	.62	.02	.05	-.07	.11	.66	No
Similarity in academic ambitions	.00	-.09	-.18	.19	.51	.06	.09	-.12	.25	.74	No
Alters academic achievement	.05	-.03	.00	.10	.96	.03	.05	-.02	.09	.89	No
Similarity in academic achievement	**.19**	**-.09**	**.01**	**.37**	**.98**	.10	.10	-.10	.29	.83	No
Gender similarity	**.45**	**-.06**	**.33**	**.56**	**1.00**	**.45**	**.06**	**.33**	**.57**	**1.00**	Yes
Similarity in parental background	-.03	-.04	-.11	.05	.21	-.03	.04	-.11	.05	.25	No
Similarity in ethnic background	**.18**	**-.09**	**.01**	**.35**	**.98**	**.19**	**.09**	**.01**	**.36**	**.98**	Yes

Notes. Results from *sienaBayes*. 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 that the parameter is positive; values close 0 indicate that the parameter is negative.

5.5. Discussion

This study explored the potential influence of friends on the academic ambitions of adolescents in two school subjects. Longitudinal multilevel social network analysis was applied to examine peer effects on the development of adolescents' academic ambitions. Expanding on the discussion presented in previous studies, this study targeted the immediate ambitions that students have in primary education. Additionally, it separated social selection processes from social influence.

The results were consistent with previous studies that showed how friends can influence students by transmitting academic norms, values, and motivation (e.g., Hamm et al., 2011; Reindl, 2020; Shin and Ryan, 2014). The findings indicated that adolescents aligned their ambitions in Hungarian literature with those of their friends. For mathematics, the results pointed in the same direction, although the *p*-values were slightly outside the accepted threshold. These results also confirmed previous research indicating that less observable attributes or intrinsic values are likely to be influenced by others (Chow et al., 2018; de Klepper et al., 2010; van Duijn et al., 2003).

The current study found that adolescents' academic ambitions were impacted by the ambitions of their friends. This influence was observed even when taking into account individual characteristics, the academic achievement of their friends, and the initial selection of friends based on similar academic ambitions. It is important to note, however, that friends' influence on students' academic ambitions seemed to be domain-specific. In Hungarian literature, the high ambitions of friends appeared to be more appealing than their low ambitions. Meanwhile, in mathematics, the low ambitions of friends seemed to contribute to trapping students in low ambitions.

The diverging tendencies beyond social influence effects for the two school subjects may be related to the unique position of mathematics compared to other school subjects. Previous research has indicated that when it comes to academic achievement in mathematics, it is often perceived as being more reliant on innate ability rather than being something that can be improved through effort, as is the case with reading and writing (Gunderson et al., 2017). Additionally, mathematics achievement is found to be more closely associated with individual interest compared to other subjects (Jansen, Lüdtke and Schroeders 2016). Perceiving mathematics achievement as being determined by innate ability, friends who have low ambitions in mathematics may reinforce each other's beliefs that mathematics is not something they can succeed in. As a result, they may discourage each other from striving for higher achievement in mathematics.

Friends did not seem to exert additional influence on students' academic ambitions via their academic achievement. This result is consistent with a previous longitudinal study which suggested that the academic achievement of friends may not have a negative impact on students' self-evaluations beyond the effect of the broader peer context (Jansen, Boda, and Lorenz 2022).

The investigation clearly revealed that different school subjects have varying effects on friendship selection. The similarity in academic achievement in Hungarian literature seemed to contribute to the selection of friends among Hungarian adolescents in the sample. This partly supports previous findings which suggest that academic achievement, as an important attribute, can signal other relevant characteristics to peers, forming the basis of friendship ties (Lomi et al., 2011; Torlò and Lomi, 2017). The study found that, as hypothesised, academic achievement in Hungarian literature impacted the choice of friends. Contrary to the hypothesis, when it comes to mathematics, the similarity in academic achievement did not contribute to the selection of friendships.

Based on the results, academic success in Hungarian literature seemed to be an important characteristic that could establish friendships. This may be due to the connection between students' attitudes towards reading and their reading abilities. Engagement or motivation in reading can be social and, therefore, manifested through the sharing of book experiences with others (Wigfield, 1997). Students who enjoy reading tend to have better reading achievement and comprehension (Kush, Watkins and Brookhart, 2005; Cheema, 2018). Therefore, classmates may observe similarities in their academic achievement in Hungarian literature. These similarities may be attributed to behaviours related to leisure reading or positive attitudes toward reading. In turn, such similarities can contribute to the formation, maintenance, and dissolution of friendship ties.

Furthermore, students' attitudes towards reading and their reading achievement can be influenced by their family background (Rogiers, Van Keer and Mercie, 2020). This means that students similar language style or shared cultural references signal their similar socioeconomic backgrounds, which can serve as a basis for selecting friends. Nonetheless, social selection results should be treated with some caution because of the exclusion of ego effects.

The generalizability of the results may be limited due to the initial sampling procedure, which resulted in an overrepresentation of less advantaged schools in the sample. Nevertheless, presenting evidence for peer effects in such a context highlights the importance of social relations networks in reducing social inequalities. Future studies that replicate the investigation in different contexts and utilise alternative data sources could potentially address this limitation.

Despite these limitations, the study has made several significant contributions to understanding the impact of social influence on educational outcomes. To the best of my knowledge, this study was the first to offer a comprehensive analysis that disentangles the effect of social influence from selection on similarity in academic ambitions measured as aspired school grades accounting for the possible confounding effect of academic achievement. The analysis found evidence for social influence among primary school students before they are subject to ability tracking at the secondary level. Finally, the results emphasise that academic motivation is a domain-specific construct (Green, Martin and Marsh, 2007; Jansen, Lüdtke and Schroeders, 2016), as well

as that both friendship selection and influence mechanisms related to academic values are domain-specific (Chow et al., 2018), and therefore, should be studied accordingly.

6. PEER INFLUENCE AND EDUCATIONAL PREFERENCES: DIRECT INFLUENCE OR ACCESS TO FRIENDS' EDUCATIONAL RESOURCES?

6.1. Introduction

Students' educational preferences, aspirations, and expectations have consistently been linked to educational attainment (Chowdry, Crawford, and Goodman, 2011; Haller, 1968; Homel and Ryan, 2014; Gutman and Akerman, 2008; Marjoribanks, 2003). While parents can influence the education their children prefer or set as a goal for themselves (e.g., Boudon, 1974; Breen and Goldthorpe, 1997; Portes et al., 2010; Sewell and Hauser, 1993), a growing body of research, based on *The Wisconsin Longitudinal Study* (Sewell and Hauser, 1972, 1993), also acknowledges the significance of peers in shaping educational preferences, goals, or expectations (e.g., e.g., Kretschmer and Roth, 2021; Raabe and Wölfer, 2019; Rosenqvist 2018).

The impact of peers, particularly close friends, on educational outcomes may be stronger during adolescence compared to earlier life stages (Berndt 1992; Berndt and Savin-Williams, 1993; Brown and Larson, 2009; Giordano 2003). Previous research has indicated a positive relationship between the educational aspirations, expectations, or preferences of friends or members of a friendship group among adolescents (Carolan, 2018; Hallinan and Williams, 1990; Kiuru et al., 2007; Mora and Oreopoulos, 2011; Roth, 2017; Sewell and Hauser, 1972; Zimmermann, 2018).

Importantly, however, the positive association between friends' educational preferences, expectations, or aspirations can stem from two processes: friendship selection and influence (Brown and Larson, 2009; McPherson, Smith-Lovin, and Cook, 2001; Mouw, 2006). Research attempting to distinguish between these two processes related to similar educational aspirations, expectations, or preferences has only received attention in recent years (Kretschmer and Roth, 2021; Lorenz et al., 2020; Mundt and Mundt, 2020).

Those investigations were conducted among secondary school students, after tracking into stratified trajectories, and focused on the highest educational level expected by students. Some of these studies pointed out that peer influence plays a role in shaping educational expectations in general (Kretschmer and Roth, 2021), while others only found evidence for social influence in schools with diverse educational tracks (Lorenz et al., 2020) or suggested that social selection may be more important than social influence with regard to friends' similar expectations (Mundt and Mundt, 2020).

The purpose of this study is to investigate direct and indirect peer influence mechanisms and their impact on the educational preferences of adolescents. Friends may have an indirect effect on adolescents' educational preferences through their parental background or academic achievement.

The study examines how friends can influence students in Hungarian primary schools before they enter secondary school tracks. This is important because Hungarian secondary school tracks are highly stratified by adolescents' academic achievement and family background (Shavit and Blossfeld, 1993).

Consequently, the type of educational track itself may reduce and limit the influence that friends have on adolescents' future aspirations and expectations (Buchmann and Dalton, 2002; Lorenz et al., 2020; Raabe and Wölfer, 2019). Therefore, unlike previous studies in this field, this study focuses on the secondary school track preferences of primary school students. Peer effects on the educational preferences of primary school students have mainly focused on the school cohort and not friends (e.g., Jonsson and Mood, 2008; Rosenqvist, 2018; Smith, 2023; Zwier et al., 2023). The analysis utilises multilevel social network models to accurately measure the impact of friends' influence on educational preferences, taking into consideration the effect of friendship selection (Mouw, 2006).

Hence, taken together, this article advances the field in multiple ways. First, the study examines multiple mechanisms of peer influence simultaneously while accounting for the selection of friendships based on similar attributes. The analysis examines how the preferences of friends' impact students' educational preferences while also taking into account the indirect effect of friends' parental background and academic achievement. Second, the study investigates peer influence mechanisms in a primary school setting before students are distributed to socio-economically and academically more homogeneous secondary school tracks.

6.2. The Present Study

Secondary school choice and the process of applying to secondary schools are important milestones in the educational journey of Hungarian adolescents. The preferences for secondary school education often develop over a long period of time, and many secondary schools consider a student's academic performance in upper primary grades when admitting students.

Prior to the secondary school application process in eighth grade, students have the opportunity to discuss and consider their options (GVI, 2020a; Ikonen et al., 2018) or demonstrate their preferences through observable behaviours driven by their preferences, such as studying diligently, actively participating in classes, or the opposite. Students can also share relevant information with each other regarding the application process, the secondary school tracks, or specific schools. Subsequently, adolescent peers may influence each other's secondary school track preferences preceding the application period through a number of mechanisms.

First, it is common for adolescents to conform to the norms and values shared by their peers (Brown and Larson, 2009; Kelley, 1952; Merton, 1968a). This phenomenon is also observed in the

academic field (Coleman, 1988; Crosnoe, Cavanagh and Elder, 2003; Kruse and Kroneberg, 2020; Ryan, 2001). For example, friends have the ability to establish or strengthen academic values, norms, or behaviours (Abrams and Hogg, 1990; Brown et al., 2008; Brown and Larson, 2009; Ryan, 2001) that either encourage or discourage specific academic paths. It is also possible that friends create circumstances that facilitate certain behaviours (Brown et al., 2008), like inviting others to school open days before applications are made. Therefore, it can be anticipated that adolescents will adjust their secondary school track preferences in reaction to their friends' preferences.

H1 - Adjustment hypothesis: Adolescents adjust their educational preferences to their school friends' preferences.

Second, parents' resources can be advantageous both to their children and to their children's peers (Carolan and Lardier, 2018; Cherng, Calarco and Kao, 2013; Coleman, 1988; Crosnoe, 2004; Crosnoe, Cavanagh and Elder, 2003). Students can be exposed to the information, academic norms, and values that are shared by their friends' families. For example, some parents may be more knowledgeable about the admission requirements at various schools and may have a better comprehension of the education that different schools and programs provide. Parents with tertiary-level education are usually more invested in their children's educational issues and tend to prefer the most academic-oriented secondary school track (grammar school track) for their children (GVI, 2020a). Having friends whose parents have higher education level can give students access to the educational resources of their friends' parents. Therefore, it can be expected that adolescents will adjust their secondary school track preferences in response to their friends' parental backgrounds.

H2a - Instrumental resource hypothesis: Adolescents adjust their educational preferences to the more academically-oriented option when their friends' parents have tertiary-level education.

Having friends whose parents are highly educated can be especially beneficial for students from less privileged families (Burgess and Umaña-Aponte, 2011; Smith, 2023; Sokatch, 2006; Wohn et al., 2013).

H2b - Instrumental resource hypothesis: If adolescents do not have parents with a tertiary-level education, they are more likely to choose academically-focused educational paths when they have peers who have at least one parent with a tertiary-level qualification.

Third, friends' academic achievement can affect students' self-evaluations, and thus, educational preferences through negative contrast or positive assimilation (e.g., Seaton et al., 2008).

Nevertheless, friends' academic achievement may not affect how adolescents evaluate their abilities and prospects beyond the effect of the broader peer context (Jansen, Boda and Lorenz 2022). Students' educational preferences may be indirectly affected by the academic achievement of their friends as academic achievement may shape the educational choices of their friends. Therefore, this study also controls for the academic achievement of friends.

Aside from the various ways peers can influence each other's educational preferences, it is important to note, however, that friendship ties are endogenously selected based on similarity along relevant dimensions (Brown and Larson, 2009; McPherson, Smith-Lovin and Cook, 2001). Therefore, in order to accurately determine the impact of influence on the similarity of friends' educational preferences, it is necessary to separate these mechanisms (Brown and Larson, 2009; Steglich, Snijders and Pearson, 2010; Ryan, 2001; Veenstra and Dijkstra, 2012).

As indicated above, communication with peers about educational preferences and salient indicators of academic norms can influence students' educational preferences. Nevertheless, communication and salient indicators of school-related engagement can also contribute to the development of friendship relations (Wang et al., 2018). The grammar school track, which is the most academic-oriented among other tracks, stands out in this regard. It typically has the most demanding admission criteria (Oktatási Hivatal, 2021), which necessitates more thorough preparation and research. Consequently, friendship selection within a school class may be based on the secondary school track preferences of adolescents.

H3 - Selection Hypothesis: Educational preferences contribute to friendship selection.

6.3. Methods

6.3.1. Data

The present analysis is based on the second, fourth, and fifth waves of data gathered within the framework of the MTA 'Lendület' RECENS research project 'Competition and Negative Ties' (e.g., Kisfalusi, 2018a) during the spring semesters of the academic years 2013/2014 ($N_{schools}$=35, $N_{classes}$=58, $N_{students}$=1131), 2014/2015 ($N_{schools}$=34, $N_{classes}$=53, $N_{students}$=1054) and, 2015/2016 ($N_{schools}$=26, $N_{classes}$=39, $N_{students}$=743), when students were enrolled in the fifth, sixth and seventh grades of primary school.

Questions about students' secondary school track preferences were asked from the first wave to the fifth wave. At the time of wave six (eighth grade), students were required to apply for secondary education. In the sixth wave, the question was replaced with information from administrative records regarding students' applications to secondary schools. Therefore, the formal

secondary school applications made by students in eighth grade were not included in the present analysis. Instead, they are discussed in a separate empirical chapter (Chapter 7).

The midterm and final school grades are not independent of each other. Academic achievement in wave one directly affects academic achievement in wave two, and the same applies to wave three and wave four. This is because the midterm grade is included in the final grade. Yet, there is no such direct relationship between academic achievement in wave two, wave four and wave five. Including only data from spring semesters allows for a consistent condition to model the impact of academic achievement on preferences throughout all periods.

Before collecting data, the research group provided parents and students with written information about the research project. Obtaining consent from both students and parents was a necessary requirement for students to participate. Consent was obtained from the majority of students in the sample for all three waves (94 per cent, 95 per cent, and 97 per cent respectively), resulting in an overall participation rate of 92 per cent, 90 per cent, and 89 per cent respectively. Questionnaires were collected during regular school classes using tablets in the presence of trained research assistants. Students were assured that their responses would be kept confidential and would be anonymised after the data collection process.

An excessive number of missing responses can lead to unstable and biased estimations in social network analysis (Huisman and Steglich, 2008). Therefore, school classes that had a participation rate lower than 75 per cent in any waves or a composition change larger than 20 per cent in any period were excluded from the analysis. School classes that did not have any changes in educational preferences were also excluded from the study. This left a total of 21 groups (school classes) for the analysis (*Table 20*).

As the excluded classes were smaller on average, this meant that 65.4% of potential students (N=493) were included in the analysis. Further descriptive statistics are reported for them. The Jaccard indices indicate the percentage of stable connections over time, and they were at least .30 in all groups. This suggests that while there weren't many changes in the friendship nominations, the networks did undergo some modifications, making them suitable for longitudinal network analysis (Ripley et al., 2021).

Table 20: Friendship network descriptive statistics

Network	Size	Density			Jaccard similarity index		Composition change (%)	
		Time 1	Time 2	Time 3	From time 1 to time 2	From time 2 to time 3	From time 1 to time 2	From time 2 to time 3
#1	19	.36	.43	.33	.60	.39	3%	12%
#2	31	.27	.29	.30	.41	.50	2%	3%
#3	33	.19	.24	.26	.42	.40	7%	11%
#4	32	.25	.29	.21	.54	.50	3%	7%
#5	22	.34	.36	.43	.49	.56	14%	3%
#6	17	.21	.24	.38	.36	.44	0%	3%
#7	19	.29	.32	.33	.69	.61	0%	12%
#8	27	.29	.24	.24	.52	.48	5%	14%
#9	28	.31	.32	.42	.47	.60	8%	10%
#10	19	.25	.33	.29	.34	.59	15%	10%
#11	21	.22	.26	.43	.45	.37	11%	6%
#12	31	.25	.30	.31	.51	.54	3%	7%
#13	19	.53	.38	.48	.48	.34	6%	6%
#14	19	.26	.20	.29	.51	.41	5%	0%
#15	24	.25	.42	.43	.51	.39	9%	5%
#16	19	.32	.49	.55	.67	.27	12%	12%
#17	26	.20	.23	.27	.32	.56	9%	7%
#18	18	.27	.20	.29	.46	.35	3%	10%
#19	21	.33	.40	.44	.72	.64	9%	11%
#20	27	.30	.25	.44	.59	0.49	8%	12%
#21	21	.39	.36	.39	.54	0.53	11%	3%

Notes. Own calculations. Network sizes equal the number of students enrolled in a specific school class at least at one of the measurements. Class compositions and sizes were still susceptible to change between waves. Total N=493

6.3.2. Measures

6.3.2.1. Dependent Variables

Educational preferences. Students were asked the following question: *'In which kind of secondary school would you like to continue your studies after primary school?'* They could answer with the following categories: Grammar school (academic track)/Vocational secondary school (mixed track)/Vocational school (vocational track)/Not sure yet/I do not want to continue my studies. The grammar school track stands out from other tracks because it has a higher bar for admission (Oktatási Hivatal, 2021), higher aspirations for further education, and a student body that comes from more advantaged socio-economic backgrounds (Schumann 2009).

Because of the 'Not sure yet' category, the data cannot be treated as an ordinal outcome. The study primarily focused on examining whether students expressed a preference for the grammar school track. This preference was measured as a binary variable, where 1 indicated 'grammar school track preferences' and 0 indicated 'not grammar school track preferences'. As supplementary analysis, the vocational and vocational secondary category was also dichotomized and treated as a binary outcome in separate models. The models with the binary outcome for the vocational track did not converge, therefore the vocational secondary track preferences were considered in the supplementary analysis. Convergence criteria, model specification, and the interpretation of the results for multilevel random coefficient Siena analysis are introduced in detail in the following sections.

Friendship. Students were given a list of their classmates' names and asked to rate them on a scale of one to five. The highest value (5) was labelled as '*a good friend of mine*' and these peers were considered friends in the present analysis. An adjacency matrix was created to represent the friendship nominations among students. The matrix contains binary values to indicate whether there is a friendship between two students. Although students can have meaningful social connections with peers outside of their school classes, the friendships and interactions they have with their classmates during school hours are typically a crucial aspect of their peer relations. This is because early adolescents spend the majority of their days in school, where they interact with their classmates and are often evaluated in comparison to them.

Descriptive statistics on the educational preferences, parental background, and academic achievement of participants included in the study and students in the sample from non-included school classes can be found in *Appendix F*. There was a significant difference between the preferences and parental background of students in the included and excluded classes at the last measurement. Nonetheless, the SAOM model the adjustment of the behaviour dependent variable (in this case, secondary school preferences with a focus on the grammar school track). There was no significant difference between the school classes that were included and those that were excluded in terms of students changing their preferences to or from the grammar school track between two data collection waves (*Appendix G*).

Furthermore, the grammar school preferences of students in the included classes in 2016 were more similar to the share of Hungarian students who preferred grammar school track education in their applications in the following year (2017), than in the excluded classes (Applications in administrative data in 2017: 39.89 per cent, Preferences in included classes: 32.88 per cent, Preferences in the excluded classes: 24.38 per cent) (Oktatási Hivatal, 2021).

6.3.2.2. Independent Variables

Academic achievement. Academic achievement is very influential on educational preferences and attainment (e.g., Breen and Goldthorpe, 1997; Sewell, Haller, and Portes, 1969; Sewell, Haller, and Ohlendorf, 1970). Academic achievement was measured by calculating the average of students' self-reported grades in Hungarian literature and mathematics from the midterm report that came before each measurement of secondary school preferences. This average can have values on a scale of 1 to 5, with 1 being *'Insufficient'* and 5 being *'Excellent'*.

Parental background. Students' parental background can affect educational aspirations, preferences, or choices (e.g., Boudon 1974; Breen and Goldthorpe 1997). Parents who have a higher level of education can also positively impact the educational outcomes of their children's peers (Carolan and Lardier, 2018; Cherng, Calarco and Kao, 2013; Coleman, 1988; Crosnoe, 2004; Crosnoe, Cavanagh and Elder, 2003).

Their (foster) mother's and (foster) father's highest level of education was asked from students in waves four, five, and six. Based on Erikson's (1984) dominance criterion, the higher educational level among the parents was used. Supposing that students become more aware of their parents' educational background as they grow older and are more likely to provide an accurate answer to that question, the most recent data available was used as a constant covariate throughout the analysis.

It can be argued that even if students' parents completed some education between wave two and wave six, they could already benefit from the resources that a higher-educated parent could offer while their parents were in the process of obtaining that degree. For a more comprehensive analysis, alternative models were considered in the preliminary stage. These models examined the educational level of the parent of the same gender, instead of using the dominance criterion (*Appendix K* and *Appendix L*).

Parental background: tertiary. A dichotomized measure of parental background that indicates whether at least one of the parents had tertiary-level education (1='at least one of the parents completed college, university, or Ph.D. education', 0='none of the parents completed college, university, or Ph.D. education').

Parental background: secondary. A dichotomized measure of parental background is used to determine whether at least one of the parents has completed secondary education with a secondary school leaving exam, but neither of them has obtained tertiary-level education (1='at least one of the parents completed secondary education, but none of them obtained tertiary-level education', 0='none of the parents completed secondary. education').

Gender. Students' gender can affect their educational preferences and ambitions; some studies indicated that adolescent girls tended to aspire higher than boys (e.g., Raabe and Wölfer,

2019), while other results pointed in the opposite direction (e.g., Roth, 2017). Gender similarity may also play a role in the selection of friendships (e.g., Mercken et al., 2009; Kretschmer et al., 2018; Poulin and Pedersen, 2007). Therefore, the gender of the students was included in the models as a binary variable, comparing females to males.

Being Roma. Students' self-reported ethnic identity was considered in the analysis. This is important because Roma students may have lower expectations for themselves compared to their non-Roma peers, likely due to the internalization of institutional labelling mechanisms (Szalai, 2008). Those students whose self-reported identity was Roma or both Roma and Hungarian were considered Roma in the analysis.

The descriptive statistics of the behaviour dependent and the predictor variables can be found in *Table 21*.

Table 21: Descriptive statistics of the behaviour dependent and predictor variables

	Range	Mean (SD) (*missing N*)		
		Time 1	**Time 2**	**Time 3**
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 non on them completed tertiary education'		.22 (0.41)	(*0*)
Same-gender parent's highest level of education: tertiary (constant covariate)	0 'Same-gender parent did not complete tertiary education', 1 'Same-gender parent completed tertiary education'		.22 (.42)	*(0)*
Self-reported ethnic identity: being Roma (changing 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. Own calculations. Total subsample of 21 school classes, N=493.

6.3.3. Analytical Strategy and Model Specification

The present analysis models the co-evolution of adolescents' friendship ties and educational preferences on longitudinal social network data by applying the random coefficient multilevel implementation of Stochastic Actor-Oriented Models (SAOM) (Koskinen and Snijders, 2022) as introduced in Chapter 4.2.2. SAOM can disentangle the effect of social selection (individuals selecting friends based on similarity) and influence (people becoming similar to their friends). SAOM estimate the interdependent effects of network processes and individual attributes on the

evolution of a network (here, friendships) and individual behaviour (here, secondary school track preferences).

SAOM results are derived for the probabilities of changes in friendship ties and educational preferences between two observations and should be interpreted as log odds ratios in logistic regression models. Regarding behaviour dynamics, it is tested whether adolescents tended to adjust their preferences toward their friends' average preferences. Friends' indirect, cross-behavioural influence on preferences was considered by modelling adolescents' tendency to change their preferences in response to their friends' parental background and academic achievement.

The convergence of the models was evaluated by running four independent sequences of the same model configuration each consisting of 3,000 main iterations. The models were compared with the *rstan* package (Stan Development Team, 2020) based on monitoring the $\hat{R}$-values (the ratio of within and between chain variance) on the array of iterations by chains and by parameters of the four models. Models were considered to have converged if all $\hat{R}$ values were ≤ 1.1 for each parameter of interest and the estimated equivalent sample size under independent sampling were $\geq$ 5 times the number of chains (in this case 20), as suggested by Gelman *et al.* (2014). All results shown in the present paper met this requirement and even the more rigid criteria of $\hat{R}$ values for parameters of interest being ≤ 1.05.

SAOM offer multiple configurations for modelling the influence of one's network on the adjustment of their behaviour. It can be assumed that the more common a behaviour is among adolescents' friends, the more noticeable and therefore influential it is for them (Manzo, 2013). Therefore, friends' influence was modelled by using the average alter effect.

Yet, it is also possible that having a single friend with highly educated parents is enough to provide access to sufficient resources to change one's preferences (Lin, 2001). Therefore, additional analysis was conducted in the preliminary stage to model an alternative specification with maximum alternative effects (for details see *Appendix M, -, Appendix O*).

In the behavioural part of the model, individual characteristics were controlled for that may affect the adjustment of adolescents' educational preferences. These include academic achievement, parental educational background, gender, and self-reported ethnicity (being Roma or not). Models 1 and 2 focus on the differences between having at least one tertiary-educated parent compared to students without any tertiary-educated parent. Models 3 and 4 differentiate between students whose parents have obtained tertiary education and those whose parents have secondary education, as compared to students whose parents have education levels below that.

The models also took into account whether specific attributes of the students affected friendship selection. The egoXaltX effect for educational preferences examined whether the similarity in grammar school preferences among adolescents affected the formation and

maintenance of their friendships. The possible confounding effect of similarity in academic achievement and parental background was also accounted for with egoXaltX effects. The egoXaltX effects match the avAlt and avXAlt specifications in the behaviour dynamics part of the model for the same attributes.

Alter effects (whether those with certain preferences or higher achievement were more likely to be nominated as friends) were included as a control variable. Ego effects (modelling whether those with certain aspirations or higher achievement were more likely to nominate others as friends) were excluded as the models did not converge with their inclusion.

The issue of convergence for egoX effects remained unresolved even when the maximum number of outgoing ties was limited. For example, by excluding outgoing ties from actors who nominated more than half or two-thirds of the class. Additionally, allowing for time-variation of ego effects in the models did not solve the convergence problem for the egoX effect either. Excluding ego effects from the models could bias similarity (egoXaltX) effects.

In addition to the effects related to individual attributes, it was important to consider the endogenous structural effects on the formation of students' friendship networks. The complete model specification is presented in *Table 22* and *Table 23*. Similarity effects based on self-reported ethnicity were not included in the final models because they violated convergence criteria. Self-reported ethnicity was omitted from the behaviour part of the Models 3 and 4 models because the parameters for ethnicity did not converge.

Table 22: Effects for friendship dynamics

Effect name (RSiena effect name)		**Modelling the tendency of…**
Friendship dynamics		
Structural effects		
	Outdegree (density)	creating and maintaining friendship ties
	Reciprocity (recip)	creating and maintaining reciprocated friendship ties
	Transitive triplets (gwespFF)	creating and maintaining friendship ties with friends of friends
	Interaction between reciprocity and transitive triplets	creating and maintaining friendship ties with friends of reciprocated friends
	Indegree popularity – sqrt (inPopsqrt)	creating and maintaining friendship ties with those actors who have more/fewer incoming ties
	Outdegree activity – sqrt (outActsqrt)	creating and maintaining friendship ties with those actors who have more/fewer outgoing ties
Alters' preferences (altX)		creating and maintaining friendship ties with those who prefer the grammar school track/vocational secondary school track
Similarity in preferences (egoXaltX)		creating and maintaining friendship ties with those with similar preferences measured by the product of an actor's preferences (whether an actor prefers the grammar school track/vocational secondary school track) and the sum of the actors' preferences (how many of them prefer the grammar school track/vocational secondary school track) whom that actor is tied to
Alter's academic achievement (altX)		creating and maintaining friendship ties with those who have higher academic achievement
Similarity in academic achievement (egoXaltX)		creating and maintaining friendship ties with those with similar academic achievement measured by the product of an actor's academic achievement and the sum of the actors' academic achievement whom that actor is tied to
Alters' parental background (altX)		creating and maintaining friendship ties with those who have at least one parent with tertiary education

(To be continued on the next page)

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Similarity in parental background (egoXaltX)	creating and maintaining friendship ties with those with similar parental background measured by the product of an actor's parental background (whether an actor has at least one parent with tertiary/secondary education) and the sum of the actors' parental background (how many of them have at least one parent with tertiary/secondary education) whom that actor is tied to
Cross-attribute similarity: interaction between ego's grammar school preferences and alter's academic achievement	creating and maintaining friendship ties with those with high academic achievement if ego's preference is the grammar school track measured by the product of an actor's outdegree weighted by their grammar school preferences (whether their most preferred secondary school track is the grammar school) and the sum of the actors' academic achievement whom that actor is tied to
Cross-attribute similarity: interaction between ego's grammar school preferences and alter's parental background	creating and maintaining friendship ties with those with advantaged parental background if ego's preference is the grammar school track measured by the product of an actor's outdegree weighted by their grammar school preferences (whether their most preferred secondary school track is the grammar school) and the sum of the actors' tertiary parental education level whom that actor is tied to
Gender similarity	creating and maintaining friendship ties based on gender similarity measured by the centered similarity scores between an actor and those to whom that actor is tied to For binary variables equals sameX but is centered.

Notes. Own edition, based on Ripley et al. (2021)

Table 23: Effects for behaviour dynamics

Effect name (RSiena effect name)	**Modelling the tendency of…(example for grammar school track preferences)**
Behaviour dynamics	
Linear (linear)	educational preferences changing (to or from grammar school track/vocational secondary school track) over time
Average alter (friendship) (avAlt)	students assimilating their preferences to their friends' average preferences
Alters' (friendship) average academic achievement (avXAlt)	the tendency of adolescents to change their preferences in response to their friends' average academic achievement (Cross-behaviour influence)
Ego's academic achievement (effFrom)	students with higher academic achievement changing to or from grammar school track/vocational secondary school track preferences
Parental background (effFrom)	
Tertiary	students with at least one parent with tertiary-level education changing to or from grammar school track preferences compared to those without parents with tertiary-level education
Secondary	students with at least one parent with secondary- but not tertiary-level education changing to or from grammar school track preferences compared to those without parents with secondary-level education
Alters' (friendship) average parental background (avXAlt)	the tendency of adolescents to change their preferences in response to friends' average parental background (Cross-behaviour influence)
Being a girl (effFrom)	gender differences in changing to or from grammar school track preferences
Being Roma (effFrom)	ethnic differences in changing to or from grammar school track preferences
Interaction between alters' average parental background and Ego's parental background	students changing their preferences to or from grammar school track preferences in response to their friends' parental background if they have at least one parent with tertiary -level education

Notes. Own edition, based on Ripley et al. (2021)

6.4. Results

6.4.1. Descriptive Results

Table 24 shows the change in the preferences of students' for the two periods by the adjustment of students' preferences. Most students did not change their preferences regarding the grammar school track between observations, yet a considerable proportion of the students changed their preferences over time. There was somewhat less change regarding preferences for the grammar school track in the second period compared to the first period. Nevertheless, there was a considerable shift from uncertain preferences to any other preferences in the second period. This indicates that students' preferences solidified as the secondary school applications approached.

As indicated by the average dyadic similarity scores between friends, which ranged from 0 (lowest) to 1 (highest), it was evident that they shared similar educational preferences, academic achievement, and parental background (*Table 25*). Dyadic similarities were measured by calculating the absolute value of the differences between adolescents and their friends and this value was then divided by the difference between the highest and lowest values in the data. The result was subtracted from one (Ripley et al., 2021). The procedure was repeated for all friendship pairs and the average of those similarity measures was computed. The similarity within friendship pairs in terms of educational preferences appeared to be unequal among different subgroups. The clustering of students with grammar school track preferences in friendship networks was more pronounced than for students with other preferences (*Appendix H*).

Table 24: The adjustment of students' educational preferences

		From T1 to T2		From T2 to T3	
		Classes included in SAOM		Classes included in SAOM	
		N	%	N	%
Change of grammar school track preferences	Change to another option	49	13.2	30	9.01
	Other preferences at both	225	60.8	192	57.66
	Keeping preferences	46	12.4	60	18.02
	Change to grammar school track	50	13.5	51	15.32
Change of vocational secondary school track preferences	Change to another option	59	15.95	42	12.61
	Other preferences at both	202	54.59	171	51.35
	Keeping preferences	55	14.86	55	16.52
	Change to vocational secondary school track	54	14.59	65	19.52
Change of vocational school track preferences	Change to another option	11	3.40	11	3.68
	Other preferences at both	297	91.67	263	87.96
	Keeping preferences	3	0.93	8	2.68
	Change to vocational school track	11	4.01	17	5.69
Change of uncertain track preferences	Change to another option	58	15.68	75	22.52
	Other preferences at both	173	46.76	185	55.56
	Keeping preferences	56	15.14	25	7.51
	Change to uncertain preferences	83	22.43	48	14.41

Notes. Own calculations.

Table 25: Average dyadic similarities by educational preferences, academic achievement, and parental background among school class friends

	Preference for grammar school track	Preference for vocational secondary school track	Uncertain track preferences	Average academic achievement	Parental background (At least one parent with tertiary-level education)	Parental background (At least one parent with secondary-level, but not tertiary-level education)
Friends (N dyads)						
T1 (N=2454)	.58	.59	.51	.78	.66	.67
T2 (N=2424)	.64	.60	.54	.79	.67	.67
T3 (N=2228)	.64	.58	.68	.78	.66	.64
Classmates (N dyads)						
T1 (N=6450)	.62	.60	.53	.75	.64	.68
T2 (N=5572)	.63	.58	.54	.76	.63	.67
T3 (N=4698)	.62	.57	.69	.73	.64	.67

Notes. Own calculations. 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 from 1 (Ripley et al., 2021).

6.4.2. Random Coefficient Multilevel Siena Model Results

Table 27 to *Table 30* report posterior means, posterior standard deviations, and posterior Bayesian *p*-values from the models. *P*-values close to 1 indicate a high probability of the parameter being positive given the data, model specification, and priors. In contrast, *p*-values that are close to 0 indicate a high probability that the parameter is negative, considering the data, model specification, and priors.

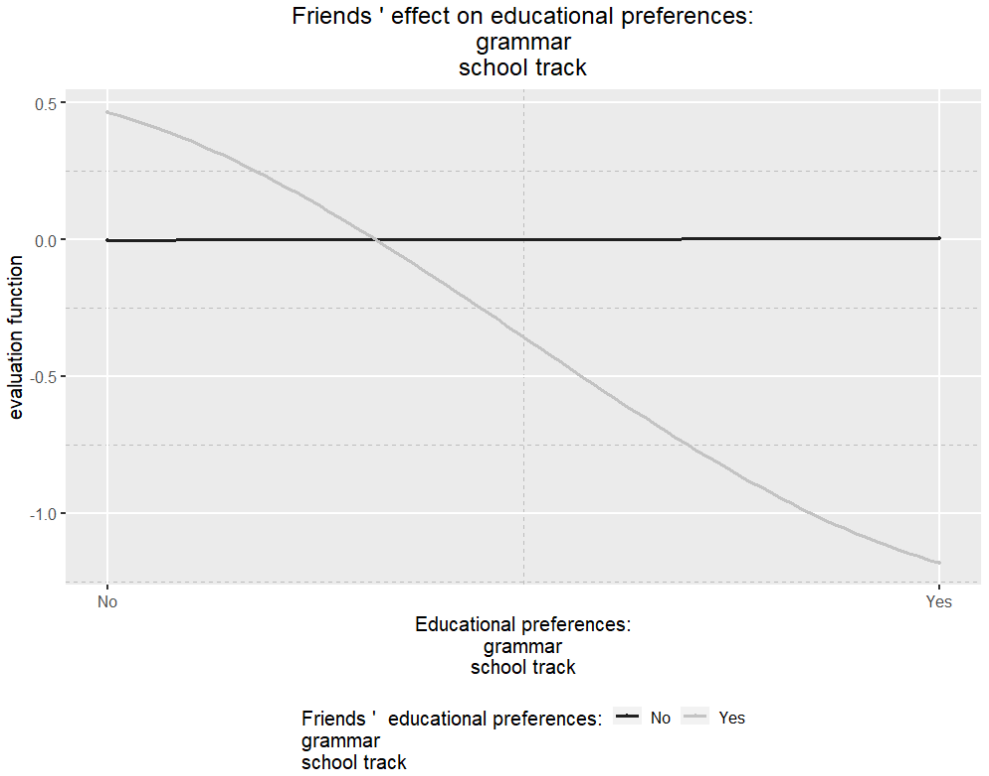
Table 27 and *Table 28* contain results on social selection and social influence regarding preferences for grammar school track. The first model only includes social selection and influence effects of grammar school track preferences while the second model considers friends' parental background and academic achievement. The second model also includes cross-attribute similarity effects to account for whether the selection of friends based on similar preferences is driven by students with grammar school track preferences seeking out friendships with high achievers or individuals whose parents have a high education level. The second model also adds social selection and influence effects of academic achievement and parental background. *Table 29* and *Table 30* examine the preferences for grammar and vocational secondary schools in separate models. These tables differentiate between parents with tertiary-level education and those with secondary-level education.

In this paper, *p*-values of $p < .025$ for coefficients with negative sign, and *p*-values of $p > .975$ for coefficients with positive sign were accepted. These values were considered as evidence that the parameters were negative or positive, respectively and are marked as bold in the table. Applying these thresholds aligns with the frequentist approach, so they should only serve as guidelines.

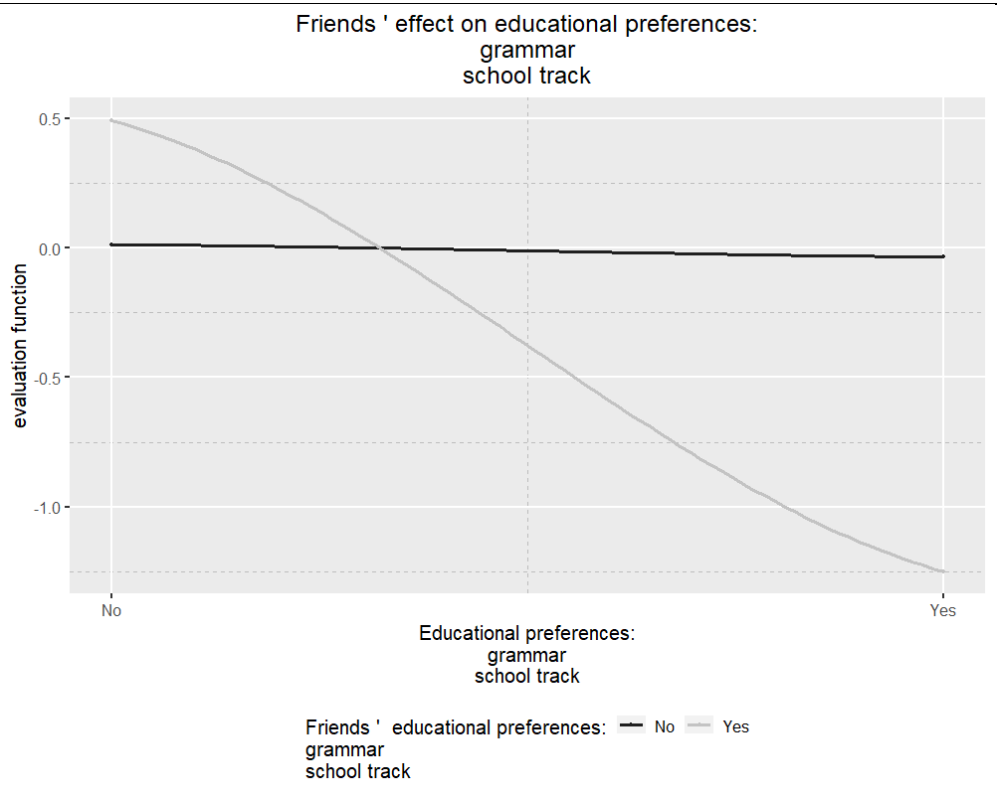
The results showed varied support for the influence of friends on adolescents' educational preferences. Students did not change their preferences to align with their friends' grammar school track preferences (H1: *Adjustment hypothesis*, *Table 28*, $\theta = -1.65$, $SD = 1.07$, $p = .05$). Although the *p*-values fall outside the range to find the results trustworthy, the negative sign of the coefficients indicates a tendency for dissimilarity. This is supported by the negative coefficient of the average alter effect in the model that examines vocational secondary school track preferences (*Table 30*, $\theta = -3.41$, $SD = 1.40$, $p < .001$).

Dissecting the influence effects by educational preferences (*Table 26*) showed that grammar school track preferences were less attractive for students in response to their friends' preferences for the grammar school track. Meanwhile, students tended to adjust their preferences to the grammar school track in response to their friends having different preferences. Overall, the inclination to deviate from the grammar school track in response to friends' preferences for the grammar school track was more noticeable. Similar associations could be observed with regard to preferences for the vocational secondary school track.

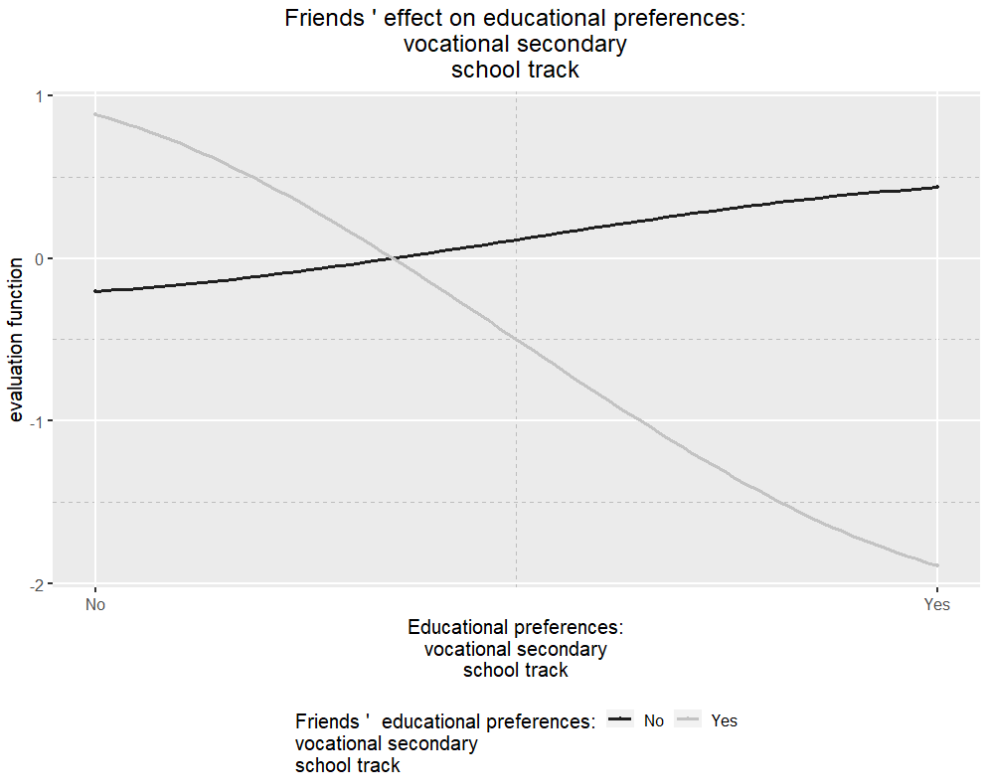
Table 26: Friends' effect on educational preferences by the various preferences

Model 2: grammar school track preferences	

Notes. Own edition based on the influence tables

Tanle 26 continued Model 3: grammar school track preferences	

Notes. Own edition based on the influence tables

Table 26 continued Model 4: vocational secondary school track preferences	

Notes. Own edition based on the influence tables

There was evidence supporting the idea that the educational background of friends' parents had a positive impact on adolescents' preferences for the grammar school track, in line with the *Instrumental resource hypothesis* (H2a). This effect was observed specifically when comparing friends with parents who have a tertiary-level education to friends with parents from other educational backgrounds (*Table 28*, Model 2: θ = 1.40, *SD* = .71, *p* = .98).

When friends' parents with tertiary- and secondary-level education were distinguished from other categories, there was no convincing evidence for this effect (*Table 30*, $\theta_{tertiary} = 1.20, SD_{tertiary} = .82,\ p_{tertiary} = .93; \theta_{secondary} = -.80,\ SD_{secondary} = 1.02, p_{secondary} = .21$). Nevertheless, even when measuring friends' parental background with multiple categories, the sign of the coefficients still showed the expected relationship. Specifically, students were more likely to prefer the grammar school track in response to their friends' parents' tertiary-level education. On the contrary, students were more likely to prefer the vocational secondary school track in response to their friends' parents' secondary-level education.

Overall, the results indicated that when it comes to adjusting preferences to the grammar school track, the parental background of friends only had a convincing effect when comparing friends' parents with tertiary education level to those with any other education level. The impact of friends' parental background can be seen as influence, as the model controls for the tendency to form or maintain ties based on similarities in parental background.

Students' own parental background seemed to be meaningful regarding the adjustment of students' grammar school preferences without friends' parental background in the model (Table 28, θ_{Model1} = .67, *SD* = .30**,** *p* **=** .99). Nonetheless, when friends' parental background was included, there was no significant relationship between students' own parental background and their preference for the grammar school track (θ_{Model2} = .63, *SD* = .35**,** *p* **=** .96).

Regarding the lack of impact of students' own parental background and the positive impact of their friends' parental background on adolescents' adjustment to grammar school track preferences, it is important to emphasise that the SAOM focus on how educational preferences adjust over time, rather than just their current state. Therefore, it is possible that students' parental background did not impact their decision to change their preference for the grammar school track between two data collection waves. However, this does not necessarily mean that parental background did not influence students' *initial* preferences for the grammar school track.

The study found that the influence of friends' parental backgrounds on students' grammar school track preferences did not vary by the students' own parental backgrounds (*Instrumental resource hypothesis H2b*). This means that students, regardless of whether their parents have a tertiary-level education or not, were equally influenced by having friends whose parents have a

tertiary-level education (*Table 28*, Model 2). Friends' average achievement did not have a direct effect on students' educational preferences in any of the models.

Table 27: Random coefficient multilevel Siena model results part 1.1 (social selection)

Network (friendship) dynamics	Model 1 (Grammar school track)				Model 2 (Grammar school track)				Varying across classes
	θ (SD)	Credible from	Credible to	*p*-value	θ (SD)	Credible from	Credible to	*p*-value	
Structural effects									
Outdegree	**-2.41 (.19)**	**-2.79**	**-2.03**	**<.01**	**-2.39 (.19)**	**-2.76**	**-2.01**	**<.01**	Yes
Reciprocity	**1.91 (.14)**	**1.63**	**2.21**	**>.99**	**1.96 (.15)**	**1.68**	**2.26**	**>.99**	Yes
Transitive triplets	**1.83 (.10)**	**1.63**	**2.04**	**>.99**	**1.85 (.11)**	**1.64**	**2.08**	**>.99**	Yes
Transitive reciprocated triplets	**-.80 (.11)**	**-1.02**	**-.58**	**<.01**	**-.83 (.11)**	**-1.05**	**-.62**	**<.01**	Yes
Indegree popularity – sqrt	**-.25 (.07)**	**-.39**	**-.12**	**<.01**	**-.28 (.07)**	**-.42**	**-.15**	**<.01**	Yes
Outdegree activity – sqrt	.01 (.04)	-.07	.09	.58	.01 (.04)	-.07	.09	.59	Yes
Alters' grammar school preferences	-.09 (.06)	-.21	.02	.06	-.13 (.06)	-.25	-.01	.02	No
Similarity in grammar school preferences (egoXaltX) (H3: Selection hypothesis)	**.49 (.15)**	**.20**	**.80**	**>.99**	**.48 (.16)**	**.19**	**.80**	**>.99**	No
Alter's academic achievement					**.04 (.02)**	**.002**	**.08**	**.98**	No
Similarity in academic achievement (egoXaltX)					-.01 (.02)	-.04	.03	.29	No
Alter`s parental background					.05 (.04)	-.03	.12	.87	No
Similarity in parental background (egoXaltX)					-.11 (.07)	-.25	.03	.06	No
Interaction between ego's grammar school track preferences and alter's academic achievement					.03 (.07)	-0.11	.16	.67	No
Interaction between ego's grammar school track preferences and alter's parental background					.06 (.11)	-.16	.28	.70	No
Gender similarity	**.39 (.06)**	**.28**	**.50**	**>.99**	**.40 (.06)**	**.28**	**.52**	**>.99**	Yes

Notes. Results from *sienaBayes*. 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 that the parameter is positive; values close 0 indicate that the parameter is negative.

Table 28: Random coefficient multilevel Siena model results part 1.2 (social influence)

Behaviour (preferences) dynamics	Model1 (grammar school track preferences)				Model2 (grammar school track preferences)				Varying across classes
	θ (SD)	Credible from	Credible to	p-value	θ (SD)	Credible from	Credible to	*p*-value	
Linear shape	**-0.46 (0.14)**	**-0.73**	**-0.19**	**<.01**	**-0.46 (0.15)**	**-0.79**	**-0.18**	**<.01**	No
Friends' average grammar school track preferences (H1: Adjustment hypothesis)	-1.43 (1.00)	-3.56	0.38	0.06	-1.65 (1.07)	-3.88	0.36	0.05	No
Friends' average academic achievement					0.03 (0.38)	-0.71	0.77	0.52	No
Friends' average parental background (H2a: Instrumental resource hypothesis)					**1.40 (0.71)**	**0.14**	**2.82**	**0.98**	No
Friends' average parental background x student's parental background (H2b: Instrumental resource hypothesis)					-0.12 (1.20)	-2.49	2.29	0.46	No
Academic achievement	**0.63 (0.17)**	**0.30**	**0.98**	**>.99**	**0.62 (0.19)**	**0.26**	**1.01**	**>.99**	No
At least one parent has tertiary-level education	**0.67 (0.30)**	**0.07**	**1.26**	**0.99**	0.63 (0.35)	-0.04	1.29	0.96	No
Being a girl	-0.05 (0.27)	-0.54	0.50	0.50	0.05 (0.27)	-0.46	0.59	0.57	No
Being Roma	-0.24 (0.36)	-0.94	0.45	0.25	0.10 (0.38)	-0.63	0.85	0.59	No

Notes. Results from *sienaBayes*. 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 that the parameter is positive; values close 0 indicate that the parameter is negative.

Table 29: Random coefficient multilevel Siena model results for grammar and vocational secondary school tracks with friends' parents' tertiary- and secondary-level education part 2.1 (social selection)

Network (friendship) dynamics	Grammar school track Model 3				Vocational secondary school track				Varying across classes
	θ (SD)	Credible from	Credible to	*p*-value	θ (SD)	Credible from	Credible to	*p*-value	
Structural effects									
Outdegree	**-2.44 (.19)**	**-2.80**	**-2.04**	**<.01**	**-2.39 (.19)**	**-2.75**	**-2.00**	**<.01**	Yes
Reciprocity	**2.00 (.15)**	**1.70**	**2.30**	**>.99**	**1.97 (.14)**	**1.70**	**2.27**	**>.99**	Yes
Transitive triplets	**1.86 (.11)**	**1.65**	**2.09**	**>.99**	**1.84 (.11)**	**1.64**	**2.09**	**>.99**	Yes
Transitive reciprocated triplets	**-.86 (.11)**	**-1.08**	**-.63**	**<.01**	**-.83 (.11)**	**-1.08**	**-0.63**	**<.01**	Yes
Indegree popularity – sqrt	**-.28 (.07)**	**-.42**	**-.13**	**<.01**	**.01 (.04)**	**-.43**	**-.14**	**<.01**	Yes
Outdegree activity – sqrt	.01 (.04)	-.07	.09	.63	**-.27 (.07)**	-.07	.09	0.60	Yes
Alters' preferences	**-.13 (.06)**	**-.25**	**-.01**	**.02**	**.14 (.06)**	**.03**	**.26**	**.99**	No
Similarity in preferences (egoXaltX) (H3: Selection hypothesis)	**.48 (.15)**	**.19**	**.79**	**>.99**	**.31 (.15)**	**.01**	**.60**	**.98**	No
Alter's academic achievement	**.05 (.02)**	**.004**	**.09**	**.98**	**.04 (.02)**	**-.005**	**.08**	**.96**	No
Similarity in academic achievement (egoXaltX)	-.01 (.02)	-.04	.03	.38	<.001 (.02)	-.03	.03	.51	No
Alter`s parental background									
Tertiary	.04 (.05)	-.05	.13	.82	.03 (.04)	-.05	.12	.76	No
Secondary	.01 (.05)	-.08	.10	.60	.01 (.05)	-.08	.10	.55	No
Similarity in parental background (egoXaltX)									
Tertiary	-.08 (.07)	-.21	.06	.12	-.07 (.07)	-.21	.07	.18	No
Secondary	-.14 (.10)	-.33	.06	.07	-.15 (.10)	-.34	.05	.07	No
Gender similarity	**.40 (.06)**	**.28**	**.52**	**>.99**	**.40 (.06)**	**.29**	**.51**	**>.99**	Yes

Notes. Results from *sienaBayes*. 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 that the parameter is positive; values close 0 indicate that the parameter is negative.

Table 30: Random coefficient multilevel Siena model results for grammar and vocational secondary school tracks with friends' parents' tertiary- and secondary-level education part 2.2 (social influence)

Behaviour (preferences) dynamics	Grammar school track Model 3				Vocational secondary school track Model 4				Varying across classes
	θ (SD)	Credible from	Credible to	p-value	θ (SD)	Credible from	Credible to	*p*-value	
Linear shape	**-.53 (.15)**	**-.82**	**-.24**	**<.01**	**-.45 (.13)**	**-.72**	**-.19**	**<.01**	No
Friends' average aspirations (H1: Adjustment hypothesis)	-1.70 (1.11)	-4.15	.34	.05	**-3.41 (1.40)**	**-6.71**	**-1.08**	**<.01**	No
Friends' average academic achievement	.10 (.37)	-.63	.83	.61	-.09 (.32)	-.72	.52	.39	No
Friends' average parental background (H2a: Instrumental resource hypothesis)									
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. Results from *sienaBayes*. 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 that the parameter is positive; values close 0 indicate that the parameter is negative.

Regarding the tendency to form and maintain friendships based on educational preferences, the results aligned with the *Selection hypothesis* (*Table 27*, *Table 29*). Students who preferred the grammar school track were more likely to maintain and form friendships with others who also had the same preference. This is supported by the positive egoXaltX effects for grammar school preferences (e.g., in *Table 27*, $\theta_{\text{Model2}} = .48$, $SD = .16$, $p > .99$). Moreover, students who preferred the vocational secondary school track were more likely to form and maintain friendships with others who also preferred the vocational secondary school track (*Table 29*, $\theta_{\text{Model4}} = .31$, $SD = .15$, $p > .98$).

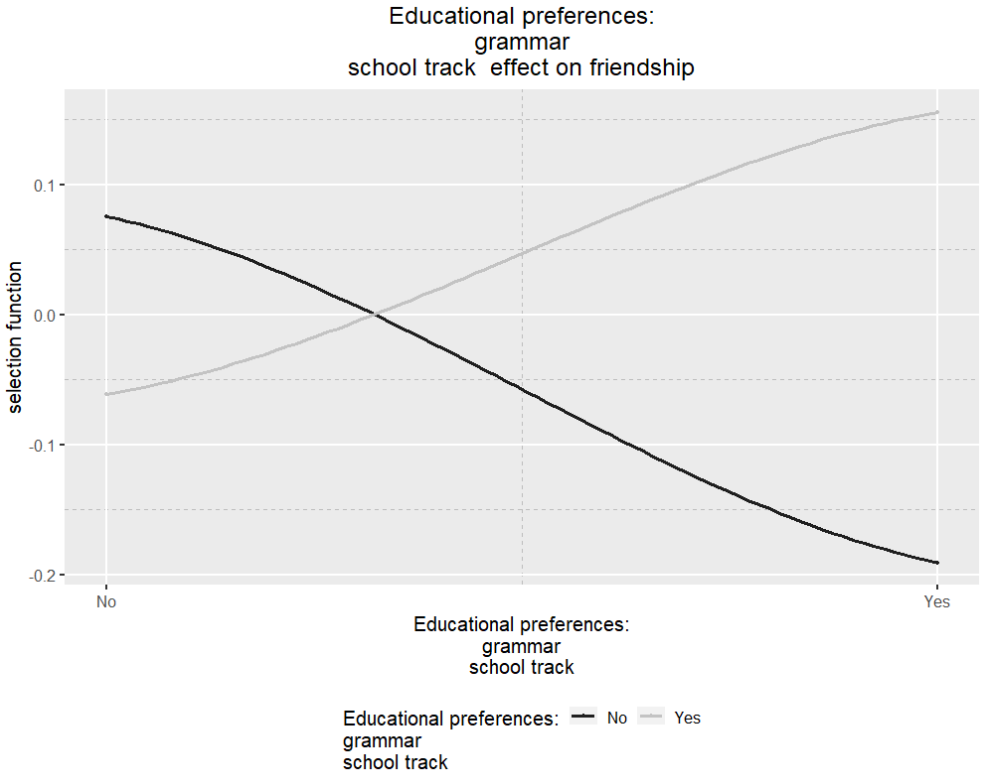
The results for the egoXaltX effect should be interpreted with caution due to the lack of convergence for the ego effects. As a result, the ego effects were excluded from the models. Therefore, the *Selection hypothesis* cannot convincingly be accepted or rejected based on the available empirical evidence. Despite these restrictions, the positive effect of similar preferences on creating or maintaining friendship ties was not eliminated by similarity based on academic achievement or parental background, nor by students with grammar school track preferences seeking friendship ties based on academic achievement or parental background. Thus, educational preferences seemed to be clustered within friendships.

The selection figures (*Table 31*) for the models with the grammar school track behaviour dependent variable (Model 2 and Model 3) indicate that students who preferred the grammar school track were more likely to be considered attractive as friends by those with similar preferences but were less likely to be sought after as friends by students with different preferences.

For students who had different preferences than the grammar school track, they found others with similar preferences somewhat more attractive as friends. However, this tendency was not as strong as the clustering of students with preferences for the grammar school track. For students who preferred the vocational secondary school track, they found other students with the same preferences to be more attractive as friends.

Concerning the structural effects of friendship dynamics, the negative coefficient of the outdegree effect showed that students were selective in their friendship choices. The positive reciprocity effect indicated that students tended to reciprocate incoming friendship 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.

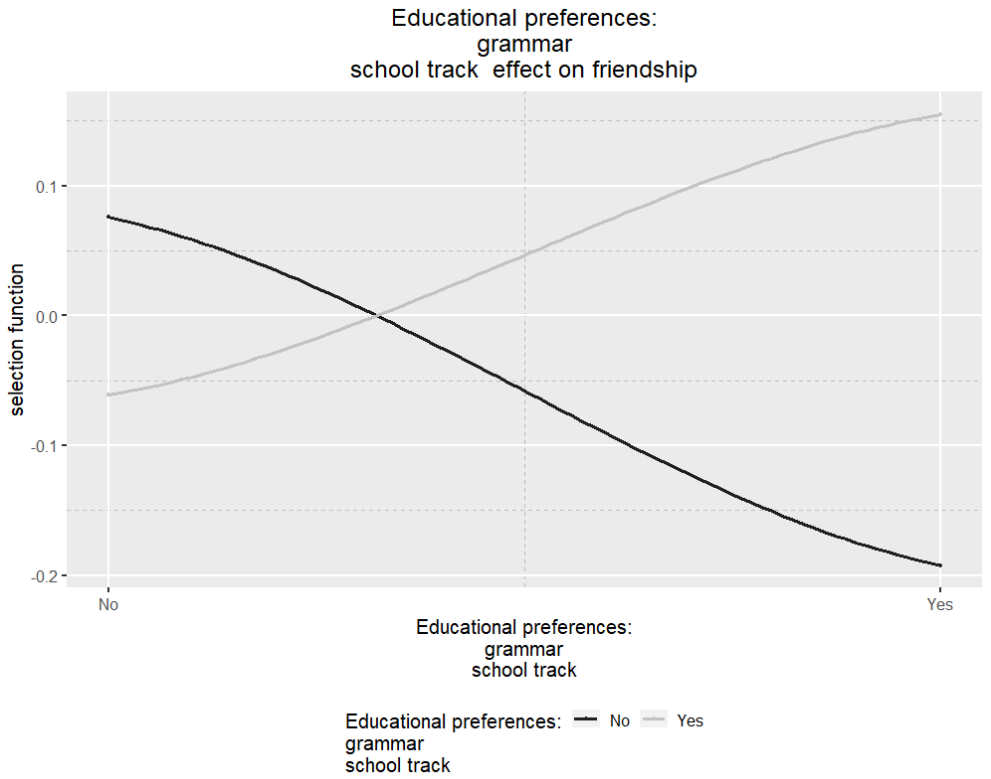
Table 31: The effect of educational preferences on friendships

Model 2: grammar school track preferences	

Notes. Own edition based on the selection tables

(Table 31 continued)

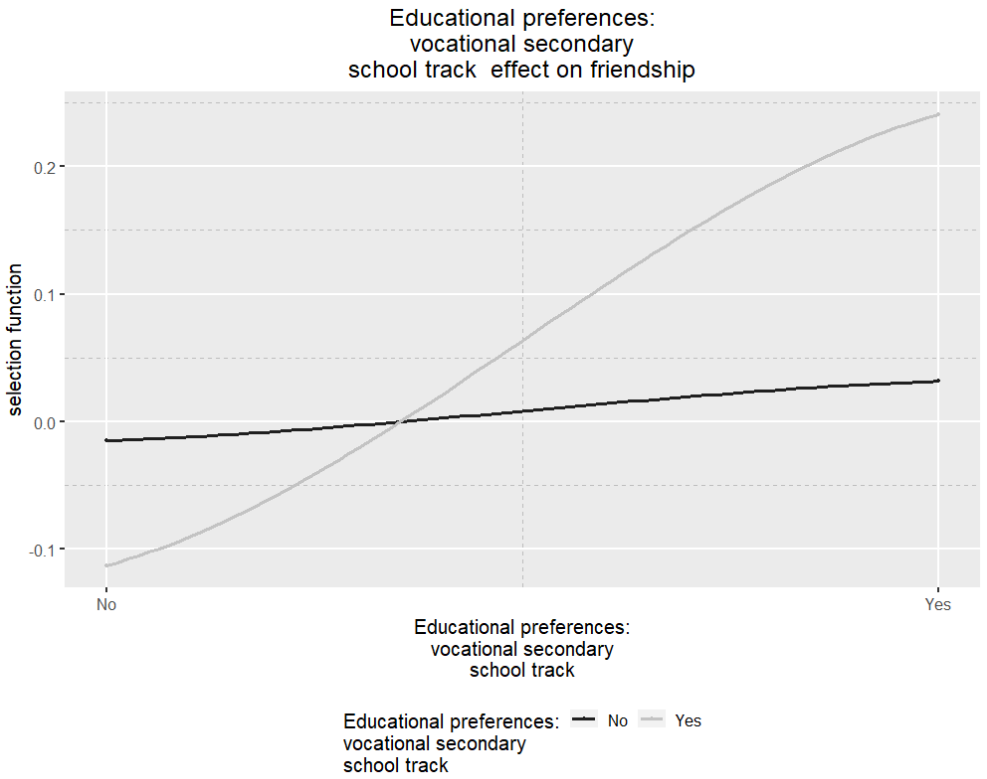
Model 3: grammar school track preferences



Notes. Own edition based on the selection tables

(Table 31 continued)

Model 4: vocational secondary school track preferences



Notes. Own edition based on the selection tables.

6.5. Discussion

The study examined whether the educational preferences of adolescents could be influenced by their friends, through adjusting their own preferences to align with their friends' preferences and through having access to their friends' parental resources. To investigate the effect of friends on the secondary school track preferences of Hungarian adolescents in the upper grades of primary schools, longitudinal multilevel social network analysis was conducted. This analysis expands on previous research by considering various social influence mechanisms that impact students' educational preferences. Additionally, the study accounts for the possibility of social selection playing a role in the similarity of educational preferences among friends.

The findings suggest that peers can influence the shift in adolescents' educational preferences toward the grammar school track, primarily through the parental resources of their friends. Students who have friends from privileged backgrounds may be more inclined to opt for the academically-oriented secondary school track. This track typically attracts students with higher socio-economic status and abilities. These results indicate that schools not only offer formal education, but also play a role in shaping students' educational paths by providing access to social connections that otherwise would not be available to individuals (Coleman, 1988; Crosnoe, 2004; Granovetter, 1973, 1983; Lin, 2001).

Contrary to some previous studies examining the influence of peers on educational preferences (e.g., Kretschmer and Roth, 2021; Raabe and Wölfer, 2019; Rosenqvist, 2018), this investigation discovered that the secondary school track preferences of friends did not positively affect the adjustment of adolescents' own preferences. The results indicate that adolescents were more likely to develop different preferences than their friends.

By examining the preferences of primary school students before they transition to secondary school, this study investigates their preferences for the next level of the education system, rather than focusing on a specific educational level. In this context, the preferences of friends may have a different impact on the preferences of adolescents, compared to the distant educational options that were the main focus of previous studies (Kretschmer and Roth, 2021; Lorenz et al., 2020; Mundt and Mundt, 2020). When considering application and admission to secondary schools, students may weigh their most preferred and most probable options (Gottfredson, 2005).

The present analysis suggests that sometimes students tend to deviate from their friends' preferences. This tendency towards dissimilarity may be observed because students are aware that they are competing for the same limited number of available places in secondary education, and they may adjust their preferences to a different track than what their friends prefer in order to have better chances to get admitted. Furthermore, students who have established preferences may differ

from their friends who are still uncertain about their post-primary educational careers. This way, the tendency toward dissimilarity may differentiate between established and uncertain preferences.

The positive effect of having friends whose parents have a higher level of education on students' preferences for the grammar school track may be related to the significant role parents play in making educational decisions prior to secondary school. As parents with a higher level of education are more knowledgeable and involved in their children's education, those who become friends with their children may rely on their attitudes and knowledge.

Regardless of these findings, there are limitations which provide a basis for future research. Most importantly, the generalizability of the results might be limited by the initial sampling procedure and the sample restrictions made for applying random coefficient SAOM. The absence of ego effects in the models may introduce bias to the estimates for similarity effects. Therefore, it is not possible to definitively accept or reject the *Selection hypothesis*. Nonetheless, the analysis is still able to capture the adjustments in adolescents' behaviour in response to the state of their network.

Future research could benefit from incorporating a larger dataset in order to enhance the reliability and applicability of the findings regarding different mechanisms of influence on educational preferences. Moreover, the study only captures within-school relationships. While adolescents tend to have a majority of friends in school, they also have friends in their neighbourhood and other contexts, such as sports or music clubs. Although friendships in these contexts may not provide information about educational careers, future research could consider friends outside of school in order to gain a more comprehensive understanding of the role that friends play in individuals' educational journeys. Nevertheless, the present analysis can provide insight into social influence regarding educational preferences in less advantaged contexts before ability tracking to secondary education.

7. SEEING YOUR FUTURE WHEN LOOKING AT YOUR PEERS? FRIENDS' AND CLASSMATES' EFFECT ON STUDENT'S SECONDARY SCHOOL TRACK PREFERENCES

7.1. Introduction

Peers can have a significant effect on the educational outcomes of adolescents, including their educational preferences (Carolan, 2018; Raabe and Wölfer, 2019; Roth, 2017; Sewell and Hauser, 1972; 1993; Zimmermann, 2018). The aim of this study is to examine the relationship between the educational preferences of adolescent peers.

Adolescents tend to associate their attitude and behaviour with those shared by relevant others (e.g., Brown and Larson, 2009). In this context, friendships play a crucial role (Berndt and Savin-Williams, 1993) as shared interests and similarities can indicate compatibility, fostering stronger relationships (Laursen and Veenstra, 2021). Peers in educational institutions also affect how adolescents perceive themselves and assess their abilities and prospects in comparison to others (Brooks, 2005; Erwin, 1998).

Social relationships and social networks can also provide access to resources that otherwise would not be available to individuals (Coleman, 1988; Granovetter, 1973, 1983; Lin, 2001). This way, students can benefit from social connections such as friendships or a more inclusive peer network, even if they are not primarily formed for academic purposes. For students from less advantaged backgrounds, having high-aspiring peers, and specifically, friends, can be particularly beneficial (Burgess and Umaña-Aponte, 2011; Lessard and Juvonen, 2019; Smith, 2023; Sokatch, 2006; Wohn et al., 2013).

The analysis explores how different characteristics of friends and classmates, like secondary school preferences, academic achievement, and parental background, are connected to the secondary school track that adolescents prefer when applying to secondary school. By using Generalized Structural Equation Models (GSEMs), the analysis can examine both the direct and indirect pathways of these associations.

Around the age when Hungarian primary school students apply to secondary education, adolescents tend to make their academic decisions based on what they perceive as the most favourable and probable option (Gottfredson, 2005). The education that students aim for is crucial for their future educational decisions and achievements (Chowdry et al., 2011; Haller, 1968; Homel and Ryan, 2014; Gutman and Akerman, 2008; Marjoribanks, 2003). This holds especially true in educational systems with tracking, in which different tracks are strongly stratified not only by students' academic achievement but also by their family backgrounds (Shavit and Blossfeld, 1993).

Secondary school tracks are also strongly associated with post-secondary school educational opportunities and ambitions (Schumann, 2009).

Sorting students into different tracks restricts their opportunities to interact with peers from diverse backgrounds (Kertesi and Kézdi, 2009). As a result, the influence of peers on students' future educational preferences may be limited in secondary school (Buchmann and Dalton, 2002; Raabe and Wölfer, 2019). Therefore, the present analysis focuses on friends' and classmates' effects on the secondary school track preferences of primary school students which have not been widely examined (exceptions exist for the effect of the school cohort, e.g., Jonsson and Mood, 2008; Rosenqvist 2018; Smith, 2023; Zwier et al., 2023).

The composition of the broader peer context affects whom individuals may meet, and thus, whom they can befriend (Feld, 1982; Hartup and Stevens, 1997; Juvonen, 2018; Manski, 1993; McPherson and Smith-Lovin, 1987). Unlike most previous studies in this field (an exception is Raabe and Wölfer, 2019), the analysis also takes into account the disentangled effect of friends and the school class peer context. The study also controls for the possible role of the creation and dissolution of friendship ties in friends' similar educational preferences (Brown and Larson, 2009; Cohen, 1977; Manski, 1993; Steglich et al., 2010; Ryan, 2001; Veenstra and Dijkstra, 2012).

7.2. The Present Study

7.2.1. The Association between Adolescent friends' educational preferences and the broader peer context

Individuals, including adolescents, often adopt their attitudes and behaviour based on the attitudes and behaviour of others who are important to them (Brown and Larson, 2009; Kelley, 1952; Merton, 1968a). This can happen through peer pressure, the encouragement of similar behaviour, observing others as role models (Abrams and Hogg, 1990; Brown et al., 2008; Brown and Larson, 2009; Ryan, 2001), or creating situations where certain behaviours are facilitated without explicitly trying to influence others (Brown et al., 2008).

Considering the mechanisms mentioned above regarding educational preferences, peers can establish norms that either support or oppose educational success and conformity to school for one another (Coleman, 1988; Crosnoe, Cavanagh and Elder, 2003; Kruse and Kroneberg, 2020; Ryan, 2001). Peers can also make certain educational options more accessible or widely known (Brown and Larson, 2009). For example, they can attend open days of specific schools together before the secondary school application process. Students can also directly discuss available career or school options, their preferences among those options, and their reasoning for the choices they are about to make (MKIK Gazdaság- és Vállalkozáskutató Intézet (GVI), 2020a; Ikonen et al., 2018). Moreover,

people often tend to simply align with the common preferences within their network or avoid deviating from them due to social or psychological consequences (Jæger, 2007; Manzo, 2013).

A large body of empirical research supports that adolescents' educational preferences or choices are associated with the preferences of their friends or friendship groups (e.g., Carolan, 2018; Kiuru et al., 2007; Kretschmer and Roth, 2021; Mora and Oreopoulos, 2011; Roth, 2017; Sewell and Hauser, 1972; Zimmermann, 2018). Nonetheless, a recent Hungarian study reported no direct effects of friends' and desk mates' secondary school choices on students' choices (Keller, 2023).

Hypothesis 1: There is a positive association between students' educational preferences and the preferences of their friends.

Educational institutions have a significant impact on students' relationships with their peers. Children spend a considerable amount of time in these institutions and are consistently assessed in comparison to their peers, particularly in educational systems where class assignments are fixed, like in Hungary. Peers in the same class have the ability to establish the overall educational norms and values within the class, which in turn can influence students' motivation, attitudes towards school, and school-related behaviour (Juvonen, 2018; Kertesi and Kézdi, 2009). Students in the same educational setting experience the same teaching environment. Teachers may present educational opportunities differently based on the composition of each class (Dollmann and Rudolphi, 2020; Juvonen, 2018; Manski, 1993). This may have detrimental effects on the educational outcomes of students in school classes with a disadvantaged composition (Kertesi and Kézdi, 2009).

Several previous studies have examined the relationship between the school engagement, academic achievement, or educational preferences of adolescents and the characteristics of their broader peer group (e.g., Choi et al., 2008; Dupriez et al., 2012; Jonsson and Mood, 2008; Nieuwenhuis and Chiang, 2021; Rosenqvist, 2018; Smith, 2023; van Ewijk and Sleegers, 2010). Nevertheless, little is known about the disentangled effect of friendship ties and the broader peer context on educational preferences (the exception is Raabe and Wölfer, 2019, to my knowledge). Therefore, this study takes into account the broader peer context when examining how friends' educational preferences are linked to adolescents' preferences. It assumes that not only friends, but also the characteristics of classmates, may have a positive association with students' educational preferences.

Hypothesis 2: there is a positive association between students' educational preferences and the preferences of their classmates.

It is important to note that the peer context plays a significant role in determining the pool of potential friends. People with similar sociodemographic characteristics tend to be sorted into the same social contexts, which increases the likelihood of them befriending each other (Feld, 1982; Hartup and Stevens, 1997; Juvonen, 2018; Manski, 1993; McPherson and Smith-Lovin, 1987). Educational preferences in a school class may be similar due to initial similarities in students' parental background or abilities. These similarities are often the result of location- or ability-based selection processes (Juvonen, 2018; Kertesi and Kézdi, 2009; Manski, 1993).

7.2.2. Further Underlying Mechanisms of Peer Effects on Educational Preferences

Peer effects on students' educational preferences may be channelled through peers' parental background and academic achievement. Peers' parental resources can indirectly affect adolescents' preferences through the effect of peers' parental background on peers' educational preferences (Choi et al., 2008). Furthermore, adolescents may have direct access to the parents of their peers who are resourceful, as well as to the information that more educated and usually more involved parents possess about educational institutions and options (Coleman, 1988; Lin, 2001). The effect of peers' parental background may go beyond the effect of parental background at the individual level (e.g., Carolan and Lardier, 2018; Cherng et al., 2013; Crosnoe, 2004).

Peers' academic achievement may also affect students' educational preferences through social comparison mechanisms (e.g., Festinger, 1954; Mussweiler, 2009). This mechanism may indicate negative contrast with high achievers and the downward adjustment of individuals' self-evaluations and ambitions (e.g., Alwin and Otto, 1977; Marsh, 1991; Rosenqvist, 2018) Nevertheless, social comparison may result in the assimilation of adolescents' academic achievement to their friends' achievement (e.g., Cook, Deng and Morgano, 2007; Huguet et al., 2009; Lomi et al., 2011), and thus, in students' adjustment to more challenging educational preferences (e.g., Breen and Goldthorpe, 1997; Sewell et al., 1970). The negative and positive effects of social comparison with peers' academic achievement can also coexist (Seaton et al., 2008).

Therefore, peers' parental background and academic achievement are considered in the analysis as potential factors that could affect the relationship between peers' educational preferences and students' preferences.

7.2.3. Peer Effects and the Educational Preferences of Students from a less Advantaged Background

Peers can be a valuable educational resource, particularly for students who come from less privileged family backgrounds (Burgess and Umaña-Aponte, 2011; Lessard and Juvonen, 2019;

Sokatch, 2006; Wohn et al., 2013). Social relationships that provide access to the resources of different social groups might be especially important in this regard (Granovetter, 1973). In the case of secondary school tracks, relevant information concerning admission criteria can be especially crucial for students who are interested in academically more demanding schooling options but are unsure whether they could get admitted (Keller et al., 2021).

Therefore, it can be assumed that information and academic norms, values, or motivation accessed through friends or classmates can be particularly helpful for students from disadvantaged backgrounds in developing preferences for challenging academic options.

> **Hypothesis 3**: The relationship between students' educational preferences and those of their peers varies by the parental background of the students and is more pronounced for students whose parents have lower levels of education.

It is important to note, however, that the availability of resources does not automatically mean that they can benefit individuals in practice (Bottrell, 2009). For instance, being surrounded by resourceful peers can be detrimental for less advantaged students when paired with a sense of relative deprivation (Nieuwenhuis and Chiang, 2021; Owens, 2010).

7.3. Data and Methods

7.3.1. Data

The present study primarily utilised the sixth wave of data collected within the framework of the MTA 'Lendület' RECENS research project 'Competition and Negative Ties', along with information from the fifth wave of the same data collection. The data for the sixth wave was collected during the spring semester of the 2016/2017 academic year. It included 37 classes from 25 schools, with students who were enrolled in the eighth grade, the last grade of primary school and were around 14.57 years old (SD=.65, $N_{students}$=663).

The data for the fifth wave was collected during the spring semester of the 2015-2016 academic year. The study included 39 classes from 26 schools, with students who were in seventh grade and around 13.63 years old (SD = .71, N = 743 students). Most of the students in the sample in the fifth and sixth waves had the necessary consent (95 per cent) and completed the questionnaire (89 per cent and 90 per cent). However, not all students answered all the questions. Questionnaires were available on tablets and were answered during regular school classes in the presence of trained research assistants. Students were ensured that their answers would be treated confidentially and anonymised for the data analysis.

7.3.2. Measures

7.3.2.1. Dependent Variable

Descriptive statistics for the dependent and main independent variables can be found in *Table 32*. The dependent variable was obtained from administrative data that includes the track of the secondary school selected as the first choice on students' application forms. The dataset includes a dichotomized version of the measure, with a value of '1' for individuals who applied to grammar school track in the first place and '0' for those who did not.

Due to the nature of the secondary school application process in Hungary, it can be assumed that students prioritize the training program listed first on their application form. From the programs students apply for and are accepted to, they are admitted to the school and program that is their top choice among their preferences (Kacy, 2010). Students are typically admitted to secondary education that is their top choice in their applications (GVI, 2020b).

It is reasonable to differentiate between the preferences for grammar school track and the preferences for other secondary school tracks. This is because students who apply to grammar school track generally have higher academic records and come from more privileged family backgrounds compared to students who apply to other secondary school tracks (GVI, 2020a). This mechanism is also evident in the socioeconomic composition of students in grammar school tracks (GVI, 2020b; Lannert, 2009; Schumann, 2009). Moreover, the secondary school track has a profound effect on future ambitions and accomplishments. Students attending the grammar school track are more likely to pursue tertiary education after secondary education than students in other tracks (GVI 2020a; Lannert, 2009; Schumann, 2009).

7.3.2.2. Independent Variables

Friendship. The students could rate all their classmates on a scale of 1 to 5, indicating the quality of their relationships from negative to positive. Those marked with the highest value (5, labelled as *'a good friend of mine'*) were considered as friends. Nominations could be either unilateral or reciprocated.

Each measure of friends' characteristics was obtained for all friends at the time of secondary school applications, as well as for those who were also considered friends the year before. Throughout the analysis, the term *stable friends* is used to refer to friends who were reported as friends in both the eighth grade (T) and in seventh grade, the year before secondary school applications (T-1). *All friends*, however, were only reported as friends in the academic year of secondary school applications (T: eighth grade).

Friends'/stable friends' grammar school track preferences. The percentage of friends or stable friends preferring a grammar school education as their top choice in the application form.

Classmates' grammar school track preferences. The percentage of classmates (excluding friends or stable friends) preferring a grammar school education as their top choice in the application form.

The study also considered the impact of individual-level measures on students' preference for the grammar school track in eighth grade. Descriptive statistics for further independent variables can be found in *Table 33*.

Academic achievement. Measured by students' grade-point average (GPA) at the end of seventh grade, based on their academic achievement in subjects commonly considered during the secondary school application process (Mathematics, Hungarian grammar, Hungarian literature, History, First foreign language). Grades in the Hungarian educational system range from one to five (1: insufficient, 5: very good).

Previously reported preferences: grammar school track. Whether students expressed a preference for the grammar school track in the year before the secondary school application period.

Previously reported preferences: don't know yet. Whether students reported uncertain preferences for their secondary school track in the year before the application period.

Parents' highest education level: *not tertiary*. Adolescents who do not have a parent with a tertiary education, as compared to adolescents who have at least one parent with a tertiary education.

Parents' highest education level: not secondary. Adolescents without a parent who has completed secondary education, as compared to adolescents who have at least one parent with completed secondary education.

Based on Erikson's (1984) dominance criterion, parental background was measured by considering the highest education level attained by their parents. It was compared whether the highest education level was tertiary or secondary (including secondary school leaving examination) against the situation where neither of the parents completed secondary education. To analyse the impact of the interaction between students' parental background and their peers' preferences for the grammar school track, in line with Hypothesis 3, the education level of the students' parents at the individual level was reverse-coded. Nevertheless, the parental background of students' peers was not reverse-coded.

Gender. Students' gender comparing female respondents to males.

Ethnic background. Ethnic background, socioeconomic status, and students' abilities are often interconnected because Roma students tend to come from disadvantaged family backgrounds (Kertesi and Kézdi, 2012). Moreover, Roma students have lower expectations of themselves compared to their non-Roma peers. This is a result of internalised institutional labelling (Szalai,

2008). Self-reported Roma identity was determined by students indicating their ethnicity as either Roma or both Hungarian and Roma, as opposed to not identifying as Roma.

Experiment. During eighth grade, certain classes from the sample were included in a cluster-randomized information campaign that promoted attending grammar school for selected students within the class. The purpose of the field experiment was to determine if uncertainty about admission requirements for the grammar school track could deter students from applying. As this intervention could alter the results, it was controlled for whether a student's class was included in this experimental study (see Keller et al., 2021). Therefore, a variable was used to measure whether the students' class was included in the cluster-randomized information campaign promoting grammar school for certain students in the class.

The study considered the previous track preferences of friends and classmates, as well as their parental backgrounds and academic achievement. These factors were taken into account because they may influence adolescents' preferences for the grammar school track in their applications, either directly or through their impact on the preferences of their peers. In each case, classmates' measures excluded friends or stable friends, depending on which friends were considered by the model.

Friends: tertiary-educated parents. The percentage of friends or stable friends who have at least one parent with tertiary education.

Friends: secondary educated parents. The percentage of friends or stable friends who have at least one parent who completed secondary education but did not complete tertiary education.

Classmates: tertiary-educated parents. The percentage of classmates who have at least one parent with tertiary education.

Classmates: secondary educated parents. The percentage of classmates who have at least one parent who completed secondary education but did not complete tertiary education.

Friends' previous secondary school preferences: grammar school track. The percentage of friends or stable friends who expressed a preference for the grammar school track in the year before the applications.

Friends' previous secondary school preferences: uncertain. The percentage of friends or stable friends who expressed uncertain preferences in the year before the applications.

Classmates' previous secondary school preferences: grammar school track. The percentage of classmates who expressed a preference for the grammar school track in the year before the applications.

Classmates' previous secondary school preferences: uncertain. The percentage of classmates who expressed uncertain preferences in the year before the applications.

Friends' academic achievement. The average GPA of friends or stable friends at the end of seventh grade.

Classmates' academic achievement. The average GPA of classmates at the end of seventh grade.

Table 32: Distribution of dependent and main independent variables

Variables	Categories or Min-Max	Mean (SD)	N
Dependent variable			
First-place application: grammar school track	0'No' 1'Yes'	.27 (.45)	573
Peer effects: share of first-place applications to the grammar school track			
Friends			
All friends	0-1	.32 (.34)	530
Stable friends	0-1	.34 (.37)	446
Classmates			
Excluding all friends	0-1	.26 (.27)	534
Excluding stable friends	0-1	.26 (.27)	556

Notes. Own calculations.

Table 33: Distribution of control variables

Variables	Categories or Min-Max	Mean	N
Friends' characteristics			
Percentage of previously expressed			
All friends	0-1	.32 (.30)	528
Stable friends	0-1	.33 (.34)	447
Percentage of previously expressed			
All friends	0-1	.20 (.25)	528
Stable friends	0-1	.19 (.27)	447
Percentage of at least one parent with			
All friends	0-1	.27 (.29)	530
Stable friends	0-1	.28 (.32)	445
Percentage of at least one parent with			
All friends	0-1	.25 (.26)	530
Stable friends	0-1	.25 (.30)	445
Average GPA at the end of 7th grade			
All friends	2.21-5	3.70	530
Stable friends	2.07-5	3.79	446
Classmates' characteristics			
Percentage of previously expressed			
Excluding all friends	0-1	.29 (.23)	534
Excluding stable friends	0-1	.30 (.21)	562
Percentage of previously expressed			
Excluding all friends	0-1	.21 (.17)	534
Excluding stable friends	0-.67	.20 (.13)	562
Percentage of at least one parent with			
Excluding all friends	0-1	.25 (.22)	534
Excluding stable friends	0-.83	.24 (.20)	557
Percentage of at least one parent with			
Excluding all friends	0-1	.25 (.18)	534
Excluding stable friends	0-1	.25 (.16)	562
Average GPA at the end of 7th grade			
Excluding all friends	2.13-4.87	3.56	534
Excluding stable friends	2.43-4.81	3.57	556
Individual-level characteristics			
Previously expressed secondary			
Grammar school track	0'No'	.30 (.46)	529
Don't know yet	0'No'	.20 (.40)	529
Reverse-coded parental background			
Reverse-coded tertiary	0'At least one parent has tertiary education level' 1'No parent has tertiary education level'	.75 (.44)	569
Reverse coded secondary	0'At least one parent has completed secondary education, but none of them completed tertiary education' 1'No parent has secondary education level'	.75 (.43)	569
GPA at the end of 7th grade	2-5	3.61	573
Gender	0'Male' 1'Female'	.51 (.50)	573
Self-reported ethnicity	0'Not Roma' 1'Roma or Roma-Hungarian'	.36 (.48)	572
Class participation in the experiment	0'Class did not participate' 1'Class did participate'	.47 (.50)	573

Notes. Own calculations.

7.3.3. Analytical Approach and Model Specification

The similarity among individuals in friendships can be partly attributed to social selection. This means that people tend to prefer befriending others who are similar to them in terms of relevant attributes (Brown and Larson, 2009; Hartup and Stevens, 1997; McPherson, Smith-Lovin and Cook, 2001). It is important to consider this issue when examining the effect of friends (Brown and Larson, 2009; Steglich, Snijders and Pearson, 2010; Ryan, 2001; Veenstra and Dijkstra, 2012). This issue is addressed in the present analysis by differentiating between stable friends and all friends, as explained in Chapter 7.3.2.2.

Moreover, the educational preferences of classmates may initially be similar to each other due to selection processes in the educational system (e.g., Juvonen, 2018; Kertesi and Kézdi, 2009; Manski, 1993; McPherson and Smith-Lovin, 1987). Therefore, the Generalized Structural Equation Models (GSEMs) applied for the analysis included school class fixed effects in the main model with $N_{school\ classes} - 1$ dummy variables. Models with fixed effects for school classes were used to estimate how the characteristics of friends and classmates could influence the educational preferences of adolescents while controlling for unobserved heterogeneity between school classes. All standard errors were clustered for school classes accounting for the nested nature of the data (students embedded in school classes), which otherwise violated GSEMs' assumption of independent observations.

Nevertheless, the study is not able to differentiate between the 'influencer' and the 'influenced': individuals belong to the same group of people whose impact on each other is being measured (Manski, 1993; Mouw, 2006; Sacerdote, 2011). Therefore, it is important to consider that the reported peer effects are correlational results. The term 'effects' is used in the statistical sense, as commonly applied in regression techniques.

GSEMs do not require the data to have a normal distribution, and therefore, offer an adequate tool for the analysis of the main dependent variable (students' preferences for the grammar school track in their applications) in the present study which was measured on a binary scale. Thus, in order to analyse the direct effects on the main outcome, logit models were applied. Linear regression models were used to analyse continuous independent variables in the other equations of the model.

Some variables were only used as predictors (exogenous) in the models, while others were assumed to serve as both predictors and outcomes (endogenous) (*Figure 6* for a simplified overview). The endogenous variables in the models included the preferences of students, their friends, and their classmates for the grammar school track in their applications. Additionally, the preferences of students, their friends, and their classmates (grammar school track and uncertain preferences compared to other preferences) the year before the applications were also considered as

endogenous variables. Finally, the academic achievement of students, their friends, and their classmates were also considered as endogenous variables. 'Sub-models' in the present analysis refer to the cases when the endogenous variables (apart from the main dependent variable) serve as outcomes.

In the main model, peers' (friends' and classmates') preferences for the grammar school track in their applications were included to investigate whether students' preferences for the grammar school track were affected by the preferences of their friends and classmates (*Hypothesis 1 and 2*), while also controlling for other peer and individual attributes.

Taking into account the individual characteristics of students, the assumption was made that their parents' background would directly and indirectly impact their preferences for the grammar school track in their applications. This latter, indirect effect could be seen through the effect of parental background on academic achievement and previous preferences (Boudon, 1974; Breen and Goldthorpe, 1997).

To test *Hypotheses 3*, product indicators were included that captured the interaction between students' parental background and their friends' and classmates' preferences for the grammar school track. This made it possible to examine whether the effect of peers' preferences varied depending on students' parental background.

The following endogenous variables were modelled as binary dependent variables: students' prior preferences for a grammar school track and their uncertainty about their preferences. Meanwhile, linear regression models were used to analyse the following endogenous variables: students' GPA at the end of the previous school year, the percentage of friends and classmates who preferred the grammar school track in their applications, the percentage of friends and classmates who expressed uncertain preferences or preferences for the grammar school track in the previous school year, as well as the average GPA of friends and classmates at the end of the previous school year.

To model the effects on the percentage of friends and classmates who preferred the grammar school track in their applications, measures for friends' and classmates' academic achievement, parental background, and previous preferences were included. The study also included the parental background of friends and classmates to model their previous preferences and their average GPA as dependent variables.

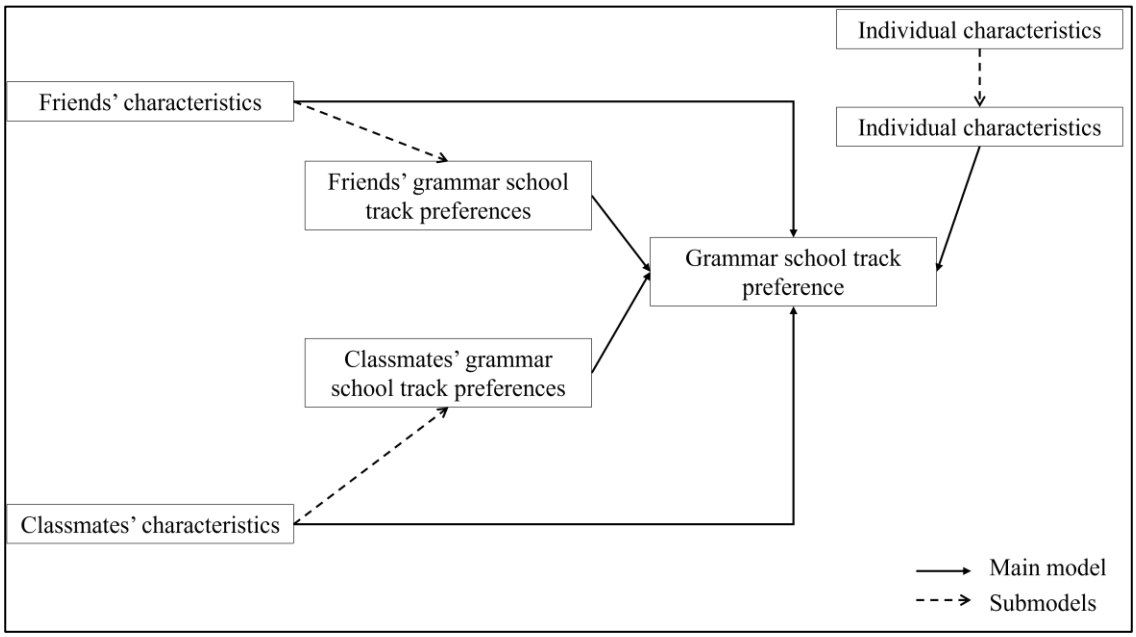
To determine whether participation in the supplementary experimental study affected peer effects, the analysis was also conducted separately for classes that did and did not participate in the experiment. The models that were run separately did not converge when class fixed effects were included. As a result, models without class fixed effects were compared.

GSEMs with missing data utilise equation-wise deletion to handle missing observations. This approach aims to maximise the number of valid observations within each equation. Because some variables had a large number of missing values in the analysis, multiple imputations were used to fill in the missing data. This was done using Stata's *mi* command with chained equations, which is an iterative approach involving multiple equations (Stata Corp, 2021). All variables with missing data were imputed. This resulted in 663 complete cases for the analysis, representing the 663 students who attended any of the school classes included in the study during the sixth wave of data collection. Multiple imputed values (20 in the present analysis) were pooled for the data analysis taking into consideration the uncertainty of each value.

According to the different types of variables that were imputed, various models were defined for the equations. Binary variables were imputed using logit models, while proportional variables ranging from 0 to 1 were imputed using truncated models that defined a lower threshold of 0 and an upper threshold of 1. Variables measuring academic achievement were imputed using truncated models that defined a lower (2) and an upper threshold (5) based on the observed minimum and maximum values in the data.

Multiple imputation results have some constraints. Log likelihoods and thus, log likelihood-based model fit statistics are not accessible after multiple imputation. As similar conclusions could be drawn from both the results with and without multiple imputation, the multiple imputation results were only presented as supplementary findings.

Figure 6: Simplified overview of the models



Notes. Own edition.

7.4.Results

7.4.1. Descriptive Results

Friends and classmates seemed to be highly similar regarding their preferences for the grammar school track, parental background, and academic achievement (*Table 34*). The average dyadic similarities were of similar size for each peer relationship measure.

Table 34: Average dyadic similarities among peers by grammar school track preferences, aspirations, academic achievement, and parental background

	Average number of ties (SD)	**Grammar school track preferences (applications)**	**Grammar school track preferences (in the school year preceding applications)**	**GPA at the end of seventh grade**	**Parental background (At least one parent with tertiary-level education)**	**Parental background (At least one parent with secondary-, but not tertiary-level education)**
Friends (N dyads)						
All friends (N=3160)	5.93	.73	.62	.76	.68	.64
Stable friends (N=1794)	3.95	.72	.64	.78	.68	.62
Classmates						
Excluding all friends (N=6659)	12.45	.70	.64	.72	.67	.65
Excluding stable friends (N=10029)	17.85	.72	.65	.74	.69	.66

Notes. Own calculations. Dyadic similarities were measured by computing the absolute value of the differences between adolescents and their friends divided by the range (the difference between the highest and the lowest values), and subtracting the result from one (Ripley et al., 2021). The procedure was repeated for all friendship pairs and the average of those similarity measures (always ranging between zero and one) was computed.

Not all adolescents in the sample had stable friends. Some participants did not take part in the study at both measurements (N=38). As a result, they were unable to report their friends on both occasions. Furthermore, some students did not report any stable friends (N=113). Those adolescents who participated in both waves of the study but did not mention having any stable friends, or any friends at all, appeared to be significantly less inclined to report preferences for the grammar school track compared to students who had stable friends or any friends in general. (*Table 35*, $\text{Chi-squared}_{\text{stable friends}}=17.27$, $p<.001$, $\text{Chi-squared}_{\text{All friends}}=5.60$, $p=.0018$). This indicates that having intimate social relationships had a positive association with more academic-oriented educational preferences in the sample.

Table 35: First place applications by whether adolescents' have stable friends or friends at all

	Students' preferences in their applications (Application in the first place in eighth grade) (%)	
	Grammar school	**Not grammar school**
Has stable friends, Chi-squared=17.27, p<.001		
Yes (N=446)	31.17	68.83
No (N=127)	12.60	87.40
Has any friends, Chi-squared=5.60, p=.0018		
Yes (N=530)	28.30	71.70
No (N=43)	11.63	88.37

Notes. Own computations.

7.4.2. GSEM Results

7.4.2.1. Main Results

The coefficients of GSEM results for the main outcome variable of the model should be interpreted as the average marginal effects in logistic regression models. The marginal effect of a covariate refers to the procedure of taking the logistic probability function at the estimated logit of each observation and multiplying it by the coefficient of the covariate. For average marginal effects, this product is averaged over all observations (Mood, 2010). Continuous variables were included in the models in a standardized form, with a mean of 0 and a standard deviation of 1 (except for the multiple imputation models).

Table 36 displays the results for the main part of the models, specifically the students' preferences for the grammar school track in their applications as the dependent variable. The models that are introduced primarily focus on stable friends and classmates, with the exception of *Model 5c* which includes the effect of all friends for comparison purposes. In *Models 1* to *4*, the impact of different peer characteristics on adolescents' preferences for the grammar school track are considered separately in each model. In *Models 5a* to *5f*, the grammar school track preferences of peers in their applications, their previous preferences, their average academic achievement, and their parental background are considered in the same models.

Models 5b, 6, and *7* are the primary configurations to be considered in relation to the hypotheses. *Model 5a* and *Model 5b* include the same effects, except for school class fixed effects which are not included in *Model 5a*. Without accounting for school class fixed effects (*Model 5a*), a positive correlation was observed between classmates' grammar school track preferences in their applications and students' own preferences for the grammar school track ($AME = .10\ \ SE = .04$). The same correlation did not hold for students' stable friends' grammar school preferences.

In *Model 5b*, with the inclusion of school class fixed effects, friends' and classmates' grammar school track preferences in their applications were negatively associated with students' preferences for the grammar school track in their applications opposing *Hypotheses 1* and

Hypothesis 2 (e.g., $AME_{stable\ friends} = -.21,\ SE_{stable\ friends} = .03$; $AME_{classmates\ wo\ stable\ friends} = -.37,\ SE_{sclassmates\ wo\ stable\ friends} = .06$).

In this same model, students who had a higher percentage of stable friends with previous preferences for the grammar school track were more likely to prefer the grammar school track in their applications. This result supports *Hypothesis 1*. One standard deviation increase in the proportion of stable friends who preferred the grammar school track in seventh grade increased the probability of students preferring the grammar school track in their applications by an average of 8 percentage points ($SE = .02$) and this effect controlled for the creation or dissolution of friendship ties based on grammar school preferences during the observed one-year period.

Classmates' GPA ($AME = .17,\ SE = .07$) and stable friends' GPA ($AME = .13, SE = .03$) showed a positive relationship with students' preferences for the grammar school track in their applications. Having more friends with a parent with tertiary-level education didn't show a direct association with adolescents' preferences for the grammar school track in their applications. Nevertheless, a higher proportion of friends whose parents' highest education level was secondary was negatively associated with students' preferences for the grammar school track in their applications (e.g., $AME_{stable\ friends} = -.04,\ SE_{stable\ friends} = .02$).

The differences in effect sizes and standard errors found in models that included all peer characteristics (opposing *Models 1* to *4*) may be due to the correlation between peers' preferences in their applications, their previous preferences, their GPA, and their parental background. It is possible that the coefficients of different signs offset each other to some degree. The positive average marginal effects for the previous preferences of stable friends, as well as the GPA of friends and classmates, were smaller in size compared to the negative coefficients for the preferences of friends and classmates in their applications.

Thus, in conclusion, there is no compelling evidence to support a positive connection between friends' or classmates' educational preferences when unobserved heterogeneity across school classes was accounted for. This suggests that any positive connection observed between the preferences of classmates can be attributed to students initially being grouped together in school classes. In terms of individual-level characteristics, students who preferred the grammar school track prior to the application period were more likely to apply to the grammar school track compared to students who preferred any of the vocational tracks in the previous school year. Also, a positive but weaker association could be observed in most of the models for students with uncertain preferences in the school year preceding the applications. Better school performance in seventh grade and being female also had a positive effect on students' preferring the grammar school track in their applications in eighth grade.

Model 5c offers a comparison for *Model 5b* with all friends. *Model 5d* displays the results of multiple imputation for stable friends with school class fixed effects, and its findings are not substantially different from those in *Model 5b*. *Models 5e* and *5f* display the results with stable friends and without school class fixed effects. These models are presented separately for the subsample that was not included in the experimental study and the subsample that was included.

The small sample sizes make it challenging to interpret the models separately for the classes that were included (*Model 5f*) and the ones that were not included (*Model 5e*) in the supplementary experimental study. Concerning the effects of peers' preferences on students' grammar school track preferences, the effect size of classmates' grammar school track preferences in their applications was greater for school classes not included in the experiment ($AME = .16, SE = .05$) than for school classes included ($AME = .04, SE = .05$). Nevertheless, these effects underwent substantial changes for the entire sample when school class fixed effects were included ($Model\ 5b$: $AME = -.37, SE = .06$), compared to when they were not included ($Model\ 5a$: $AME = .10, SE = .04$).

Model 6 and *Model 7* include interaction terms between students' own parental backgrounds and their peers' grammar school preferences to test whether the effect of peers' educational preferences varies by students' parental background. *Model 6* includes those interaction terms for peers' grammar school track preferences in their applications, while *Model 7* includes the interaction terms for peers' previous grammar school track preferences.

The effect of stable friends' and classmates' grammar school preferences did not vary by students' parental background, neither concerning peers' preferences in their applications (*Model 6*), nor concerning their previous preferences (*Model 7*) as indicated by the coefficients and standard errors of the interaction terms, and thus, not supporting *Hypothesis 3*.

Table 36: The main part of the models

	Model1	Model 2	Model 3	Model 4	Model 5a	Model 5b	Model 5c	Model 5d	Model 5e	Model 5f	Model 6	Model 7
Preference for the grammar school track Average marginal effects (AME)	**Stable friends**	**Stable friends**	**Stable friends**	**Stable friends**	**Stable friends, no fixed effects**	**Stable friends**	**All friends**	**Stable friends with multiple imputations (log odds ratios, not AME)**	**Stable friends, no fixed effects, no experiment**	**Stable friends, no fixed effects, experiment**	**Stable friends**	**Stable friends**
Friends												
Friends' grammar school track preferences	**-.09 (.04)***				.03 (.03)	**-.21 (.03)*****	**-.16 (.03)*****	**-11.56 (2.18)*****	.001 (.04)	.02 (0.03)	**-.19 (.04)*****	**-.21 (.03)*****
Classmates' grammar school track preferences	**-.29 (.12)***				**.10 (.04)***	**-.37 (.06)*****	**-.34 (.05)*****	**-29.89 (6.84)*****	**.16 (0.05)****	.04 (0.05)	**-.40 (.07)*****	**-.36 (.05)*****
Friends' previous secondary school preferences												
Grammar school track		.02 (.02)			.005 (.03)	**.08 (.02)*****	**.05 (.02)***	**4.82 (1.28)*****	-.03 (0.05)	.01 (0.02)	.07 (.02)***	.08 (.05)
Don't know yet		.04 (.02)			-.01 (.02)	.02 (.02)	.02 (.02)	2.01 (1.79)	**-.05 (0.02)***	.03 (0.03)	.02 (.02)	.03 (.02)
Friends' GPA at the end of seventh grade			.01 (.03)		.01 (.02)	**.13 (.03)*****	.07 (.04)	**4.36 (1.23)*****	.01 (0.03)	.05 (0.03)	**.14 (.04)****	**.13 (.04)****
Friends' parental background												
Share of parents with tertiary-level education				.01 (.03)	-.01 (.02)	-.04 (.02)	-.02 (.02)	-2.70 (1.50)	-.03 (0.03)	.02 (0.02)	-.03 (.02)	-.03 (.02)
Share of secondary educated parents				**-.04 (.01)****	**-.04 (.02)***	**-.04 (.01)****	**-.04 (.02)***	**-2.77 (1.14)****	**-.06 (0.03)***	**-.05 (0.02)***	**-.04 (.01)****	**-.04 (.01)****

(Table 36 continued)

Average marginal effects (AME)	Model1	Model 2	Model 3	Model 4	Model 5a	Model 5b	Model 5c	Model 5d	Model 5e	Model 5f	Model 6	Model 7
	Preference for the grammar school track											
	Stable friends	**Stable friends**	**Stable friends**	**Stable friends**	**Stable friends, no fixed effects**	**Stable friends**	**All friends**	**Stable friends with multiple imputations (log odds ratios, not AME)**	**Stable friends, no fixed effects, no experiment**	**Stable friends, no fixed effects, experiment**	**Stable friends**	**Stable friends**
Classmates												
Previous secondary school preferences												
Grammar school track		-.10 (.19)			-.03 (.03)	-.17 (.09)	.01 (.05)	-17.6 (10.28)	.01 (0.03)	**-0.1 (0.03)****	-.19 (.09)*	-.19 (.1)*
Don't know yet		.004 (.11)			-.01 (.01)	0 (.08)	-.04 (.03)	-5.16 (12.28)	.002 (0.03)	-.02 (0.02)	-.03 (.07)	-.02 (.08)
Classmates' GPA at the end of seventh grade			-.12 (.06)		**-.06 (.03)***	**.17 (.07)***	**.11 (.04)****	**8.85 (3.64)****	**-.09 (0.04)***	-.03 (0.05)	**.16 (.06)****	**.16 (.06)***
Classmates' parental background												
Share of parents with tertiary-level education				.02 (.09)	.03 (.03)	**-.11 (.05)***	-.03 (.03)	-10.71 (6.1)	.01 (.04)	**.09 (0.03)****	**-.09 (.04)***	-.09 (.05)
Share of parents with secondary-level education				.04 (.09)	**.04 (.02)***	**-.25 (.06)*****	**-.07 (.03)***	**-32.73 (10.36)*****	.05 (0.03)	**.06 (0.02)****	**-.28 (.07)*****	**-.24 (.07)*****
Individual-level characteristics												
Previous preference (ref.: vocational or vocational secondary)												
Grammar school track	**.15 (.03)*****	**.17 (.04)*****	**.18 (.03)*****	**.18 (.02)*****	**.19 (.03)*****	**.16 (.02)*****	**.16 (.03)*****	**3.10 (.59)*****	**.14 (0.04)*****	**.24 (0.04)*****	**.15 (.03)*****	**.15 (.03)*****
Don't know yet	**.07 (.03)****	**.07 (.04)**	**.07 (.03)****	**.10 (.03)*****	**.11 (.03)*****	**.08 (.03)***	**.08 (.04)***	**1.18 (.56)****	.08 (.05)	**.11 (0.04)****	.06 (.05)	.06 (.04)

(*Table 36 continued*)

Average marginal effects (AME)	Preference for the grammar school track											
	Model1	**Model 2**	**Model 3**	**Model 4**	**Model 5a**	**Model 5b**	**Model 5c**	**Model 5d**	**Model 5e**	**Model 5f**	**Model 6**	**Model 7**
	Stable friends	**Stable friends**	**Stable friends**	**Stable friends**	**Stable friends, no fixed effects**	**Stable friends**	**All friends**	**Stable friends with multiple imputations (log odds ratios, not AME)**	**Stable friends, no fixed effects, no experiment**	**Stable friends, no fixed effects, experiment**	**Stable friends**	**Stable friends**
Individual-level												
Previous preference (ref.: vocational or vocational secondary)												
Grammar school track	**.15 (.03)*** **	**.17 (.04)*** **	**.18 (.03)*** **	**.18 (.02)*** **	**.19 (.03)*** **	**.16 (.02)*** **	**.16 (.03)*** **	**3.10 (.59)*** **	**.14 (0.04)*** **	**.24 (0.04)*** **	**.15 (.03)*** **	**.15 (.03)*** **
Don't know yet	**.07 (.03)** **	**.07 (.04)**	**.07 (.03)** **	**.10 (.03)*** **	**.11 (.03)*** **	**.08 (.03)***	**.08 (.04)***	**1.18 (.56)** **	.08 (.05)	**.11 (0.04)** **	.06 (.05)	.06 (.04)
GPA at the end of seventh grade	**.14 (.02)*** **	**.15 (.02)*** **	**.13 (.02)*** **	**.17 (.02)*** **	**.13 (.02)*** **	**.18 (.02)*** **	**.16 (.02)*** **	**4.52 (.82)*** **	**.16 (.02)*** **	**.13 (0.03)*** **	**.17 (.03)*** **	**.17 (.03)*** **
Parents' highest education level												
Not tertiary, but secondary	-.03 (.04)	-.02 (.04)	-.04 (.05)	-.01 (.05)	-.03 (.04)	.06 (.04)	-.01 (.03)	.99 (1.00)	-.003 (.06)	-.04 (0.05)	.02 (.04)	.02 (.04)
Below secondary	.03 (.03)	**.06 (.03)***	.04 (.03)	**.08 (.03)***	**.07 (.03)***	**.09 (.03)*** **	**.06 (.02)** **	**1.96 (.69)*** **	.07 (.06)	**.08 (0.03)***	**.12 (.03)** **	**.09 (.03)** **
Being female (ref.: male)	**.07 (.03)***	**.13 (.03)*** **	**.11 (.03)** **	**.13 (.04)*** **	**.13 (.04)*** **	**.11 (.03)*** **	**.07 (.03)** **	**2.08 (.70)*** **	.08 (0.06)	**.17 (0.04)*** **	**.10 (.03)*** **	**.11 (.03)*** **
Roma or Roma-Hungarian (ref.: other)	.04 (.05)	.05 (.05)	.05 (.05)	.06 (.05)	-.03 (.04)	**.08 (.03)** **	.03 (.04)	1.57 (.84)	-.08 (0.07)	-.01 (0.05)	**.09 (.03)*** **	**.09 (.03)*** **

(*Table 36 continued)*

Preference for the grammar school trac	**Model 6**	**Model 7**
Average marginal effects (AME)	**Stable friends**	**Stable friends**
Interactions 1		
Friends' grammar school track preferences and parents' highest level of education – secondary but not tertiary	.02 (.04)	
Classmates' grammar school track preferences and parents' highest level of education – secondary but not tertiary	.04 (.03)	
Friends' grammar school track preferences and parents' highest level of education – not secondary	-.04 (.03)	
Classmates' grammar school track preferences and parents' highest level of education – not secondary	.01 (.02)	
Interactions 2		
Friends' previous grammar school track preferences and parents' highest level of education – secondary but not tertiary		.002 (.04)
Classmates' previous grammar school track preferences and parents' highest level of education – secondary but not tertiary		.05 (.03)
Friends' previous grammar school track preferences and parents' highest level of education – not secondary		-.01 (.04)
Classmates' previous grammar school track preferences and parents' highest level of education – not secondary		.01 (.03)

(*Table 36 continued)*

	Preference for the grammar school track											
	Model1	**Model 2**	**Model 3**	**Model 4**	**Model 5a**	**Model 5b**	**Model 5c**	**Model 5d**	**Model 5e**	**Model 5f**	**Model 6**	**Model 7**
Average marginal effects (AME)	**Stable friends**	**Stable friends**	**Stable friends**	**Stable friends**	**Stable friends, no fixed effects**	**Stable friends**	**All friends**	**Stable friends with multiple imputations (log odds ratios, not AME)**	**Stable friends, no fixed effects, no experiment**	**Stable friends, no fixed effects, experiment**	**Stable friends**	**Stable friends**
School class fix effects	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes
Constant (log odds)	**-20.50 (1.67) *****	**-19.70 (2.35) *****	**-20.42 (2.24) *****	**-19.39 (1.75) *****	**-3.65 (0.66) *****	**-14.09 (4.09) ****	-3.06 (2.71)	**-49.14 (13.12) *****	**-3.5 (1.07) ****	**-4.68 (1.02) *****	**-13.12 (4.56) ****	**-12.96 (4.5) ****
N students (main model)	428	428	428	428	428	428	462	663	215	213	428	428
N groups	37	37	37	37	37	37	37	37	20	17	37	37
BIC (entire model)	1564	1605	1604	1594	1650	1527	2217	-	6074	5196	1528	1516

Notes. GSEM results. Standard errors in parentheses, * p < 0.05, ** p < 0.01, *** p < 0.001

7.4.2.2. Direct and Indirect Effects

Nonlinear indirect effects of peers' characteristics were obtained as log odds ratios using the *nlcom* postestimation command (*Table 37* and *Figure 7* for the paths) (StataCorp, 2021). Indirect effects are obtained for *Model 1*, which accounts for school class fixed effects and the direct influence of peers' grammar school preferences. Additionally, these indirect effects are introduced for *Model 5b* and *Model 5c*, which include school class fixed effects and the direct effect of peers' grammar school track preferences in their applications, their previous grammar school track preferences, their academic achievements, and their parental backgrounds.

In the following, the analysis focuses on the main indirect effects of interest for stable friends in *Model 5b*. Indirect effects through the effect of peers' grammar school track preferences in their applications

$$(paths: 8+1;\ 10+1;\ 12+1; 13+8+1;\ 14+10+1;\ 17+1;\ 15+8+1;\ 16+10+1)$$

were consistent with the direct negative effect of peers' grammar school track preferences in their applications on students' own grammar school track preferences in their applications.

Classmates' previous preferences had a significant positive association with students' preferences by influencing their previous preferences for the grammar school track ($path: 9+7$, $\beta_{classmates\ wo\ stable\ friends} = 2.52,\ SE_{classmates\ wo\ stable\ friends} = .60$).

In addition to the direct positive relationship between stable friends' academic achievement and students' preference for the grammar school track in their applications, it also had an indirect positive effect through its effect on students' own academic achievement ($path: 11+6,\ \beta = 1.28,\ SE = .35$). Having stable friends who had at least one parent with a tertiary-level education indirectly influenced students' grammar school track preferences in their applications through the effect of their previous grammar school track preferences ($path: 13+2,\ \beta = .91,\ SE = .23$) and academic achievement ($path: 14+3,\ \beta = 1.46,\ SE = .44$) of stable friends.

7.4.2.3. Sub-models

The results for the sub-models are presented in *Appendix P*, which includes models with stable friends, models with all friends, and models with stable friends using multiple imputations. Results being very similar for all of the sub-models, only the results of the stable friends sub-models are introduced in the following. The study did not find any association between an individual's previous preference for the grammar school track and the previous preferences of their stable friends for the grammar school track ($AME = .002,\ SE = .03$). Meanwhile, a positive association was observed between students' previous preferences for the grammar school track and the previous preferences of their classmates ($AME = .13,\ SE = .02$). This effect may be because of the

composition of the classroom, as the sub-models did not include fixed effects for school classes due to convergence problems.

Students whose parents completed secondary education, but not tertiary education, were less likely to express a preference for the grammar school track before submitting their applications compared to students who had at least one parent with a tertiary education level ($AME = -.21, SE = .05$). Students whose parents did not complete secondary education were more likely to be uncertain about their previous secondary school preferences compared to students who had at least one parent with tertiary education level ($AME = .15, SE = .05$).

The percentage of friends' who preferred the grammar school track in their applications was positively associated with the percentage of friends' expressing previous grammar school preferences ($AME = .36, SE = .06$), the percentage of their parents with tertiary-level education ($AME = .22, SE = .07$), and their average academic achievement ($AME = .35, SE = .06$). The percentage of friends' parents with tertiary-level education had a positive effect on the proportion of their previous grammar school track preferences ($AME = .54, SE = .08$). The proportion of friends' parents with tertiary- or at least secondary-level education was positively related to friends' average academic achievement ($AME_{tertiary} = .50,\ SE_{tertiary} = .08; AME_{secondary} = .22,\ SE_{secondary} = .06$). Similar associations could also be observed for classmates' characteristics.

Table 37: Main *nonlinear* direct and *in*direct effects of interest on students' preferences for the grammar school track in their applications

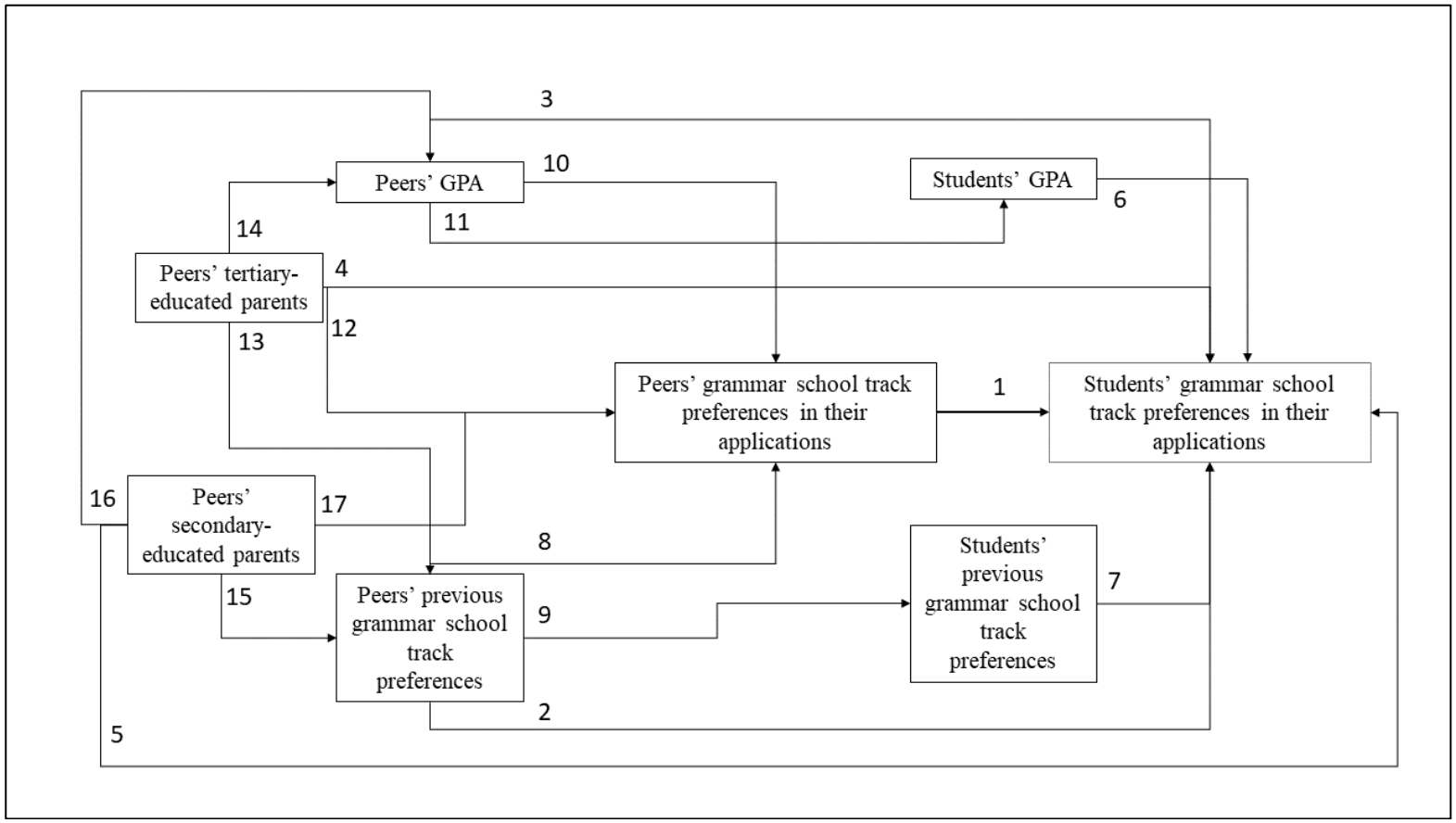
		Model 1		Model 5b		Model 5c	
		Stable friends	**Classmates wo stable friends**	**Stable friends**	**Classmates wo stable friends**	**All friends**	**Classmates wo all friends**
Path in Figure 6	**Peers' previous grammar school preferences**						
2	***Direct***	**-**	**-**	**1.69 (.43)*** **	-3.80 (1.97)	**1.13 (.57)***	.30 (1.14)
8+1	***Indirect through its effect on peers' grammar school track preferences in their applications***	-.53 (.29)	-1.50 (1.00)	**-1.64 (.38)*** **	**-2.62 (1.08)****	**-1.17 (.37)****	**-3.06 (.94)****
9+7	***Indirect through its effect on students' previous preferences for the grammar school track***	.03 (.39)	**1.78 (.42)*** **	.05 (.55)	**2.52 (.60)*** **	.59 (.47)	**1.47 (.62)***
	Peers' GPA						
3	***Direct***	**-**	**-**	**2.86 (.65)*** **	**3.81 (1.43)****	1.47 (.82)	**2.35 (.89)****
10+1	***Indirect through its effect on peers' grammar school track preferences in their applications***	-.52 (.29)	-1.56 (.82)	**-1.61 (.39)*** **	**-2.73 (.90)****	**-1.27 (.33)*** **	**-2.25 (.66)****
11+6	***Indirect through its effect on students' GPA***	**.99 (.20)*** **	.09 (.11)	**1.28 (.35)*** **	.17 (.19)	**1.55 (.35)*** **	.11 (.17)

Table 37 continued	**Peers' parental background: tertiary**						
4	***Direct***	-	-	-.87 (.46)	**-2.42 (1.16)***	-.36 (.42)	-.56 (.55)
12+1	***Indirect through its effect on friends' grammar school track preferences in their applications***	-.33 (.23)	-1.25 (.83)	**-1.02 (.35)****	**-2.17 (.91)***	**-.83 (.29)****	**-1.78 (.70)***
13+8+1	***Indirect through its effect on peers' previous grammar school track preferences and the effect of peers' previous grammar school preferences and peers' preferences in their applications***	-.29 (.17)	-1.08 (.76)	**-.89 (.26)****	**-1.88 (.83)***	**-.61 (.23)****	**-2.04 (.73)****
14+10+1	***Indirect through its effect on peers' GPA and the effect of peers' GPA and peers' preferences in their applications***	-.27 (.16)	-1.09 (.63)	**-.82 (.23)*****	**-1.90 (.70)****	**-.68 (.21)****	**-1.45 (.50)****
13+2	***Indirect through its effect on peers' previous grammar school track preferences***	-	-	**.91 (.23)*****	**-2.73 (1.30)***	**.59 (.28)***	.20 (.76)
14+3	***Indirect through its effect on peers' GPA***	-	-	**1.46 (.44)****	**2.65 (1.05)***	.78 (.47)	**1.51 (.61)***

Table 37 continued	**Peers' parental background: secondary**						
5	***Direct***	-	-	**-.99 (.33)****	**-5.50 (1.46)*****	**-.96 (.38)***	**-1.50 (.71)***
17+1	***Indirect through its effect on friends' grammar school track preferences in their applications***	.02 (.09)	.18 (.35)	.07 (.29)	.31 (.63)	.04 (.24)	-.04 (.50)
15+8+1	***Indirect through its effect on peers' previous grammar school track preferences and peers' preferences in their applications***	-.05 (.06)	-.03 (.18)	-.15 (.13)	-.05 (.31)	-.08 (.11)	-.09 (.25)
16+10+1	***Indirect through its effect on peers' GPA and peers' preferences in their applications***	-.11 (.08)	-.40 (.30)	**-.35 (.14)***	-.69 (.42)	-.25 (.12)*	-.60 (.31)
15+2	***Indirect through its effect on peers' previous grammar school track preferences***	-	-	.16 (.12)	-.08 (.44)	.07 (.10)	.01 (.04)
16+3	***Indirect through its effect on peers' GPA***			**.62 (.26)***	.96 (.57)	.29 (.20)	**.63 (.32)***

Notes. nlcom results from GSEM models. Standard errors in parentheses. * p < 0.05, ** p < 0.01, *** p < 0.001

Figure 7: Paths for direct and indirect effects in *Table 37*



Notes. Own edition.

7.5. Discussion

This study investigated whether students' educational preferences are associated with their friends' preferences, while also considering other factors such as friends' academic achievement, parental background, and the broader peer context. Generalized Structural Equation Models were used to analyse the effect of peers on adolescents' preferences for the grammar school track in their applications. The analysis also accounted for that friendship ties may be created or dissolved based on similarity in educational preferences.

The results indicated that students' own preferences for the grammar school track in their applications had a negative association with the share of friends and classmates who preferred the grammar school track in their applications. Meanwhile, there was a positive relationship between the share of stable friends who preferred the grammar school track in the year before secondary school applications and students' preferences in their applications. Thus, Hypothesis 1, regarding the positive association between students' and their friends' educational preferences, was only supported in relation to friends' previous educational preferences. Hypothesis 2, which suggests a similar association among classmates, was not supported by the present analysis beyond the unobserved heterogeneity across school classes. The study found that the relationship between students' preferences and the preferences of their peers for the grammar school track did not vary by students' different parental backgrounds.

The transmission of educational preferences may take a longer time, potentially explaining why students' preference for the grammar school track was affected by their friends' past grammar school preferences rather than their current preferences at the time of the applications. Thus, stable friendships seem to be able to promote competitive educational preferences. Nevertheless, the effect of stable friends' previous preferences was small compared to the negative effect of peers' preferences in their applications. Overall, the results did not provide sufficient support for the positive association between friends' educational preferences. This is partly in line with the results of a recent study that showed no direct positive effect of the secondary school track choices of friends on the choices of Hungarian adolescents (Keller, 2023).

The significant negative coefficients of peers' preferences for the grammar school track in their applications with the inclusion of school class fixed effects may be somewhat surprising. This could be partly explained by the fact that the unobserved heterogeneity between school classes is likely to be related to students' educational preferences. Moreover, the ambitious preferences of peers may be disheartening for students during the secondary school application process, as there is no longer an opportunity to improve their academic performance, but only to adjust their preferences.

Perceived societal constraints can set boundaries on individuals' ability to envision or hope for themselves, potentially limiting their desires (Tarabini and Curran, 2018). Therefore, individuals' aspirations and expectations tend to align according to those perceived constraints (Bohon, Johnson, and Gorman, 2006; Haller, 1968; Portes et al., 2010). Having more peers who aim for the most competitive grammar school track may indicate lower chances of getting into that program. This could discourage students from choosing it as their first preference.

A positive connection was found between the academic achievement of stable friends and classmates at the end of the school year preceding the applications and students' preferences for the grammar school track in their applications. Previous research on the relationship between the academic achievement of peers and students' educational preferences has yielded inconsistent results. Some studies have indicated a negative effect of the academic achievement of peers on educational preferences within the same school cohort (Jonsson and Mood, 2008; Rosenqvist, 2018), while others have found a positive effect for classmates within the same school (Smith, 2023). The present study indicates that the high achievement of close peers may promote ambitious educational options.

The generalizability of the present results may be limited because the initial sampling procedure aimed to include school classes with a wide range of ethnic compositions. Future studies replicating this investigation in other contexts and using different data could offer a solution for this limitation. Still, the study can provide insights into peer effects on educational preferences in settings in which less advantaged children are overrepresented. The study did not control for initial friendship selection based on educational preferences. Nonetheless, the presented results emphasise the role of the educational context in the study of peer effects suggesting that in contexts in which disadvantaged students are overrepresented, peers' high aspirations may be discouraging for students.

8. SUMMARY AND CONCLUSION

8.1. Summary of the Empirical Findings

The aim of this dissertation was to explore the influence of peers on educational aspirations in Hungarian primary schools. Aspirations have been used as a general term to investigate academic ambitions and preferences regarding secondary school education. This study aimed to expand on existing knowledge about the influence of peers, especially friends, on adolescents' aspirations. The dissertation focused on various aspects of educational aspirations and peer effects.

Table 38 provides a summary of the key results.

The empirical analyses were carried out on the second, fourth, fifth, and sixth waves of a panel study that consisted of six waves conducted by the Research Center for Educational and Network Studies (RECENS) between 2013 and 2017 with primary school students as participants. Chapter 5 utilised the fourth, fifth, and sixth waves, Chapter 6 used the second, fourth, and fifth waves, while Chapter 7 used the fifth and sixth waves of the study.

The dissertation explored the impact of peers on different measures of aspirations. Chapter 5 discussed students' academic goals, specifically their academic ambitions in two school subjects. Chapter 6, on the other hand, examined how students' preferences for their secondary school track evolved from fifth to seventh grade. Chapter 7 focused on students' preferences for the grammar school track when applying to secondary schools.

Among peer relationships, particular attention has been paid to the influence of friends among peers during adolescence (Berndt, 1992; Berndt and Savin-Williams, 1993; Brechwald and Prinstein, 2011). Hence, the dissertation mainly focused on friendship ties. The peer relations students experience in school, especially with those they spend a lot of time around, can also be fundamental to their growth. Therefore, besides friends, the effect of school classmates was also considered in Chapter 7.

The empirical studies featured in Chapter 5 and Chapter 6 directly addressed social influence and social selection issues. Using multilevel Stochastic Actor-Oriented Models, the studies separated the effects of social selection and social influence. In Chapters 5 and 6, the examination was limited to dyadic associations since Stochastic Actor-Oriented Models including group-level (school class-level) peer effects did not converge.

Chapter 5 focused on the co-evolution of friendship ties and academic ambitions over the course of sixth, seventh, and eighth grades. The analysis measured academic ambitions by assessing the grades students aspired to achieve in two important school subjects: mathematics and Hungarian literature. These subjects play a crucial role in students' future academic careers. Meanwhile, the

study distinguished the role of social influence and friendship selection based on academic ambitions and academic achievement.

Chapter 6 examined how students' preferences for secondary school tracks developed from the spring semester of fifth grade to the spring semester of seventh grade. The study investigated the influence of various characteristics of students' friends, such as their preferences, parental background, and academic achievement on students' secondary school track preferences. The study distinguished between the selection of friends and the influence of friends based on the abovementioned characteristics. Chapter 7 analysed whether students' preference for the grammar school track in their applications was linked to the preferences of their friends and classmates. Friendship selection was controlled for by focusing on stable friends within the observed period.

8.1.1. Empirical Results for Social Influence

The results related to the impact of peer influence on academic ambitions and preferences for secondary school tracks suggest that the way social influence works may vary depending on the specific measures of aspirations. The study in Chapter 5 demonstrated that changes in adolescents' academic ambitions were associated with their friends' ambitions. Over time, the students modified their academic ambitions in the two subjects to align more closely with those of their friends, although the *p*-value for mathematics slightly surpassed the accepted threshold. Nevertheless, the influence tables showed that the mechanisms underlying the tendency toward similarity were slightly different for the two school subjects. In Hungarian literature, the attractiveness of friends' high ambitions was more pronounced than that of low ambitions, while the opposite process could be observed for mathematics.

Chapter 6 results showed that the average preferences of friends did not have a direct positive effect on the formation of students' grammar school track preferences. The findings in Chapter 6 suggest that having friends who were more inclined towards the grammar school track did not benefit students in aligning their preferences with the grammar school track. Having friends who preferred the vocational secondary school track had a negative impact on students' own preferences for that track. The sign of the coefficients was also negative regarding grammar school track preferences, but the *p*-values were outside the accepted threshold.

Based on the findings in Chapter 7, there was a negative association between the grammar school track preferences of friends and classmates in their applications and the preferences of adolescents for the grammar school track in their applications. Meanwhile, the preferences of friends for the grammar school track in the school year before secondary school applications were found to have a positive but weaker correlation with adolescents' preferences for the grammar school track in their own applications. Thus, friends' 'lagged' (previous) preferences had a positive

association with students' preferences in their applications but only with friends' preferences in their applications also accounted for.

The influence of friends on the aspirations of adolescents could also originate from other qualities of friends, apart from their aspirations. According to the evidence presented in Chapter 6, the resources that the parents of friends can provide may influence whether adolescents develop preferences for the grammar school track. Having friends who have at least one parent with tertiary education level positively influenced students' preferences for the grammar school track. The results of this study demonstrate that parental background is a major factor in the decisions of students at this age. Subsequently, the impact of friends may be channelled through their parental resources, namely those of friends from more advantaged backgrounds.

Friends' academic achievement did not have a direct effect on students' academic ambitions or secondary school track preferences preceding the application period as shown in the empirical analyses in Chapters 5 and 6. In Chapter 7, the results revealed a direct positive connection between the academic achievement of stable friends and the preferences of adolescents for the grammar school track in their applications. Additionally, an indirect positive effect was observed through the effect of the academic achievement of stable friends on the academic achievement of students. Those results indicate that high-achieving friends may motivate students to strive for competitive options by setting academic norms that align with those options, while there was no indication of negative contrast effects in either of the studies.

The susceptibility to peer influence may be affected by individual attributes. Thus, the empirical studies in Chapters 6 and 7 assessed whether the effects of peers vary depending on the student's family background. According to the results, peer effects on students' aspirations did not vary by students' family background.

Although both focus on secondary school track preferences, the empirical results presented in Chapters 6 and 7 cannot be directly compared. They were evaluated using a specific methodological approach and slightly different subgroups that were appropriate for the research questions and outcome measures. Nevertheless, the results of the two studies both indicated that friends and classmates did not have a direct positive impact on adolescents' preferences for the academic-oriented secondary school track. Instead, it seemed that the preferences of friends had a negative impact on students' own preferences. Additionally, both studies showed that other characteristics of friends could affect students' preferences for the more academic-oriented secondary school track.

Nonetheless, an essential difference between the two studies was that before the last year of primary school, students could answer with the 'I don't know yet' category when asked about their

secondary school track preferences. When it came to applying for secondary school, one had to make a decision without the option of saying ‘I don’t know yet’.

8.1.2. Empirical Results for Social Selection

Turning to the contribution of academic attributes to friendship selection, results in Chapter 5 indicated that academic ambitions did not contribute to the creation, maintenance, or dissolution of friendship ties among Hungarian adolescents in either school subjects. Meanwhile, academic achievement in Hungarian literature seemed to be a salient and relevant attribute regarding friendship selection. Neither academic achievement nor academic ambitions in mathematics contributed to friendship selection.

Regarding secondary school track preferences in Chapter 6, students appeared to be more likely to form and maintain friendships with classmates who had similar track preferences indicating that educational advantages may be concentrated within these adolescent friendships (DiMaggio and Garip, 2012).

Nonetheless, one should be careful in assessing the social selection results because of the absence of ego effects in the selection part of SAOM. This is especially the case regarding the empirical analysis in Chapter 6 in which the effect measuring similarity directly included ego’s value. It can still be argued that distinguishing social selection and social influence processes in the models in Chapters 5 and 6 can still show whether adolescents tend to adjust their aspirations in response to their friends’ characteristics when the evolution of their networks are controlled for.

Table 38: Research questions and findings in the empirical chapters

Main research questions	Chapter 5	Chapter 6	Chapter 7
Do peers affect adolescents' educational aspirations?	Adolescents tend to adjust their academic ambitions in Hungarian literature and mathematics to their friends' academic ambitions	No direct positive effect Having friends with highly educated parents has a positive effect students' grammar school aspirations	Friends' preferences in their applications have a negative effect on students' grammar school track preferences, previous preferences have a positive effect when considered together with preferences in applications
Does social selection, social influence, or both contribute to friends' similar educational aspirations?	Social influence contributes to similar aspired grades in both school subjects Academic ambitions do not contribute to friendship selection	Students tend to select friends on the basis of grammar or vocational secondary school track preferences, but the results are inconclusive because of the lack of ego effects Social influence contributes to dissimilarity	-
Do academic achievement, educational aspirations, or both contribute to friendship selection?	Academic achievement contributes to friendship selection in Hungarian literature Academic ambitions do not play a role in friendship selection Those effect should be interpreted with caution		-
Do peer effects on educational aspirations vary by students' parental backgrounds?	-	No	No

8.2. Main Scientific Contributions of the Study

Following an overview of the empirical chapters, the central research questions and the scientific contribution of the dissertation are discussed. The main objective of this dissertation was to examine the dynamics of friendship selection and influence on aspirations, considering the different ways in which peers can impact aspirations. This dissertation advances prior research in numerous

ways. In Chapter 5 and 6 of the dissertation, Stochastic Actor-Oriented Models were employed to distinguish between social influence and social selection when examining aspirations. As standard statistical models cannot capture the dependencies within networks, the estimates they would provide in regard to the impact of friends on aspirations would be biased.

Previously, only a few studies applied SAOM for analysing friends' influence on educational aspirations while taking the possible confounding effect of friendship selection into account (e.g., Kretschmer and Roth, 2021; Lorenz et al., 2020; Mundt and Mundt, 2020). None of those studies concentrated on primary school students. Nevertheless, in stratified educational systems, exposure to peers before tracking may be particularly relevant because tracks are typically composed of individuals with similar academic achievement and parental backgrounds (Shavit and Blossfeld, 1993).

In addition, the studies examined how social influence may differ regarding various indicators of aspirations and how various attributes of peers, such as their aspirations, parental background, and academic achievement, may affect students' own aspirations. The various measures of aspirations used in the studies had different relationships with subsequent educational accomplishments. The dissertation revealed that the influence of peers on the examined measures of aspirations varied. Moreover, the importance of different measures of aspirations and academic achievement seemed to vary in the friendship selection process.

By focusing only on one measure of aspirations, the dissertation may have missed the role that different aspiration measures play in selecting friends and the various ways in which peers can influence different aspirations. The next section will discuss the theoretical implications of different aspiration measures yielding dissimilar results for selection and influence.

The empirical analysis in Chapter 7 further differentiated between the influence of friends' attributes and classmates' attributes. This analysis showed the importance of distinguishing between individual friendships and peer relationships in the broader context.

Still, some findings remain open to further investigations. Future research in this area could provide insights into how students access the resources of their peers' parents. To what extent do parents share information with their children's friends and the parents of their children's friends? And how does this information flow from parents through their children to the children of their friends?

In addition, it is important to conduct further investigation on the conditions under which friends' educational preferences, particularly their preference for the most academically-oriented track, can discourage students from expressing similar preferences. Future research could explore the concepts that students associate with success in different school subjects to gain greater insight into their impact on the friendship selection.

8.3. Theoretical Implications

The present dissertation revealed that social networks may have an impact on students' educational aspirations. The results implied that peer influence on academic outcomes may be conveyed through various mechanisms. The type of aspiration indicators examined had different conclusions regarding social influence.

In Chapters 5 and 6, the empirical analyses examined whether students adjusted their aspirations to align with those of their friends. The studies also differentiated between social influence and social selection processes. The empirical results from Chapter 5 showed that adolescents' academic ambitions were impacted by their friends' academic ambitions. There was a tendency in Hungarian literature and mathematics to align one's ambitions with those of one's friends, although in the case of mathematics, *p*-values slightly exceeded the accepted thresholds.

While the high ambitions of friends were more appealing than their low ambitions in Hungarian literature, the attractiveness of the low or moderate ambitions of friends appeared to be the reason for the influence on academic ambitions of friends in mathematics. Those findings highlight that academic motivation is a domain-specific construct not only at the individual level but also with regard to social influence.

Regarding students' secondary school track preferences (Chapter 6), there was no direct positive influence of friends' preferences on students' grammar school track preferences. The influence of friends was somewhat indirect, being linked to the resources of their parents. The results of the empirical analysis in Chapter 6 demonstrated that having access to external parental capital, particularly having friends from affluent backgrounds, could have an effect on secondary school track preferences.

The study in Chapter 6 emphasises the importance of schools as social institutions where social networks can influence academic outcomes (e.g., Coleman, 1988). These findings are consistent with previous results that implied that educated parents have more interest in the academic track and are more familiar with the educational system. Therefore, more educated parents are often believed to have an information advantage, which could influence the attitudes and choices of other parents or students (e.g., Carolan and Lardier, 2018; Cherng, Calarco, and Kao, 2013; Coleman, 1988; Crosnoe, 2004; GVI, 2020a).

The results from Chapter 5 and Chapter 6 suggest that the influence of friends' aspirations on aspirations may be more substantial for academic outcomes which are specific to the immediate school environment, or which have a more immediate impact. When students aim for a specific grade, they tend to have a better understanding of what is attainable and how to achieve their goals, compared to when they choose a secondary school track.

The empirical analysis in Chapter 7 examined students' preferences for the grammar school track in students' secondary school applications accounting for classmates' effect as well as the creation and dissolution of friendship ties in the observed one-year period. Somewhat surprisingly, the applications that were preferred by friends were negatively related to the applications that were favoured by students.

Combining the results of Chapters 6 and 7, there was a negative relationship between students' preferences for the grammar school track their peers' preferences, although the *p*-values exceeded the set thresholds in the SAOM in Chapter 6. This opposes some previous research that suggested the positive influence of peers on educational preferences (e.g., Kretschmer and Roth, 2021; Raabe and Wölfer, 2019; Rosenqvist, 2018).

This unexpected negative relationship in the current research could be attributed to the slightly different focus of the present study. Several previous studies (e.g., Kretschmer and Roth, 2021; Raabe and Wölfer, 2019) have examined the influence of peers on distant educational aspirations, specifically the highest level of education individuals aim to achieve. When considering long-term educational outcomes, students do not need to consider the availability of specific seats. Meanwhile, when considering the type of secondary school they prefer, students may be more influenced by the availability of seats and their perception of the likelihood of being admitted to different types of education.

Perceived constraints can create barriers which can prevent individuals from having aspirations or dreams for themselves (Tarabini and Curran, 2018). Individuals tend to adjust their aspirations and expectations to perceived constraints (Bohon, Johnson, and Gorman, 2006; Haller, 1968; Portes et al., 2010).

Students may consider the likelihood of being accepted into different programs and form their own preferences in contrast to those of their friends. This may be especially true in the context of the present study in which disadvantaged schools are overrepresented. As the deadline for secondary school applications approaches, the time available for preparation and the application process decreases. During this period, instead of transmitting norms and values, friends and classmates may influence students' beliefs about their chances of being accepted into various programs. Additionally, the inclination toward dissimilarity may also result from the distinction between already preferring a certain track or not developing established preferences.

The grammar school preferences of friends in the year leading up to the applications were positively correlated with the preferences of the students in their applications, when including the preferences of their friends in their applications. In the year before applying to secondary school, discussions about choosing a school may become more frequent, allowing enough time for preparations to be made. It is possible that this explains why there was a positive connection

between the choices students made in their applications and the previous preferences of their stable friends. Nevertheless, those effects were not nearly as strong as the negative effect of friends' preferences in their applications. It is important to note that previous preferences had a strong correlation with preferences in the applications. Therefore, the positive impact of previous preferences could be overshadowed by the negative impact of preferences in the applications.

Students' preferences in their applications for the highly competitive grammar school program were affected by the academic achievement of their stable friends and classmates. This suggests that students were more likely to pursue the challenging track if their peers had high academic achievement. Thus, this shows that friends can set academic standards for adolescents through their academic achievement and this result contributes to competing evidence regarding the negative contrast effect or positive effect of peers' academic achievement on students' aspirations (Jonsson and Mood, 2008; Rosenqvist, 2018; Smith, 2023).

Overall, the results of the three empirical chapters showed that friends' influence was most straightforward regarding academic ambitions for school grades in the next school report. Thus, friends' aspirations in primary school may have a positive effect on proximate educational outcomes as well as on outcomes that are not limited by the number of students that can reach them. In Hungary, the practice of 'grading on a curve' is not common, so there is no need for friends to compete with each other to achieve good grades. In such scenarios, adolescents may be more likely to conform to their friends' ambitions. At the same time, students from the same cohort are all applying for the same number of secondary school seats. As a result, they may strategically adjust their preferences based on their chances of getting admitted, taking into consideration their friends' preferences.

When the application period for secondary school is far away, students may not be as involved in the decision-making process regarding their options for secondary school as their parents. As a result, friends may indirectly influence each other's preferences through the resources of their parents. These results are in line with previous studies that highlight the importance of schools in individuals' educational careers beyond formal education (e.g., Coleman, 1988; Crosnoe, 2004).

Parents with tertiary education may invest more time into secondary school choice many years before the application stage. With greater material and immaterial resources, parents with high education level typically have more involvement in and knowledge about educational matters (GVI, 2020a; Lareau, 2011), and thus, may affect the preferences of other students than their children.

It is important to point out, however, the methodological differences between the studies in Chapters 6 and 7. The behaviour component of SAOM, as applied in Chapter 6, examines whether

changes in individuals' behaviour, specifically their preferences for grammar school track and vocational secondary school track, can be attributed to changes in the behaviour of their friends. Whereas the analysis in Chapter 7 focused on a cross-sectional outcome instead of change.

The empirical results presented in the dissertation suggest that educational aspirations can sometimes be the foundation for friendship ties. Chapter 5 indicated that academic aspirations in Hungarian literature and mathematics did not contribute the process of selecting friends. The results in Chapter 6 indicate that the development of secondary school track preferences may contribute to the friendship selection process within primary school classes. This is important because the clustering of educational preferences in social networks can strengthen preexisting inequalities (DiMaggio and Garip, 2012). The findings of this investigation align with previous studies that suggested a link between adolescents' post-secondary educational expectations and friendship selection (Kretschmer and Roth, 2021; Lorenz et al., 2020; Mundt and Mundt, 2020). This could be attributed to the visibility of behaviours related to the development of school preferences.

Secondary school preferences may contribute to the creation and maintenance of friendship ties through several processes. To make an informed decision about the secondary school track, thorough information gathering, and assessment is needed during the last school years of primary education. Interacting with other people can be a vital element in collecting and assessing information. By sharing information and expressing their perspectives, students can make their preferences clear.

Aspirations inspire individuals to strive for their goals (Trebbels, 2015), and this can lead to visible behaviours, such as putting in the effort to achieve the academic results necessary to accomplish those goals. Students preparing for competitive secondary schools often exhibit behaviours that are academically driven, such as completing their homework, exhibiting good conduct, and participating actively in class.

Academic achievement but not ambitions in Hungarian literature (Chapter 5) affected the selection of friends among Hungarian adolescents in the sample. This finding supports previous studies that indicated academic achievement can be an important characteristic that indicates other desirable traits to peers, ultimately leading to the formation of friendships (Lomi et al., 2011; Torlò and Lomi, 2017).

Based on the assumption that observable attributes can contribute to friendship selection (de Klepper et al., 2010; van Duijn et al., 2003), it can be supposed that academic achievement in Hungarian literature is a salient attribute for peers within the classroom and can contribute to the friendship selection process. There is a more direct relationship between academic ambitions and academic achievement in certain school subjects than between academic achievement and

preferences for the secondary school track. Therefore, there may be salient behaviour indications related to both academic achievement and academic ambitions and the former attribute being easier to observe for peers, may overshadow friendship selection on the basis of similar ambitions.

It has been observed that students' reading proficiency in school is associated with certain individual behaviours and attributes such as their enjoyment of reading during free time (Wigfield, 1997) or their parental background (Rogiers, Van Keer, and Merchie, 2020). These characteristics may be signalled through language style and cultural differences. The salience of academic achievement in Hungarian literature may be related to the phenomenon that academic achievement in Hungarian literature is related to language skills and language usage, attributes that may signal other characteristics relevant to friendship selection (e.g., family background).

It is important, however, to approach the findings on social selection with caution due to the absence of ego effects in the models. These models are still able to control for the overall role of friendship selection in the similarity of friends' aspirations and report social influence effects that are distinguished from social selection. Nonetheless, the reported similarity effects in the social selection part of the models (measured with either the simX or egoXaltX effects) may be biased with the exclusion of the egoX effects.

Overall, the empirical studies in the dissertation suggest that the proximity of the outcomes that the aspiration metrics measure, as well as students' own agency in the matter, may leave more room for students to adjust their aspirations in response to their friends' aspirations. The academic ambitions for the next evaluation period in two school subjects have a limited time frame: the upcoming school report. Academic ambitions in different subjects vary within the school setting and can be pursued without any limitation, as there are no restrictions on the number of grades a teacher can assign to their students. Meanwhile, secondary school preferences concern a more distant outcome for several years.

Students may be less invested in this issue prior to the application period, and this might be the reason why friends had an indirect positive effect on students' preferences for the grammar school track through their affluent backgrounds. Moreover, there are external factors that are unrelated to a student's academic performance but can still impact their placement in secondary school. For example, the availability of school places in a particular area can influence the options available to students. This could be a contributing factor to why friends often end up having different preferences.

8.4. Implications for Social Policy

Peer effects are important to consider when evaluating educational interventions. This is because educational policies and programs can have a multiplier effect, where the impact of an intervention

on one person can spread to others (Glaeser, Sacerdote and Scheinkman, 2003). Adolescents tend to spend more time with their peers and friends compared to earlier stages of life (e.g., Berndt 1992; Berndt and Savin-Williams 1993). Hungarian primary school students are assigned to fixed class compositions and spend a significant amount of their time with their classmates. They often develop friendships with some of them. Students in the same class have the opportunity to observe each other's academic behaviour and to communicate their goals and plans.

The results of the dissertation indicate that primary school students in Hungary can be directly influenced by their friends when it comes to their academic ambitions in school subjects. This suggests that interventions aimed at influencing students' aspirations through their peers may be more successful if they focus on outcomes within the school environment rather than targeting aspirations for external institutions. Adolescents have greater control over their academic achievement and the goals they set for themselves in terms of their grades, as opposed to the selection of secondary schools. Future interventions should consider how students' interactions with their peers affect their aspirations and motivation in the school environment. Those aspirations can benefit students' further educational careers if they achieve higher grades because of their elevated aspirations.

Moreover, it is important to consider that the influence of peers on students' aspirations varies depending on the specific domain. While students may be attracted to the high ambitions of their friends in one academic field, they may be more inclined to align themselves with their friends' less ambitious goals in another academic field. This is supported by the varying influence processes observed in Hungarian literature and mathematics. Interventions could address this issue by targeting specific obstacles to student motivation in specific domains, utilising peer influence as a means of support.

Because the parental background of friends can impact students' adjustment to their secondary school preferences before the application process, it is important for educational institutions to assist students in forming friendships with peers from diverse backgrounds. When friendship ties emerge in the classroom setting, initial homogeneity in the class context could contribute to the homophily of friendship ties (Feld, 1982; Manski, 1993; McPherson and Smith-Lovin, 1987). This is a crucial issue in the Hungarian educational system in which primary schools and primary school classes are characterized by segregation based on students' family and ethnic backgrounds (Kertesi and Kézdi, 2005; Kertesi and Kézdi, 2009).

Reducing segregation in the school system based on students' socioeconomic background could have a positive impact on the aspirations of students from disadvantaged families. This is because they would have the opportunity to access educational advantages through their peers that would otherwise be unavailable to them.

Nonetheless, friendships can be segregated even within diverse class assignments (Dollmann and Rudolphi, 2020). Therefore, heterogeneity within school classes can only help reduce educational inequalities if there is also support for the formation of diverse friendship connections. One way for teachers to address how students can influence each other is by implementing seating assignments (Keller and Takács, 2019). Further, peers who are near in age to students but come from a different social context are underutilised tools in mentoring. Nevertheless, there is evidence that when secondary school students are randomly assigned to serve as near-peer mentors, it can enhance the academic motivation of their mentees in the eighth grade of primary school (Destin, Castillo and Meissner, 2018). Therefore, encouraging the development of peer relationships like this could be beneficial for the educational outcomes of disadvantaged students.

Overall, interventions that aim to influence students' aspirations through their peers could be more effective if they focus on school-related outcomes that students have direct control over. Nevertheless, the characteristics of the institutional context play an important role in providing opportunities for social influence in general. If students are not able to interact with peers from diverse family backgrounds, they will miss out on the benefits of leveraging their peers' parental resources. If students from disadvantaged backgrounds are provided with accurate information about the opportunities available to them and have a belief in social mobility, they may be more motivated to pursue higher goals (Browman, Svoboda, and Destin, 2022; Destin and Oyserman, 2009; Keller, Takács, and Elwert, 2021). Yet, it is essential to emphasise that increasing aspirations without providing the necessary supportive resources to reach them can not sufficiently support the educational mobility of students from less advantaged backgrounds (Destin, 2020; St. Clair, Kintrea and Houston, 2013).

8.5. Limitations

The empirical analyses presented in the dissertation are based on a sample that is not representative of Hungarian primary school students. Students from schools with a higher proportion of Roma students compared to the overall population of Hungarian primary school students are overrepresented in the sample. Moreover, there were sample restrictions made for applying random coefficient SAOM. Therefore, the generalizability of the results is limited.

Nevertheless, the results can shed light on peer influence and selection mechanisms in educational contexts where students often lack critical educational resources at home. Therefore, the resources such as academic norms, role models, or information they can reach through their peers can have a notable effect on their educational careers.

An additional limitation is that the ego effects did not converge and were therefore removed from the models in Chapters 5 and 6. This could potentially affect the similarity effects (egoXaltX

and simX). Nonetheless, by including similarity effects, the models were still able to control for social selection.

By distinguishing between stable friends in the observed one-year period and friends in general, the empirical analysis in Chapter 7 partially accounted for friendship selection. However, it cannot be asserted that the previous creation and dissolution of friendship ties were not affected by the similarity in aspirations. Nonetheless, the results showed whether there was a similarity in grammar school preferences among friends, taking into account the selection of friendships in the last year of primary school.

8.6. Direction for Future Research

The results presented in Chapter 5 indicated that academic achievement in mathematics and Hungarian literature played different roles in the friendship selection process. Nevertheless, the mechanisms underlying this phenomenon have yet to be fully uncovered, and future studies should aim to clarify this. It is still unclear how students assess the academic performance of their friends in different subjects, and whether the academic performance in various subjects is related to factors that may be relevant to choosing friends, such as parental background and intelligence.

Adolescents' preferences for the academic-oriented track appeared to be influenced by their friends who have at least one parent with a tertiary-level qualification. Still, the dissertation cannot determine whether the resources were transferred from parents of friends to their own children and then shared with students, or if they were directly passed from parents of friends to parents of students. Therefore, it is important to further investigate the role that the parents of their friends play in the development of educational outcomes of adolescents.

Moreover, the results indicate that when students have more friends who prefer grammar school track in their applications, it can negatively impact the development of their own grammar school track preferences. Despite this, the exact mechanisms of this phenomenon are still unclear and warrant further exploration. For instance, it could be that the deteriorating effect is related to the availability of secondary schools in the neighbourhood. This could indicate how competitive admissions to the specific secondary school tracks are. There have been significant changes made to vocational and vocational secondary education since the data collection. For example, scholarships are now available for students in vocational or vocational secondary education. These reforms could be crucial in changing the role that social influence mechanisms have in shaping the preferences for secondary school tracks. Future studies could address this issue specifically.

REFERENCES

2011. évi CXC. törvény a nemzeti köznevelésről. (2011.12.29.).

Abrams, D. and Hogg, M.A. (1990) 'Social Identification, Self-Categorization and Social Influence', *European Review of Social Psychology*, 1(1), pp. 195–228. doi:10.1080/14792779108401862.

Abu-Hilal, M.M. (2000) 'A Structural Model of Attitudes Towards School Subjects, Academic Aspiration and Achievement', *Educational Psychology*, 20(1), pp. 75–84. doi:10.1080/014434100110399.

Alexander, C.N. and Campbell, E.Q. (1964) 'Peer Influences on Adolescent Educational Aspirations and Attainments', *American Sociological Review*, 29(4), pp. 568-575. doi:10.2307/2091205.

Altermatt, E.R. and Pomerantz, E.M. (2003) 'The development of competence-related and motivational beliefs: An investigation of similarity and influence among friends.', *Journal of Educational Psychology*, 95(1), pp. 111–123. doi:10.1037/0022-0663.95.1.111.

Altermatt, E.R. and Pomerantz, E.M. (2005) 'The Implications of Having High-achieving Versus Low-achieving Friends: A Longitudinal Analysis', *Social Development*, 14(1), pp. 61–81. doi:10.1111/j.1467-9507.2005.00291.x.

Alwin, D.F. and Otto, L.B. (1977) 'High School Context Effects on Aspirations', *Sociology of Education*, 50(4), pp. 259-273. doi:10.2307/2112499.

Andor, M. (2003) 'Gimnáziumok rekrutációja', *Magyar pedagógia*, 103(3), pp. 315–338.

Andor, M. (2005) 'A középiskola-választás sikeressége', *Iskolakultúra*, (8), pp. 18–28.

Andor, M. and Liskó, I. (2000) *Iskolaválasztás és mobilitás*. Budapest: Iskolakultúra.

Angrist, J.D. (2014) 'The perils of peer effects', *Labour Economics*, 30, pp. 98–108. doi:10.1016/j.labeco.2014.05.008.

Appadurai, A. (2004) 'The Capacity to Aspire: Culture and the Terms of Recognition', in Rao, V. and Walton, M. (eds.) *Culture and Public Action*. Stanford: Stanford University Press, pp. 59-84.

Archer, L., Hollingworth, S. and Mendick, H. (2010) *Urban youth and schooling: the experiences and identities of educationally 'At Risk' young people*. Maidenhead: Open University Press.

Ball, S.J. and Vincent, C. (1998) '"I Heard It on the Grapevine": 'hot' knowledge and school choice', *British Journal of Sociology of Education*, 19(3), pp. 377–400. doi:10.1080/0142569980190307.

Bandura, A., Barbaranelli, C., Caprara, G. V. and Pastorelli, C. (2001) 'Self-Efficacy Beliefs as Shapers of Children's Aspirations and Career Trajectories', *Child Development*, 72(1), pp. 187–206. doi:10.1111/1467-8624.00273.

Barone, C. (2006) 'Cultural Capital, Ambition and the Explanation of Inequalities in Learning Outcomes: A Comparative Analysis', *Sociology*, 40(6), pp. 1039–1058. doi:10.1177/0038038506069843.

Barron, K.E. and Hulleman, C.S. (2015) 'Expectancy-Value-Cost Model of Motivation', in Wright, J.D. (ed.) *International Encyclopedia of the Social & Behavioural Sciences*. Amsterdam: Elsevier, pp. 503–509.

Bazsalya, B. and Hörich, B. (2021) 'Iskolák közötti egyenlőtlenségek alakulása 2010 után', *Educatio*, 29(3), pp. 425–448. doi:10.1556/2063.29.2020.3.7.

Becker, D. (2013) 'The impact of teachers' expectations on students' educational opportunities in the life course: An empirical test of a subjective expected utility explanation', *Rationality and Society*, 25(4), pp. 422–469. doi:10.1177/1043463113504448.

Becker, R. (2003) 'Educational Expansion and Persistent Inequalities of Education: Utilizing Subjective Expected Utility Theory to Explain Increasing Participation Rates in Upper Secondary School in the Federal Republic of Germany', *European Sociological Review*, 19(1), pp. 1–24. doi:10.1093/esr/19.1.1.

Belinszki, B., Szepesi, I., Takácsné, J. K. and Vadász, C. (2020) *Országos Kompetenciamérés 2019 – Országos jelentés*. Budapest: Oktatási Hivatal. Available at: https://www.oktatas.hu/pub_bin/dload/kozoktatas/meresek/orszmer2019/Orszagos_jelentes_2019.pdf (Accessed: 5 September 2021).

Berényi, E., Berkovits, B. and Erőss, G. (2008) 'Iskolarendszer és szabad választás', in Berényi, E., Berkovits, B., and Erőss, G. (eds.) *Az iskolába rendezett gyerek– kiváltság és különbségtétela a közoktatásban*. Budapest: Gondolat Kiadó, pp. 11-22.

Berndt, T.J. (1992) 'Friendship and Friends' Influence in Adolescence', *Current Directions in Psychological Science*, 1(5), pp. 156–159. doi:10.1111/1467-8721.ep11510326.

Berndt, T.J. and Savin-Williams, R.C. (1993) 'Peer Relations and Friendships', in Tolan, P.H. and Cohler, B.J. (eds.) *Handbook of Clinical Research and Practice with Adolescents*. New York: John Wiley & Sons, pp. 203-219.

Block, P. (2015) 'Reciprocity, transitivity, and the mysterious three-cycle', *Social Networks*, 40, pp. 163–173. doi:10.1016/j.socnet.2014.10.005.

Bocskor, Á. (2021) 'Reputational Status Dynamics from a Mixed Methods Perspective: Coolness and Popularity in a Hungarian Primary School Sample', *Youth & Society*, 0044118X2110128. doi:10.1177/0044118X211012815.

Bocskor, Á. and Havelda, A. (2020) 'Status Dynamics: Popularity and Acceptance in an Ethnically Diverse Hungarian Primary School Sample', *Intersections*, 5(4), pp. 110-138. doi:10.17356/ieejsp.v5i4.581.

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

Boda, Zs. (2019) 'Friendship Bias in Ethnic Categorization', *European Sociological Review*, 35(4), pp. 567–581. doi:10.1093/esr/jcz019.

Boda, Zs. and Néray, B. (2015) 'Inter-ethnic friendship and negative ties in secondary school'. *Social Networks*, 43, pp. 57–72. doi: 10.1016/j.socnet.2015.03.004.

Boda, Zs., Néray, B. and Snijders, T.A.B. (2020) 'The Dynamics of Interethnic Friendships and Negative Ties in Secondary School: The Role of Peer-Perceived Ethnicity', *Social Psychology Quarterly*, 83(4), pp. 342–362. doi:10.1177/0190272520907594.

Bodovski, K. and Farkas, G. (2008) ''Concerted cultivation' and unequal achievement in elementary school', *Social Science Research*, 37(3), pp. 903–919. doi:10.1016/j.ssresearch.2008.02.007.

Bohon, S.A., Johnson, M.K. and Gorman, B.K. (2006) 'College Aspirations and Expectations among Latino Adolescents in the United States', *Social Problems*, 53(2), pp. 207–225. doi:10.1525/sp.2006.53.2.207.

Bottrell, D. (2009) 'Dealing with Disadvantage: Resilience and the Social Capital of Young People's Networks', *Youth & Society*, 40(4), pp. 476–501. doi:10.1177/0044118X08327518.

Boudon, R. (1974) *Education, opportunity, and social inequality: changing prospects in Western society*. New York: John Wiley & Sons.

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

Bourdieu, P. (2002) The Forms of Capital. In: Biggart, N.W. (ed.): *Readings in Economic Sociology*. Malden MA: Blackwell Publishers Ltd., pp. 280-291.

Bourdieu, P. and Passeron, J.-C. (1977). *Reproduction in education, society and culture*. London: Sage.

Boyle, R.P. (1966) 'The Effect of the High School on Students' Aspirations', *American Journal of Sociology*, 71(6), pp. 628–639. doi:10.1086/224220.

Brechwald, W.A. and Prinstein, M.J. (2011) 'Beyond Homophily: A Decade of Advances in Understanding Peer Influence Processes: Beyond Homophily', *Journal of Research on Adolescence*, 21(1), pp. 166–179. doi:10.1111/j.1532-7795.2010.00721.x.

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

Bronfenbrenner, U. and Morris, P.A. (2006) 'The Bioecological Model of Human Development', in Damon, W. and Lerner, R.M. (eds.) *Handbook of Child Psychology*. Sixth Edition. Hoboken, NJ: John Wiley & Sons, pp. 793-828.

Brooks, R. (2005) *Friendship and educational choice: peer influence and planning for the future*. Hampshire; New York: Palgrave Macmillan.

Browman, A.S., Svoboda, R.C. and Destin, M. (2022) 'A belief in socioeconomic mobility promotes the development of academically motivating identities among low-socioeconomic status youth', *Self and Identity*, 21(1), pp. 42–60. doi:10.1080/15298868.2019.1664624.

Brown, B.B. (2004) 'Adolescents' Relationships with Peers', in Lerner, R.M. and Steinberg, L. (eds.) *Handbook of Adolescent Psychology*. New York: John Wiley & Sons, pp. 363-394.

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

Brown, B.B. and Larson, J. (2009) 'Peer Relationships in Adolescence', in Lerner, R.M. and Steinberg, L. (eds.) *Handbook of Adolescent Psychology*. New York: John Wiley & Sons, pp. 74–103.

Brown, B. B., Mounts, N., Lamborn, S. D. and Steinberg, L. (1993) 'Parenting Practices and Peer Group Affiliation in Adolescence', *Child Development*, 64(2), pp. 467–482. doi:10.2307/1131263.

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

Bukodi, E., Goldthorpe, J.H. and Zhao, Y. (2021) 'Primary and secondary effects of social origins on educational attainment: New findings for England', *The British Journal of Sociology*, 72(3), pp. 627–650. doi:10.1111/1468-4446.12845.

Bullock, J.G. and Ha, S.E. (2011) 'Mediation Analysis Is Harder Than It Looks', in Druckman, J.N. et al. (eds.) *Cambridge Handbook of Experimental Political Science*. Cambridge: Cambridge University Press, pp. 508–522. doi:10.1017/CBO9780511921452.035.

Burgess, L., McNabb, C. B., FitzGibbon, L., Mulligan, N., Fancourt, A., Riddell, P. and Murayama, K. (2020) *Friendship networks and academic motivation: A longitudinal investigation examining selection and influence processes in adolescents*. preprint. Open Science Framework. doi:10.31219/osf.io/ck9y4.

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

Department of Economics, University of Bristol. Available at: http://www.bristol.ac.uk/cmpo/publications/papers/2011/wp271.pdf (Accessed: 5 September 2021).

Cairns, R., Xie, H. and Leung, M.-C. (1998) 'The popularity of friendship and the neglect of social networks: Toward a new balance', *New Directions for Child and Adolescent Development*, 1998(81), pp. 25–53. doi:10.1002/cd.23219988104.

Carolan, B.V. (2018) 'Friends' plans for college and adolescents' educational expectations: an instrumental variable approach', *International Journal of Adolescence and Youth*, 23(3), pp. 334–346. doi:10.1080/02673843.2017.1371615.

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

Castellani, M., Di Giovinazzo, V. and Novarese, M. (2010) 'Procedural Rationality and Happiness', *The Journal of Socio-Economics*, 39(3), pp. 376–383. doi:10.1016/j.socec.2009.11.004.

Cheadle, J.E. and Amato, P.R. (2011) 'A Quantitative Assessment of Lareau's Qualitative Conclusions About Class, Race, and Parenting', *Journal of Family Issues*, 32(5), pp. 679–706. doi:10.1177/0192513X10386305.

Cheema, J.R. (2018) 'Adolescents' enjoyment of reading as a predictor of reading achievement: new evidence from a cross-country survey: Enjoyment of Reading and Reading Achievement', *Journal of Research in Reading*, 41, pp. 149–162. doi:10.1111/1467-9817.12257.

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

Choi, K. H., Raley, R. K., Muller, C. and Riegle-Crumb, C. (2008) 'Class Composition: Socioeconomic Characteristics of Coursemates and College Enrollment', *Social Science Quarterly*, 89(4), pp. 846–866. doi:10.1111/j.1540-6237.2008.00587.x.

Chow, A., Kiuru, N., Parker, P. D., Eccles, J. S. and Salmela-Aro, K. (2018) 'Development of Friendship and Task Values in a New School: Friend Selection for the Arts and Physical Education but Socialization for Academic Subjects', *Journal of Youth and Adolescence*, 47(9), pp. 1966–1977. doi:10.1007/s10964-018-0894-6.

Chowdry, H., Crawford, C. and 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). doi:10.14301/llcs.v2i1.141.

Cohen, J.M. (1977) ‘Sources of Peer Group Homogeneity’, *Sociology of Education*, 50(4), p. 227. doi:10.2307/2112497.

Cohen, J.M. (1983) ‘Peer Influence on College Aspirations with Initial Aspirations Controlled’, *American Sociological Review*, 48(5), pp. 728-734. doi:10.2307/2094931.

Coleman, J. S. (1961) *The Adolescent Society: The Social Life of the Teenager and its Impact on Education*. New York: Free Press.

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

Collins, W.A. and Laursen, B. (2004) ‘Parent-Adolescent Relationships and Influences’, in Lerner, R.M. and Steinberg, L. (eds.) *Handbook of Adolescent Psychology*. New York: John Wiley & Sons, pp. 331-361.

Cook, T.D., Deng, Y. and Morgano, E. (2007) ‘Friendship Influences During Early Adolescence: The Special Role of Friends’ Grade Point Average’, *Journal of Research on Adolescence*, 17(2), pp. 325–356. doi:10.1111/j.1532-7795.2007.00525.x.

Crosnoe, R. (2004) ‘Social Capital and the Interplay of Families and Schools’, *Journal of Marriage and Family*, 66(2), pp. 267–280. doi:10.1111/j.1741-3737.2004.00019.x.

Crosnoe, R., Cavanagh, S. and Elder, G.H. (2003) ‘Adolescent Friendships as Academic Resources: The Intersection of Friendship, Race, and School Disadvantage’, *Sociological Perspectives*, 46(3), pp. 331–352. doi:10.1525/sop.2003.46.3.331.

Cunha, F. (2015) ‘Subjective Rationality, Parenting Styles, and Investments in Children’, in Amato, P.R. et al. (eds.) *Families in an Era of Increasing Inequality*. Cham: Springer International Publishing (National Symposium on Family Issues), pp. 83–94. doi:10.1007/978-3-319-08308-7_6.

David-Kacso, A., Haragus, P.T. and Roth, M. (2014) ‘Peer Influences, Learning Experiences and Aspirations of Romanian High School Students in their Final School Year’, *Procedia - Social and Behavioural Sciences*, 141, pp. 200–204. doi:10.1016/j.sbspro.2014.05.035.

Davies, M. and Kandel, D.B. (1981) ‘Parental and Peer Influences on Adolescents’ Educational Plans: Some Further Evidence’, *American Journal of Sociology*, 87(2), pp. 363–387. doi:10.1086/227462.

DeMoss, K. (2013) ‘Educational Aspirations/Expectations’, in Ainsworth, J., *Sociology of Education: An A-to-Z Guide*. Thousand Oaks, CA: SAGE Publications, Inc., pp. 222–224. doi:10.4135/9781452276151.n124.

Destin, M. (2020) ‘The Double-Edged Consequences of Beliefs about Opportunity and Economic Mobility’, *The Future of Children*, 30(1), pp. 153–163. doi:10.1353/foc.2020.0001.

Destin, M., Castillo, C. and Meissner, L. (2018) 'A Field Experiment Demonstrates Near Peer Mentorship as an Effective Support for Student Persistence', *Basic and Applied Social Psychology*, 40(5), pp. 269–278. doi:10.1080/01973533.2018.1485101.

Destin, M. and Oyserman, D. (2009) 'From Assets to School Outcomes: How Finances Shape Children's Perceived Possibilities and Intentions', *Psychological Science*, 20(4), pp. 414–418. doi:10.1111/j.1467-9280.2009.02309.x.

Dickerson, A., Maragkou, K. and McIntosh, S. (2018) *The causal effect of secondary school peers on educational aspirations*. CVER Discussion Paper Series - Research Discussion Paper 017. London: Centre for Vocational Educational Research. Available at: https://cver.lse.ac.uk/textonly/cver/pubs/cverdp017.pdf (Accessed: 5 September 2021).

Dijkstra, P., Kuyper, H., van der Werf, G., Buunk, A. P. and van der Zee, Y. G. (2008) 'Social Comparison in the Classroom: A Review', *Review of Educational Research*, 78(4), pp. 828–879. doi:10.3102/0034654308321210.

DiMaggio, P. (1982) 'Cultural Capital and School Success: The Impact of Status Culture Participation on the Grades of U.S. High School Students', *American Sociological Review*, 47(2), pp. 189–201. doi:10.2307/2094962.

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

Dollmann, J. and Rudolphi, F. (2020) 'Classroom composition and language skills: the role of school class and friend characteristics', *British Journal of Sociology of Education*, 41(8), pp. 1200–1217. doi:10.1080/01425692.2020.1799754.

van Duijn, M. A. J., Zeggelink, E. P. H., Huisman, M., Stokman, F. N. and Wasseur, F. W. (2003) 'Evolution of Sociology Freshmen into a Friendship Network', *The Journal of Mathematical Sociology*, 27(2–3), pp. 153–191. doi:10.1080/00222500305889.

Duncan, O.D., Haller, A.O. and Portes, A. (1968) 'Peer Influences on Aspirations: A Reinterpretation', *American Journal of Sociology*, 74(2), pp. 119–137. doi:10.1086/224615.

Dupriez, V., Monseur, C., Van Campenhoudt, M. and Lafontaine, D. (2012). 'Social Inequalities of Post-Secondary Educational Aspirations: Influence of Social Background, School Composition and Institutional Context'. *European Educational Research Journal*, 11(4), pp. 504–519. doi: 10.2304/eerj.2012.11.4.504.

Dweck, C.S. (2002) 'The Development of Ability Conceptions', in *Development of Achievement Motivation*. Elsevier, pp. 57–88. doi:10.1016/B978-012750053-9/50005-X.

Eccles, J.S. (2009) 'Who Am I and What Am I Going to Do with My Life? Personal and Collective Identities as Motivators of Action', *Educational Psychologist*, 44(2), pp. 78–89. doi:10.1080/00461520902832368.

Eccles, J.S. and Wigfield, A. (2020) 'From Expectancy-value Theory to Situated Expectancy-value Theory: A Developmental, Social Cognitive, and Sociocultural Perspective on Motivation', *Contemporary Educational Psychology*, 61, p. 101859. doi:10.1016/j.cedpsych.2020.101859.

Edwards, J. (1990). 'Frameworks for Applying Social Psychological Processes to Social Issues'. in Edwards, J., Tindale, R. S., Heath, L., and Posavac, E. J. (eds) *Social Influence Processes and Prevention*. Boston, MA: Springer US (Social Psychological Applications to Social Issues), pp. 1–13. doi: 10.1007/978-1-4899-2094-2_1.

Elster, J. (1983) *Sour Grapes: Studies in the Subversion of Rationality*. Cambridge: Cambridge University Press.

Engzell, P. (2019) 'Aspiration Squeeze: The Struggle of Children to Positively Selected Immigrants', *Sociology of Education*, 92(1), pp. 83–103. doi:10.1177/0038040718822573.

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

Erwin, P. (1998) *Friendship in Childhood and Adolescence*. London; New York: Routledge (Psychology focus).

van Ewijk, R. and Sleegers, P. (2010) 'The Effect of Peer Socioeconomic Status on Student Achievement: A meta-analysis', *Educational Research Review*, 5(2), pp. 134–150. doi:10.1016/j.edurev.2010.02.001.

Fehérvári, A. and Híves, T. (2017) 'Trajectories in Hungarian Education – Transition to Secondary School', *The New Educational Review*, 48(2), pp. 154–166. doi:10.15804/tner.2017.48.2.12.

Fehérvári, A., Híves, T. and Szemerszki, M. (2021) 'Népesség, szelekció, oktatás', *Educatio*, 30(2), pp. 226–241. doi:10.1556/2063.30.2021.2.4.

Feld, S.L. (1982) 'Social Structural Determinants of Similarity among Associates', *American Sociological Review*, 47(6), p. 797-801. doi:10.2307/2095216.

Festinger, L. (1954) 'A Theory of Social Comparison Processes', *Human Relations*, 7(2), pp. 117–140. doi:10.1177/001872675400700202.

Fishman, S.H. (2019) 'Do Plans Really Matter?: Re-assessing the Role of Adolescent Expectations in Educational Attainment', *Research in Social Stratification and Mobility*, 62, p. 100407. doi:10.1016/j.rssm.2019.05.002.

Flashman, J. (2012) 'Academic Achievement and Its Impact on Friend Dynamics', *Sociology of Education*, 85(1), pp. 61–80. doi:10.1177/0038040711417014.

Flechtner, S. (2017) 'Should Aspirations be a Matter of Policy Concern?', *Journal of Human Development and Capabilities*, 18(4), pp. 517–530. doi: 10.1080/19452829.2017.1364224.

Foley, K., Gallipoli, G. and Green, D.A. (2014) 'Ability, Parental Valuation of Education, and the High School Dropout Decision', *Journal of Human Resources*, 49(4), pp. 906–944. doi:10.3368/jhr.49.4.906.

Fujiyama, H., Kamo, Y. and Schafer, M. (2021) 'Peer effects of friend and extracurricular activity networks on students' academic performance', *Social Science Research*, 97, p. 102560. doi:10.1016/j.ssresearch.2021.102560.

Furlong, A., Biggart, A. and Cartmel, F. (1996) 'Neighbourhoods, Opportunity Structures and Occupational Aspirations', *Sociology*, 30(3), pp. 551–565.

Gale, T. and Parker, S. (2015) 'To aspire: a systematic reflection on understanding aspirations in higher education', *The Australian Educational Researcher*, 42(2), pp. 139–153. doi:10.1007/s13384-014-0165-9.

Gelman, A., Carlin, J. B., Stern, H. S., Dunson, D. B., Vehtari, A. and Rubin, D. B. (2014) *Bayesian Data Analysis*. Third edition. Boca Raton: CRC Press (Chapman & Hall/CRC texts in statistical science).

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

Geven, S., Weesie, J. and van Tubergen, F. (2013) 'The influence of friends on adolescents' behaviour problems at school: The role of ego, alter and dyadic characteristics', *Social Networks*, 35(4), pp. 583–592. doi:10.1016/j.socnet.2013.08.002.

Giordano, P.C. (2003) 'Relationships in Adolescence', *Annual Review of Sociology*, 29(1), pp. 257–281. doi:10.1146/annurev.soc.29.010202.100047.

Glaeser, E.L., Sacerdote, B.I. and Scheinkman, J.A. (2003) 'The Social Multiplier', *Journal of the European Economic Association*, 1(2–3), pp. 345–353. doi:10.1162/154247603322390982.

Goldthorpe, J. H. (2001). 'Causation, Statistics, and Sociology'. *European Sociological Review*, 17 (1), pp. 1–20.

Gottfredson, L.S. (1981) 'Circumscription and compromise: A developmental theory of occupational aspirations.', *Journal of Counseling Psychology*, 28(6), pp. 545–579. doi:10.1037/0022-0167.28.6.545.

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.* Hoboken, NJ: John Wiley & Sons, pp. 71–100.

De Graaf, N. D., De Graaf, P. M. and Kraaykamp, G. (2000). 'Parental Cultural Capital and Educational Attainment in the Netherlands: A Refinement of the Cultural Capital Perspective'. *Sociology of Education*, 73 (2), pp. 92–111. doi: 10.2307/2673239.

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

Granovetter, M.S. (1983) 'The Strength of Weak Ties: A Network Theory Revisited', *Sociological theory*, pp. 201–233.

Green, J., Liem, G. A. D., Martin, A. J., Colmar, S., Marsh, H. W. and McInerney, D. (2012) 'Academic motivation, self-concept, engagement, and performance in high school: Key processes from a longitudinal perspective', *Journal of Adolescence*, 35(5), pp. 1111–1122. doi:10.1016/j.adolescence.2012.02.016.

Green, J., Martin, A.J. and Marsh, H.W. (2007) 'Motivation and engagement in English, Mathematics and Science high school subjects: Towards an understanding of multidimensional domain specificity', *Learning and Individual Differences*, 17(3), pp. 269–279. doi:10.1016/j.lindif.2006.12.003.

Green, J., Nelson, G., Martin, A. J. and Marsh, H. (2006) 'The Causal Ordering of Self-Concept and Academic Motivation and Its Effect on Academic Achievement', *International Education Journal*, *7*(4), pp. 534-546.

Gremmen, M. C., van den Berg, Y. H. M., Steglich, C., Veenstra, R. and Dijkstra, J. K. (2018) 'The importance of near-seated peers for elementary students' academic engagement and achievement', *Journal of Applied Developmental Psychology*, 57, pp. 42–52. doi:10.1016/j.appdev.2018.04.004.

Gremmen, M. C., Dijkstra, J. K., Steglich, C. and Veenstra, R. (2017) 'First selection, then influence: Developmental differences in friendship dynamics regarding academic achievement.', *Developmental Psychology*, 53(7), pp. 1356–1370. doi:10.1037/dev0000314.

'Group'. (no date). *Merriam-Webster.com dictionary*. Available at: https://www.merriam-webster.com/dictionary/group (Accessed: 19 March 2022).

Grow, A., Takács, K. and Pál, J. (2016) 'Status Characteristics and Ability Attributions in Hungarian School Classes: An Exponential Random Graph Approach', *Social Psychology Quarterly*, 79(2), pp. 156–167. doi:10.1177/0190272516643052.

Gunderson, E. A., Hamdan, N., Sorhagen, N. S. and D'Esterre, A. P. (2017). 'Who needs innate ability to succeed in math and literacy? Academic-domain-specific theories of intelligence about peers versus adults.' *Developmental Psychology*, 53 (6), pp. 1188–1205. doi: 10.1037/dev0000282.

Gunzler, D., Chen, T., Wu, P. and Zhang, H. (2013) 'Introduction to mediation analysis with structural equation modelling', *Shanghai Archives of Psychiatry*, 25(6), pp. 390–394.

Gutiérrez, G. (2023) 'Is it socioeconomic or academic? Disentangling sources of peer effects on student achievement', *British Journal of Sociology of Education*, 44(1), pp. 144–163. Available at: https://doi.org/10.1080/01425692.2022.2137465.

Gutman, L.M. and Akerman, R. (2008) *Determinants of Aspirations [wider benefits of learning research report no. 27]*. London: Centre for Research on the Wider Benefits of Learning, Institute of Education, University of London. Available at: https://discovery.ucl.ac.uk/id/eprint/1541614/1/Gutman2008Determinants.pdf (Accessed: 5 September 2021).

Hajdu, T., Kertesi, G. and Kézdi, G. (2019) 'Inter-Ethnic Friendship and Hostility between Roma and non-Roma Students in Hungary: The Role of Exposure and Academic Achievement', *The B.E. Journal of Economic Analysis & Policy*, 19(1), pp. 20170289. doi:10.1515/bejeap-2017-0289.

Hajdu, T., Kertesi, G. and Kézdi, G. (2021) 'Ethnic Segregation and Inter-Ethnic Relationships in Hungarian Schools', *On Education. Journal for Research and Debate*, 4(11). doi:10.17899/on_ed.2021.11.5.

Haller, A.O. (1968) 'On the Concept of Aspiration', *Rural Sociology*, 33(4), pp. 483–487.

Hallinan, M.T. and Williams, R.A. (1990) 'Students' Characteristics and the Peer-Influence Process', *Sociology of Education*, 63(2), pp. 122–132. doi:10.2307/2112858.

Hamm, J. V., Schmid, L., Farmer, T. W. and Locke, B. (2011) 'Injunctive and Descriptive Peer Group Norms and the Academic Adjustment of Rural Early Adolescents', *The Journal of Early Adolescence*, 31(1), pp. 41–73. doi:10.1177/0272431610384486.

Hanushek, E. A., Kain, J. F., Markman, J. M. and Rivkin, S. G. (2003). 'Does Peer Ability Affect Student Achievement?' *Journal of Applied Econometrics*, 18 (5), pp. 527–544. doi: 10.1002/jae.741.

Hartup, W.W. (1996) 'The Company They Keep: Friendships and Their Developmental Significance', *Child Development*, 67(1), p. 1-13. doi:10.2307/1131681.

Hartup, W.W. (2009) 'Critical Issues and Theoretical Viewpoints', in Rubin, K.H., Bukowski, W.M., and Laursen, B. (eds.) *Handbook of Peer Interactions, Relationships, and Groups*. The Guilford Press (Social, Emotional, and Personality Development in Context), pp. 3–19.

Hartup, W.W. and Stevens, N. (1997) 'Friendships and Adaptation in the Life Course', *Psychological Bulletin*, 121(3), pp. 355–370.

Hastings, J., Neilson, C. and Zimmerman, S. (2012) *The Effect of School Choice on Intrinsic Motivation and Academic Outcomes*. Working Paper 18324 . Cambridge, MA: National Bureau of Economic Research. Available at:

https://www.nber.org/system/files/working_papers/w18324/w18324.pdf (Accessed: 5 September 2021).

de la Haye, K., Green, H. D., Kennedy, D. P., Pollard, M. S. and Tucker, J. S. (2013) 'Selection and Influence Mechanisms Associated with Marijuana Initiation and Use in Adolescent Friendship Networks', *Journal of Research on Adolescence*, 23(3), pp. 474–486. doi:10.1111/jora.12018.

Heider, F. (1946) 'Attitudes and Cognitive Organization', *The Journal of Psychology*, 21(1), pp. 107–112. doi:10.1080/00223980.1946.9917275.

Helwig, A.A. (2001) 'A Test of Gottfredson's Theory Using a Ten-Year Longitudinal Study', *Journal of Career Development*, 28(2), pp. 77–95. doi:10.1177/089484530102800201.

Hermann, Z. (2004) *Továbbtanulási döntés az általános iskola végén: a kulturális és jövedelmi tényezők szerepe*, Doctoral dissertation, Budapesti Corvinus Egyetem, Budapest, Hungary. Available at: http://phd.lib.uni-corvinus.hu/82/1/hermann_zoltan.pdf (Accessed: 5 September 2021).

Hermann, Z. (2013) *Are you on the right track? the effect of educational tracks on student achievement in upper-secondary education in Hungary*. Budapest: Labour Research Department, Institute of Economics, Hungarian Academy of Sciences. Available at: http://www.econ.core.hu/file/download/bwp/bwp1316.pdf (Accessed: 5 September 2021).

Hermann, Z. (2020) 'The Impact of Decreasing Compulsory School-Leaving Age on Dropping Out of School', in Fazekas, K. et al. (eds.) *The Hungarian Labour Market 2019*. Budapest: Institute of Economics, Centre for Economic and Regional Studies, pp. 70–77.

Hermann, Z., Horn, D. and Tordai, D. (2020) 'The Effect of The 2013 Vocational Education Reform on Student Achievement', in Fazekas, K. et al. (eds.) *The Hungarian Labour Market 2019*. Budapest: Institute of Economics, Centre for Economic and Regional Studies, pp. 64–69.

Holm, A. and Jæger, M.M. (2008) 'Does Relative Risk Aversion explain educational inequality? A dynamic choice approach', *Research in Social Stratification and Mobility*, 26(3), pp. 199–219. doi:10.1016/j.rssm.2008.05.004.

Homans, G.C. (1958) 'Social Behaviour as Exchange', *American Journal of Sociology*, 63(6), pp. 597–606.

Homel, J. and Ryan, C. (2014) *Educational Outcomes: the Impact of Aspirations and the Role of Student Background Characteristics*. Adelaide: National Centre for Vocational Education Research.

Hörich, B. (2019) 'Tanulási utak a társadalmi háttér függvényében', *Educatio*, 28(4), pp. 659–682. doi:10.1556/2063.28.2019.4.2.

Huber, C. (2013) 'Generalized structural equation modelling using stata', in *Italian Stata Users Group Meeting, November*, pp. 14–15.

Huguet, P., Dumas, F., Marsh, H., Régner, I., Wheeler, L., Suls, J., Seaton, M. and 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), pp. 156–170. doi:10.1037/a0015558.

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

Ikonen, K., Leinonen, R., Asikainen, M. A. and 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), pp. 316–338.

Jackson, M., Erikson, R., Goldthorpe, J. H. and Yaish, M. (2007) 'Primary and Secondary Effects in Class Differentials in Educational Attainment: The Transition to A-Level Courses in England and Wales', *Acta Sociologica*, 50(3), pp. 211–229. doi:10.1177/0001699307080926.

Jansen, M., Boda, Z. and Lorenz, G. (2022). 'Social Comparison Effects on Academic Self-concepts—Which Peers Matter most?' *Developmental Psychology*, 58(8), pp. 1541–1556. doi: 10.1037/dev0001368.

Jansen, M., Lüdtke, O. and Schroeders, U. (2016) 'Evidence for a positive relation between interest and achievement: Examining between-person and within-person variation in five domains', *Contemporary Educational Psychology*, 46, pp. 116–127. doi:10.1016/j.cedpsych.2016.05.004.

Jonsson, J.O. and Mood, C. (2008) 'Choice by Contrast in Swedish Schools: How Peers' Achievement Affects Educational Choice', *Social Forces*, 87(2), pp. 741–765. doi: https://doi.org/10.1353/sof.0.0135.

Juvonen, J. (2018) 'The potential of schools to facilitate and constrain peer relationships.', in Bukowski, W.M., Laursen, B., and Rubin, K.H. (eds.) *Handbook of Peer Interactions, Relationships, and Groups.* New York: The Guilford Press, pp. 491–509.

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

Kandel, D.B. (1978) 'Homophily, Selection, and Socialization in Adolescent Friendships', *American Journal of Sociology*, 84(2), pp. 427–436. doi:10.1086/226792.

Kandel, D.B. and Lesser, G.S. (1969) 'Parental and Peer Influences on Educational Plans of Adolescents', *American Sociological Review*, 34(2), pp. 213-223. doi:10.2307/2092178.

Kaplan, D. and Depaoli, S. (2013) 'Bayesian Statistical Methods', in Little, T.D. (ed.) *Oxford Handbook of Quantitative Methods. Volume 1: Foundations*. Oxford: Oxford University Press, pp. 407–437.

Karlson, K.B. (2015) 'Expectations on Track? High School Tracking and Adolescent Educational Expectations', *Social Forces*, 94(1), pp. 115–141. doi:10.1093/sf/sov006.

Keller, T. (2023). 'No evidence of direct peer influence in upper-secondary track choice—evidence from Hungary'. *European Societies*, 25 (1), pp. 154–180. doi: 10.1080/14616696.2022.2127828.

Keller, T. and Takács, K. (2019) 'Peers that count: The influence of deskmates on test scores', *Research in Social Stratification and Mobility*, 62, p. 100408. doi:10.1016/j.rssm.2019.05.003.

Keller, T., Takács, K. and Elwert, F. (2021) 'Yes, You Can! Effects of Transparent Admission Standards on High School Track Choice: A Randomized Field Experiment', *Social Forces*, soab111. doi:10.1093/sf/soab111.

Kelley, H.H. (1952) 'Two Functions of Reference Groups', in Swanson, G.E., Newcomb, T.M., and Hartley, E.L. (eds.) *Readings in Social Psychology*. New York: Henry Holt and Company, pp. 410–414.

Kertesi, G. and Kézdi, G. (2005) 'Általános iskolai szegregáció, I. rész. Okok és következmények', *Közgazdasági Szemle (Economic Review - monthly of the Hungarian Academy of Sciences)*, 52(4), pp. 317–355.

Kertesi, G. and Kézdi, G. (2009) 'Általános escolar szegregáció Magyarországon az ezredforduló után', *Közgazdasági Szemle*, 56(11), pp. 959-1000.

Kertesi, G. and Kézdi, G. (2012) 'A roma és nem roma tanulók teszteredményei közti különbségekről és e különbségek okairól', *Közgazdasagi Szemle*, 59, pp. 798–853.

Kertesi, G. and Kézdi, G. (2014) 'Iskolai szegregáció, szabad iskolaválasztás és helyi oktatáspolitika 100 magyar városban', *Budapesti Munkagazdasági Füzetek*, 16(6). Available at: http://www.econ.core.hu/file/ download/bwp/bwp1406.pdf. (Accessed: 5 September 2021).

Khattab, N. (2014) 'How and when Do Educational Aspirations, Expectations and Achievement Align?', *Sociological Research Online*, 19(4), pp. 61–73. doi:10.5153/sro.3508.

Kindermann, T.A. (2007) 'Effects of Naturally Existing Peer Groups on Changes in Academic Engagement in a Cohort of Sixth Graders', *Child Development*, 78(4), pp. 1186–1203. doi:10.1111/j.1467-8624.2007.01060.x.

Kisfalusi, D. (2016) ‘The Quality of Inter- and Intra-ethnic Friendships among Roma and Non-roma Students in Hungary’, *Corvinus Journal of Sociology and Social Policy*, 7(1), pp. 3–26. doi:10.14267/CJSSP.2016.01.01.

Kisfalusi, D. (2018a) ‘Ethnic classification among secondary school teachers and students in Hungary’, *Corvinus Journal of Sociology and Social Policy*, 9(1), pp. 35–54. doi:10.14267/CJSSP.2018.1.02.

Kisfalusi, D. (2018b) ‘Bullies and Victims in Primary Schools’, *Intersections. East European Journal of Society and Politics*, 4(1), pp. 133–158. doi:10.17356/ieejsp.v4i1.372.

Kisfalusi, D., Janky, B. and Takács, K. (2019) ‘Double Standards or Social Identity? The Role of Gender and Ethnicity in Ability Perceptions in the Classroom’, *The Journal of Early Adolescence*, 39(5), pp. 745–780. doi:10.1177/0272431618791278.

Kisfalusi, D., Pál, J. and Boda, Zs. (2020) ‘Bullying and victimization among majority and minority students: The role of peers’ ethnic perceptions’, *Social Networks*, 60, pp. 48–60. doi:10.1016/j.socnet.2018.08.006.

Kisfalusi, D., Takács, K. and Pál, J. (2019) ‘Gossip and Reputation in Adolescent Networks’, in F. Giardini and R. Wittek (eds.) *The Oxford Handbook of Gossip and Reputation*. Oxford University Press, pp. 358–379. doi: 10.1093/oxfordhb/9780190494087.013.19

Kiuru, N., Aunola, K., Vuori, J. and Nurmi, J-E. (2007) ‘The Role of Peer Groups in Adolescents’ Educational Expectations and Adjustment’, *Journal of Youth and Adolescence*, 36(8), pp. 995–1009. doi:10.1007/s10964-006-9118-6.

de Klepper, M., Sleebos, E., van de Bunt, G. and Agneessens, F. (2010) ‘Similarity in Friendship Networks: Selection or Influence? The Effect of Constraining Contexts and Non-visible Individual Attributes’, *Social Networks*, 32(1), pp. 82–90. doi:10.1016/j.socnet.2009.06.003.

Kloosterman, R., Ruiter, S., De Graaf, P. M. and Kraaykamp, G. (2009) ‘Parental education, children’s performance and the transition to higher secondary education: trends in primary and secondary effects over five Dutch school cohorts (1965-99): Social selection in Dutch secondary education’. *The British Journal of Sociology*, 60(2), pp. 377–398. doi: 10.1111/j.1468-4446.2009.01235.x.

Kóczy, L.Á. (2010) ‘A magyarországi felvételi rendszerek sajátosságai’, *Közgazdasági Szemle*, 57(2), pp. 142–164.

Koskinen, J. and Snijders, T.A.B. (2022) ‘Multilevel Longitudinal Analysis of Social Networks’, *arXiv:2201.12713 [stat]* [Preprint]. Available at: http://arxiv.org/abs/2201.12713 (Accessed: 3 February 2022).

Kretschmer, D., Leszczensky, L. and Pink, S. (2018) 'Selection and Influence Processes in Academic Achievement—More Pronounced for Girls?', *Social Networks*, 52, pp. 251–260. doi:10.1016/j.socnet.2017.09.003.

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

Kruse, H. and Kroneberg, C. (2020) *Contextualizing Oppositional Cultures: A Multilevel Network Analysis of Status Orders in Schools*. ECONtribute Discussion Papers Series 044, University of Bonn and University of Cologne, Germany. Available at: https://ideas.repec.org/p/ajk/ajkdps/044.html (Accessed: 10 June 2022)

Kush, J.C., Watkins, M.W. and Brookhart, S.M. (2005) 'The Temporal-Interactive Influence of Reading Achievement and Reading Attitude', *Educational Research and Evaluation*, 11(1), pp. 29–44. doi: https://doi.org/10.1080/13803610500110141.

Kwon, K. and Lease, A.M. (2014) 'Perceived influence of close friends, well-liked peers, and popular peers: Reputational or personal influence?', *Journal of Social and Personal Relationships*, 31(8), pp. 1116–1133. doi:10.1177/0265407514522887.

Ladányi, J. and Szelényi, I. (2001) 'The social construction of roma ethnicity in Bulgaria, Romania and Hungary during market transition', *Review of Sociology*, 7(2), pp. 79–89. doi:10.1556/RevSoc.7.2001.2.5.

Ladd, G. W., Kochenderfer-Ladd, B., Visconti, K. J. and Ettekal, I. (2012) 'Classroom peer relations and children's social and scholastic development: Risk factors and resources.', in Ryan A.M. and Ladd G.W. and (eds.) *Peer Relationships and Adjustment at School.* Charlotte, NC: IAP Information Age Publishing (Adolescence and education.), pp. 11–49.

Laninga-Wijnen, L., Gremmen, M. C., Dijkstra, J. K., Veenstra, R., Vollebergh, W. A. M. and Harakeh, Z. (2019) 'The Role of Academic Status Norms in Friendship Selection and Influence Processes Related to Academic Achievement.', *Developmental Psychology*, 55(2), pp. 337–350. doi:10.1037/dev0000611.

Lannert, J. (2005) *Pályaválasztási aspirációk.(A 13 és 17 évesek továbbtanulási aspirációi mögött munkáló tényezők három kistérségben)*, Doctoral dissertation, Budapesti Corvinus Egyetem, Budapest, Hungary. Available at: http://phd.lib.uni-corvinus.hu/86/1/lannert_judit.pdf (Accessed: 5 September 2021).

Lannert, J. (2009) *A továbbtanulási aspirációk társadalmi meghatározottsága*. Available at: https://ofi.oh.gov.hu/tovabbtanulasi-aspiraciok-tarsadalmi-meghatarozottsaga. (Accessed: 5 September 2021).

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

Lareau, A. and Weininger, E.B. (2003) 'Cultural Capital in Educational Research: A Critical Assessment', *Theory and Society*, 32(5/6), pp. 567–606. doi:10.1023/B:RYSO.0000004951.04408.b0.

Lauermann, F., Tsai, Y-M. and Eccles, J.S. (2017) 'Math-Related Career Aspirations and Choices within Eccles et al.'s Expectancy–Value Theory of Achievement-Related behaviours', *Developmental Psychology*, 53(8), pp. 1540–1559. doi:10.1037/dev0000367.

Laursen, B. and Hartup, W.W. (2002) 'The Origins of Reciprocity and Social Exchange in Friendships', *New directions for child and adolescent development*, 2002(95), pp. 27–40.

Laursen, B. and 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), pp. 889–907. doi:10.1111/jora.12606.

Lerner, R.M. and Steinberg, L. (2004) 'The Scientific Study of Adolescent Development: Past, Present, and Future', in R.M. Lerner and L. Steinberg (eds) *Handbook of Adolescent Psychology*. New York: John Wiley & Sons, pp. 1–12. https://doi.org/10.1002/9780471726746.ch1.

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

Lieberman, M.D. (2015) *Social: Why Our Brains Are Wired to Connect*. Oxford: Oxford University Press.

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

Lomi, A., Snijders, T. A. B., Steglich, C. E. G. and Torló, V. J. (2011) 'Why are Some more Peer than Others? Evidence from a Longitudinal Study of Social Networks and Individual Academic Performance', *Social Science Research*, 40(6), pp. 1506–1520. doi:10.1016/j.ssresearch.2011.06.010.

Lorenz, G., Boda, Zs., Salikutluk, Z. and 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), pp. 643–669. doi:10.1080/01425692.2020.1763163.

Lorenz, G., Boda, Zs. and Salikutluk, Z. (2021) 'Oppositional culture revisited. Friendship dynamics and the creation of social capital among Turkish minority adolescents in

Germany', *Journal of Ethnic and Migration Studies*, 47(17), pp. 3986–4005. doi:10.1080/1369183X.2021.1898354.

Lőrincz, L. (2016) 'Interethnic dating preferences of Roma and non-Roma secondary school students', *Journal of Ethnic and Migration Studies*, 42(13), pp. 2244–2262. doi:10.1080/1369183X.2016.1160769.

Lubbers, M.J., Kuyper, H. and van der Werf, M.P.C. (2009) 'Social Comparison with Friends Versus Non-friends', *European Journal of Social Psychology*, 39(1), pp. 52–68. doi:10.1002/ejsp.475.

Manski, C.F. (1993) 'Identification of Endogenous Social Effects: The Reflection Problem', *The Review of Economic Studies*, 60(3), pp. 531–542. doi:10.2307/2298123.

Manzo, G. (2013) 'Educational Choices and Social Interactions: A Formal Model and a Computational Test', in Elisabeth Birkelund, G. (ed.) *Comparative Social Research*. Emerald Group Publishing Limited, pp. 47–100. doi:10.1108/S0195-6310(2013)0000030007.

Marjoribanks, K. (1998) 'Family Capital, Children's Individual Attributes, and Adolescents' Aspirations: A Follow-Up Analysis', *The Journal of Psychology*, 132(3), pp. 328–336. doi:10.1080/00223989809599171.

Marjoribanks, K. (2003) 'Family Background, Individual and Environmental Influences, Aspirations and Young Adults' Educational Attainment: A follow-up study', *Educational Studies*, 29(2–3), pp. 233–242. doi:10.1080/03055690303283.

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), pp. 445–480. doi:10.3102/00028312028002445.

McDermott, E. R., Umaña-Taylor, A. J., Schaefer, D. R., Martinez-Fuentes, S., Co, L., Ison, A., Ryan, A. M. and 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. doi:10.1111/sode.12494.

McPherson, J.M. and Smith-Lovin, L. (1987) 'Homophily in Voluntary Organizations: Status Distance and the Composition of Face-to-Face Groups', *American Sociological Review*, 52(3), pp. 370-379. doi:10.2307/2095356.

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

Meece, J. and Agger, C. (2018) 'Achievement Motivation in Education', in Meece, J. and Agger, C., *Oxford Research Encyclopedia of Education*. Oxford University Press. Available at:

https://oxfordre.com/education/view/10.1093/acrefore/9780190264093.001.0001/acrefore-9780190264093-e-7 (Accessed: 9 August 2021).

Mercken, L., Snijders, T. A. B., Steglich, C. and de Vries, H. (2009) 'Dynamics of Adolescent Friendship Networks and Smoking Behaviour: Social Network Analyses in Six European Countries', *Social Science & Medicine*, 69(10), pp. 1506–1514. doi:10.1016/j.socscimed.2009.08.003.

Merton, R.K. (1968a) *Social Theory and Social Structure*. New York: The Free Press.

Merton, R.K. (1968b) 'The Matthew Effect in Science: The reward and communication systems of science are considered.', *Science*, 159(3810), pp. 56–63. doi:10.1126/science.159.3810.56.

MKIK Gazdaság- és Vállalkozáskutató Intézet (GVI) (2020a) *Általános iskolások pályaválasztása 2020*. Available at: https://gvi.hu/files/researches/625/palyaorientacio_2020_tanulmany_201130.pdf. (Accessed: 5 September 2021).

MKIK Gazdaság- és Vállalkozáskutató Intézet (GVI) (2020b) *Középiskolás tanulók iskola- és pályaválasztási motivációi*. 2020/1. Available at: https://gvi.hu/files/researches/586/motivacio_9evf_elemzes_20200211.pdf. (Accessed: 5 September 2021).

Molloy, L.E., Gest, S.D. and Rulison, K.L. (2011) 'Peer Influences on Academic Motivation: Exploring Multiple Methods of Assessing Youths' Most 'Influential' Peer Relationships', *The Journal of Early Adolescence*, 31(1), pp. 13–40. doi:10.1177/0272431610384487.

Mood, C. (2010) 'Logistic Regression: Why We Cannot Do What We Think We Can Do, and What We Can Do About It', *European Sociological Review*, 26(1), pp. 67–82. doi:10.1093/esr/jcp006.

Mora, T. and Oreopoulos, P. (2011) 'Peer effects on high school aspirations: Evidence from a sample of close and not-so-close friends', *Economics of Education Review*, 30(4), pp. 575–581. doi:10.1016/j.econedurev.2011.01.004.

Mouw, T. (2006) 'Estimating the Causal Effect of Social Capital: A Review of Recent Research', *Annual Review of Sociology*, 32(1), pp. 79–102. doi:10.1146/annurev.soc.32.061604.123150.

Möller, J., Müller-Kalthof, H., Helm, F., Nagy, N. and Marsh, H. W (2016). 'The Generalized Internal/External Frame of Reference Model: An Extension to Dimensional Comparison Theory', *Frontline Learning Research*, 4(2), pp. 1–11. doi: 10.14786/flr.v4i2.169.

Mundt, M.P., Mercken, L. and Zakletskaia, L. (2012) 'Peer selection and influence effects on adolescent alcohol use: a stochastic actor-based model', *BMC Pediatrics*, 12(115). doi:10.1186/1471-2431-12-115.

Mundt, S.D. and 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), pp. 1009–1021. doi:10.1080/02673843.2020.1828109.

Mussweiler, T. (2009) 'Social Comparison', in Strack, F. and Förster, J. (eds.) *Social Cognition: The Basis of Human Interaction*. New York: Psychology Press, pp. 139–156.

Nagy, P.T. (2004) 'A felsőoktatásba vezető út és az önszelekció', *Iskolakultúra*, 14(9), pp. 57-71.

Nash, R. (2003) 'Inequality/difference in education: is a real explanation of primary and secondary effects possible?', *British Journal of Sociology*, 54(4), pp. 433–451. doi:10.1080/0007131032000143537.

Nash, R. (2005) 'Cognitive *habitus* and collective intelligence: concepts for the explanation of inequality of educational opportunity'. *Journal of Education Policy*, 20(1), pp. 3–21. doi: 10.1080/0268093042000322801.

Nelson, J.I. (1972) 'High School Context and College Plans: The Impact of Social Structure on Aspirations', *American Sociological Review*, 37(2), pp. 143-148. doi:10.2307/2094022.

Nelson, R.M. and DeBacker, T.K. (2008) 'Achievement Motivation in Adolescents: The Role of Peer Climate and Best Friends', *The Journal of Experimental Education*, 76(2), pp. 170–189. Available at: https://doi.org/10.3200/JEXE.76.2.170-190.

Newcomb, A.F. and Bagwell, C.L. (1995) 'Children's Friendship Relations: A Meta-Analytic Review.', *Psychological bulletin*, 117(2), pp. 306-347.

Nieuwenhuis, J. and Chiang, Y.-L. (2021) 'Oh, the education (you think) you'll have! Relative deprivation and students' academic expectations, aspirations, and attainment', *British Journal of Sociology of Education*, pp. 1–18. doi:10.1080/01425692.2021.1959300.

Niezink, N.M.D., Snijders, T.A.B. and van Duijn, M.A.J. (2019) 'No Longer Discrete: Modeling the Dynamics of Social Networks and Continuous Behaviour', *Sociological Methodology*, 49(1), pp. 295–340. doi:10.1177/0081175019842263.

Oktatási Hivatal (2021) *Felvételi a középfokú iskolákban a 2020/2021. tanévben*. Available at: https://www.oktatas.hu/pub_bin/dload/kozoktatas/beiskolazas/kifir_felveteli20210428.pptx. (Accessed: 5 September 2021).

Osgood, D. W., Ragan, D. T., Wallace, L., Gest, S. D., Feinberg, M. E. and Moody, J. (2013) 'Peers and the Emergence of Alcohol Use: Influence and Selection Processes in Adolescent Friendship Networks', *Journal of Research on Adolescence*, 23(3), pp. 500–512. doi:10.1111/jora.12059.

Owens, A. (2010) 'Neighborhoods and Schools as Competing and Reinforcing Contexts for Educational Attainment', *Sociology of Education*, 83(4), pp. 287–311. doi:10.1177/0038040710383519.

Oyserman, D. and James, L. (2009) 'Possible Selves: From Content to Process.', in Markman, K.D., Klein, W.M.P., and Julie A. (eds.) *Handbook of Imagination and Mental Simulation.* New York: Psychology Press, pp. 373–394.

Picou, J.S. and Carter, T.M. (1976) 'Significant-Other Influence and Aspirations', *Sociology of Education*, 49(1), pp. 12-22. doi:10.2307/2112388.

Portes, A., Aparicio, R., Haller, W. and Vickstrom, E. (2010) 'Moving Ahead in Madrid: Aspirations and Expectations in the Spanish Second Generation', *International Migration Review*, 44(4), pp. 767–801. doi:10.1111/j.1747-7379.2010.00825.x.

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

Preckel, F. and Brunner, M. (2015) 'Academic self-concept, achievement goals, and achievement: Is their relation the same for academic achievers and underachievers?', *Gifted and Talented International*, 30(1–2), pp. 68–84. doi:10.1080/15332276.2015.1137458.

Quaglia, R.J. and Cobb, C.D. (1996) 'Toward a Theory of Student Aspirations', *Journal of Research in Rural Education*, 12(3), pp. 127–132.

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

Radó, P. (2007) 'Oktatási egyenlőtlenségek Magyarországon'. *Esély*, 18(4), pp. 24-36.

Rambaran, J. A., Hopmeyer, A., Schwartz, D., Steglich, C., Badaly, D. and Veenstra, R. (2017). 'Academic Functioning and Peer Influences: A Short-Term Longitudinal Study of Network–Behavior Dynamics in Middle Adolescence'. *Child Development*, 88(2), pp. 523–543. doi: 10.1111/cdev.12611.

Reindl, M. (2020) 'The transmission of academic values between best friends: How important is an accurate perception?', *Journal of Adolescence*, 83, pp. 72–82. doi:10.1016/j.adolescence.2020.06.002.

Reindl, M., Gniewosz, B. and Dresel, M. (2020). 'Friends' influence on the development of academic values in mathematics: are there differences between female and male dyads?' *European Journal of Psychology of Education*. doi: 10.1007/s10212-020-00503-3.

Reindl, M., Tulis, M. and Dresel, M. (2018). 'Associations between friends, academic emotions and achievement: Individual differences in enjoyment and boredom'. *Learning and Individual Differences*, 62, pp. 164–173. doi: 10.1016/j.lindif.2018.01.017.

Ripley, R. M., Snijders, T. A. B., Boda, Zs., Vörös, A. and Preciado, P. (2021) *Manual for RSiena*. Oxford, UK: Department of Statistics, University of Oxford. Available at:

https://www.stats.ox.ac.uk/~snijders/siena/RSiena_Manual.pdf (Accessed: 20 December 2021).

Rogiers, A., Van Keer, H. and Merchie, E. (2020) 'The profile of the skilled reader: An investigation into the role of reading enjoyment and student characteristics', *International Journal of Educational Research*, 99, p. 101512. doi:10.1016/j.ijer.2019.101512.

Rosenqvist, E. (2018) 'Two Functions of Peer Influence on Upper-secondary Education Application Behaviour', *Sociology of Education*, 91(1), pp. 72–89. doi:10.1177/0038040717746113.

Rosenthal, R. and Jacobson, L. (1968) 'Pygmalion in the classroom', *The Urban Review*, 3(1), pp. 16–20. doi:10.1007/BF02322211.

Roth, T. (2017) 'Interpersonal influences on educational expectations: New evidence for Germany', *Research in Social Stratification and Mobility*, 48, pp. 68–84. doi:10.1016/j.rssm.2016.12.001.

Rusbult, C.E. and Buunk, B.P. (1993) 'Commitment Processes in Close Relationships: An Interdependence Analysis', *Journal of Social and Personal Relationships*, 10(2), pp. 175–204. doi:10.1177/026540759301000202.

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

Sacerdote, B. (2011) 'Peer Effects in Education: How Might They Work, How Big Are They and How Much Do We Know Thus Far?', in *Handbook of the Economics of Education*. Elsevier, pp. 249–277. doi:10.1016/B978-0-444-53429-3.00004-1.

Salikutluk, Z. (2016) 'Why Do Immigrant Students Aim High? Explaining the Aspiration–Achievement Paradox of Immigrants in Germany', *European Sociological Review*, 32(5), pp. 581–592. doi:10.1093/esr/jcw004.

Sáska, G. (2014) 'Húsz év köz- és felsőoktatásáról, körkép', *Iskolakultúra*, 24(2), pp. 3–18.

Schindler, S. and Lörz, M. (2012) 'Mechanisms of Social Inequality Development: Primary and Secondary Effects in the Transition to Tertiary Education Between 1976 and 2005', *European Sociological Review*, 28(5), pp. 647–660. doi:10.1093/esr/jcr032.

Schumann, R. (2009) 'Iskolaválasztás, továbbtanulási-végzettségi aspirációk', *Új pedagógiai szemle*, 59(10), pp. 3–25.

Seaton, M., Marsh, H. W., Dumas, F., Huguet, P., Monteil, J.-M., Régner, I., Blanton, H., Buunk, A. P., Gibbons, F. X., Kuyper, H., Suls, J. and Wheeler, L. (2008) 'In Search of the Big Fish: Investigating the Coexistence of the Big-Fish-Little-Pond Effect with the Positive Effects of Upward Comparisons', *British Journal of Social Psychology*, 47(1), pp. 73–103. doi:10.1348/014466607X202309.

Sewell, W.H., Haller, A.O. and Ohlendorf, G.W. (1970) 'The Educational and Early Occupational Status Attainment Process: Replication and Revision', *American Sociological Review*, 35(6), pp. 1014–1027. doi:10.2307/2093379.

Sewell, W.H., Haller, A.O. and Portes, A. (1969) 'The Educational and Early Occupational Attainment Process', *American Sociological Review*, 34(1), pp. 82–92. doi:10.2307/2092789.

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

Sewell, W.H. and Hauser, R.M. (1993) *A Review of the Wisconsin Longitudinal Study of Social and Psychological Factors in Aspirations and Achievements 1963-1992*. Madison, WI: Center for Demography and Ecology, University of Wisconsin-Madison. Available at: https://www.ssc.wisc.edu/wlsresearch/publications/files/public/Sewell-Hauser_Review.Wisconsin.L.S.S.P.F.A.A-1963-1992_CDE_92-01.pdf (Accessed: 5 September 2021).

Shavit, Y. and Blossfeld, H.-P. (eds) (1993) *Persistent Inequality: Changing Educational Attainment in Thirteen Countries*. Boulder, CO: Westview Press.

Shin, H. and Ryan, A.M. (2014) 'Early Adolescent Friendships and Academic Adjustment: Examining Selection and Influence Processes with Longitudinal Social Network Analysis', *Developmental Psychology*, 50(11), pp. 2462–2472. doi:10.1037/a0037922.

Sirin, S.R. (2005) 'Socioeconomic Status and Academic Achievement: A Meta-Analytic Review of Research', *Review of Educational Research*, 75(3), pp. 417–453. doi:10.3102/00346543075003417.

Smirnov, I. and Thurner, S. (2017) 'Formation of homophily in academic performance: Students change their friends rather than performance', *PLOS ONE*, 12(8), p. e0183473. doi:10.1371/journal.pone.0183473.

Smith, E. (2023) 'Peer preferences and educational decisions: heterogeneous associations across student socioeconomic status', *British Journal of Sociology of Education*, 44(2), pp. 374–393. Available at: https://doi.org/10.1080/01425692.2022.2154641.

Smith, J.R. (2010a) 'Informational Influence', in J.M. Levine and M.A. Hogg (eds) *Encyclopedia of Group Processes and Intergroup Relations*. Thousand Oaks, CA: SAGE Publications, Inc., pp. 442–445.

Smith, J.R. (2010b) 'Referent Informational Influence Theory', in J.M. Levine and M.A. Hogg (eds) *Encyclopedia of Group Processes and Intergroup Relations*. Thousand Oaks, CA: SAGE Publications, Inc., pp. 687–689.

Snijders, T.A.B., van de Bunt, G.G. and Steglich, C.E.G. (2010) 'Introduction to stochastic actor-based models for network dynamics', *Social Networks*, 32(1), pp. 44–60. doi:10.1016/j.socnet.2009.02.004.

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

St. Clair, R., Kintrea, K. and Houston, M. (2013) 'Silver bullet or red herring? New evidence on the place of aspirations in education', *Oxford Review of Education*, 39(6), pp. 719–738. doi:10.1080/03054985.2013.854201.

Stadtfeld, C., Takács, K. and Vörös, A. (2020) 'The Emergence and Stability of Groups in Social Networks', *Social Networks*, 60, pp. 129–145. doi:10.1016/j.socnet.2019.10.008.

Stan Development Team. (2020). 'RStan: the R interface to Stan'. R package version 2.21.2. Available at: https://mc-stan.org/ (Accessed: 1 May 2020).

StataCorp. (2021). 'Stata Statistical Software'. Release 17. College Station, TX: StataCorp LLC.

Steglich, C., Snijders, T.A.B. and Pearson, M. (2010) 'Dynamic Networks and Behaviour: Separating Selection from Influence', *Sociological Methodology*, 40(1), pp. 329–393. doi:10.1111/j.1467-9531.2010.01225.x.

Steinberg, L. and Morris, A.S. (2001) 'Adolescent Development', *Annual Review of Psychology*, 52(1), pp. 83–110. doi:10.1146/annurev.psych.52.1.83.

Stocke, V. (2007) 'Explaining Educational Decision and Effects of Families' Social Class Position: An Empirical Test of the Breen Goldthorpe Model of Educational Attainment', *European Sociological Review*, 23(4), pp. 505–519. doi:10.1093/esr/jcm014.

Suckert, L. (2022) 'Back to the Future. Sociological Perspectives on Expectations, Aspirations and Imagined Futures', *European Journal of Sociology*, pp. 1–36. Available at: https://doi.org/10.1017/S0003975622000339.

Sullivan, A. (2001) 'Cultural Capital and Educational Attainment', *Sociology*, 35(4), pp. 893–912. doi:10.1177/0038038501035004006.

Szalai, J. (2008) 'Széttartó jövőképek', *Esély: társadalom-és szociálpolitikai folyóirat*, 19(2), pp. 26-46.

Tarabini, A. and Curran, M. (2018) 'Young People's Educational Expectations, Aspirations and Choices: The Role of Habitus, Gender and Fields', in Stahl, G. et al. (eds.) *International Perspectives on Theorizing Aspirations: Applying Bourdieu's Tools*. Bloomsbury Academic, pp. 53–67.

Taylor, C. (2004) *Modern Social Imaginaries*. Durham: Duke University Press.

Torlò, V.J. and Lomi, A. (2017) ‘The Network Dynamics of Status: Assimilation and Selection’, *Social Forces*, 96(1), pp. 389–422. doi:10.1093/sf/sox040.

Tóth, E., Csapó, B. and Székely, L. (2010) ‘Az iskolák és osztályok közötti különbségek alakulása a magyar iskolarendszerben’, 57(9), pp. 798–814.

Trebbels, M. (2015) ‘The concept of educational aspirations’, in Trebbels, M., *The transition at the end of compulsory full-time education*. Wiesbaden: Springer Fachmedien Wiesbaden, pp. 37–45. doi: 10.1007/978-3-658-06241-5_3

Turner, J. C. (1991). *Social influence.* Belmont, CA: Thomson Brooks/Cole Publishing Co.

Valls, O., Astleithner, F., Schels, B., Vogl, S. and Kogler, R. (2022) ‘Educational and Occupational Aspirations: A Longitudinal Study of Vienna Youth’, *Social Inclusion*, 10(2), pp. 226-239. doi:10.17645/si.v10i2.5105.

Vaquera, E. and Kao, G. (2008) ‘Do You Like Me as Much as I Like You? Friendship Reciprocity and Its Effects on School Outcomes among Adolescents’, *Social Science Research*, 37(1), pp. 55–72. doi:10.1016/j.ssresearch.2006.11.002.

Varga, J. (2009) ‘A tanárok elosztása a különböző szociokulturális hátterű tanulókat tanító iskolák között’, in Fazekas, K. (ed.) *Oktatás és foglalkoztatás*. Budapest: MTA KTI, pp. 65–83. Available at: http://econ.core.hu/file/download/ktik/ktik12_09_elosztas.pdf. (Accessed: 5 September 2021).

Váradi, L., Barna, I. and Németh, R. (2021) ‘Whose Norms, Whose Prejudice? The Dynamics of Perceived Group Norms and Prejudice in New Secondary School Classes’, *Frontiers in Psychology*, 11, p. 524547. doi:10.3389/fpsyg.2020.524547.

Veenstra, R. and Dijkstra, J.K. (2012) ‘Transformations in Adolescent Peer Networks’, in Laursen, B. and Collins, W.A. (eds.) *Relationship Pathways: From Adolescence to Young Adulthood*. New York: Sage, pp. 135–154.

Veenstra, R., Dijkstra, J. K., Steglich, C. and Van Zalk, M. H. W. (2013) ‘Network-Behaviour Dynamics’, *Journal of Research on Adolescence*, 23(3), pp. 399–412. doi:10.1111/jora.12070.

Velkey, G. (2019) ‘A térbeli-társadalmi egyenlőtlenségek és újratermelésük az alapfokú oktatás hazai rendszerében’, *Tér és Társadalom*, 33(4), pp. 104–131. doi:10.17649/TET.33.4.3191.

Vernon, L. and Drane, C.F. (2020) ‘Influencers: the importance of discussions with parents, teachers and friends to support vocational and university pathways’, *International Journal of Training Research*, 18(2), pp. 155–173. doi:10.1080/14480220.2020.1864442.

Vollet, J. (2017) *Capturing Peers’, Teachers’, and Parents’ Joint Contributions to Students’ Engagement: An Exploration of Models*. Dissertations and Theses. Paper 3774. doi:10.15760/etd.5658.

Vörös, A., Block, P. and Boda, Zs. (2019) 'Limits to inferring status from friendship relations', *Social Networks*, 59, pp. 77–97. doi:10.1016/j.socnet.2019.05.007.

Vörös, A. and Snijders, T.A.B. (2017) 'Cluster analysis of multiplex networks: Defining composite network measures', *Social Networks*, 49, pp. 93–112. doi:10.1016/j.socnet.2017.01.002.

Wan, S., Lauermann, F., Bailey, D. H. and Eccles, J. S. (2021) 'When Do Students Begin to Think That One Has to Be Either a "Math Person" or a "Language Person"? A Meta-Analytic Review ', *Psychological Bulletin*, 147(9), pp. 867–889. doi:10.1037/bul0000340.

Wang, L., Liang, L., Liu, Z., Yuan, K., Ju, J. and Bian, Y. (2021) 'The Developmental Process of Peer Support Networks: The Role of Friendship', *Frontiers in Psychology*, 12, p. 615148. doi:10.3389/fpsyg.2021.615148.

Wang, M-T., Kiuru, N., Degol, J. L. and 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, pp. 148–160. doi:10.1016/j.learninstruc.2018.06.003.

Wentzel, K.R., Barry, C.M. and Caldwell, K.A. (2004) 'Friendships in Middle School: Influences on Motivation and School Adjustment', *Journal of Educational Psychology*, 96(2), pp. 195–203. doi:10.1037/0022-0663.96.2.195.

Wentzel, K. R., Battle, A., Russell, S. L. and Looney, L. B. (2010) 'Social supports from teachers and peers as predictors of academic and social motivation', *Contemporary Educational Psychology*, 35 (3), pp. 193–202. doi: 10.1016/j.cedpsych.2010.03.002.

Wentzel, K. and Muenks, K. (2016) 'Peer Influence on Students' Motivation, Academic Achievement, and Social Behavior', in Wentzel, K. and Ramani, G. (eds) *Handbook of Social Influences in School Contexts: Social-Emotional, Motivation, and Cognitive*. New York: Routledge, pp. 13–30.

Van de Werfhorst, H. G., and Hofstede, S. (2007) 'Cultural Capital or Relative Risk Aversion? Two Mechanisms for Educational Inequality Compared', *The British Journal of Sociology*, 58(3), pp. 391-415. doi: https://doi.org/10.1111/j.1468-4446.2007.00157.x

Wigfield, A. (1994) 'Expectancy-value theory of achievement motivation: A developmental perspective', *Educational Psychology Review*, 6(1), pp. 49–78. doi:10.1007/BF02209024.

Wigfield, A. (1997) 'Reading motivation: A domain-specific approach to motivation', *Educational Psychologist*, 32(2), pp. 59–68. doi:10.1207/s15326985ep3202_1.

Wigfield, A. and Eccles, J.S. (2000) 'Expectancy–Value Theory of Achievement Motivation', *Contemporary Educational Psychology*, 25(1), pp. 68–81. doi:10.1006/ceps.1999.1015.

Wigfield, A. and Eccles, J.S. (2002) 'The Development of Competence Beliefs, Expectancies for Success, and Achievement Values from Childhood through Adolescence', in Wigfield, A.

and Eccles, J.S. (eds.) *Development of Achievement Motivation*. San Diego, CA: Academic Press, pp. 91–120. doi:10.1016/B978-012750053-9/50006-1.

Wigfield, A. and Eccles, J.S. (2020) 'Chapter Five - 35 Years of Research on Students' Subjective Task Values and Motivation: A Look Back and a Look Forward', in Elliot, A.J. (ed.) *Advances in Motivation Science*. Elsevier, pp. 161–198. doi:10.1016/bs.adms.2019.05.002.

Wigfield, A., Tonks, S. and Klauda, S.L. (2009) 'Expectancy-Value Theory.', in Kathryn R. Wentzel and David B. Miele (eds.) *Handbook of Motivation at School.* New York: Routledge/Taylor & Francis Group, pp. 55–75.

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

van Workum, N., Scholte, R. H. J., Cillessen, A. H. N., Lodder, G. M. A. and Giletta, M. (2013) 'Selection, Deselection, and Socialization Processes of Happiness in Adolescent Friendship Networks', *Journal of Research on Adolescence*, 23(3), pp. 563–573. doi:10.1111/jora.12035.

Van Zalk, N., Van Zalk, M., Kerr, M. and Stattin, H. (2011) 'Social Anxiety as a Basis for Friendship Selection and Socialization in Adolescents' Social Networks: Social Anxiety in Youth Peer Networks', *Journal of Personality*, 79(3), pp. 499–526. doi:10.1111/j.1467-6494.2011.00682.x.

Zander, L., Chen, I.-C. and Hannover, B. (2019) 'Who asks whom for help in mathematics? A sociometric analysis of adolescents' help-seeking within and beyond clique boundaries', *Learning and Individual Differences*, 72, pp. 49–58. doi:10.1016/j.lindif.2019.03.002.

Zell, E. and Alicke, M.D. (2010) 'The Local Dominance Effect in Self-Evaluation: Evidence and Explanations', *Personality and Social Psychology Review*, 14(4), pp. 368–384. doi:10.1177/1088868310366144.

Zell, E. and Strickhouser, J.E. (2020) 'Comparisons Across Dimensions, People, and Time: On the Primacy of Social Comparison in Self-Evaluations', *Social Psychological and Personality Science*, 11(6), pp. 791–800. doi:10.1177/1948550619884564.

Zhang, Y., Haddad, E., Torres, B. and Chen, C. (2011) 'The Reciprocal Relationships Among Parents' Expectations, Adolescents' Expectations, and Adolescents' Achievement: A Two-Wave Longitudinal Analysis of the NELS Data', *Journal of Youth and Adolescence*, 40(4), pp. 479–489. doi:10.1007/s10964-010-9568-8.

Zimmermann, T. (2018) ‘Die Bedeutung signifikanter Anderer für eine Erklärung sozial differenzierter Bildungsaspirationen’, *Zeitschrift für Erziehungswissenschaft*, 21(2), pp. 339–360. doi:10.1007/s11618-017-0781-z.

Zolnay, J. (2018) ‘Kasztosodó közoktatás, kasztosodó társadalom’, in Fejes J. B. and Szűcs N. (eds.) *Én vétkem. Helyzetkép az oktatási szegregációról*. Szeged: Motiváció Oktatási Egyesület, pp. 211-231.

Zwier, D., Geven, S., Bol, T. and Van De Werfhorst, H.G. (2023) ‘Let’s Stick Together: Peer Effects in Secondary School Choice and Variations by Student Socio-Economic Background’, *European Sociological Review*, 39(1), pp. 67–84. doi: https://doi.org/10.1093/esr/jcac033.

APPENDICES

Appendix A: Academic ambitions in two school subjects by data collection waves and by whether students' class was included in the analysis (%)

	Hungarian literature						Mathematics					
	Time 1		**Time 2**		**Time 3**		**Time 1**		**Time 2**		**Time 3**	
	Class included in the analysis											
Academic ambitions												
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
3 or below	18.50	21.50	20.60	26.50	29.40	32.10	14.30	15.90	13.00	15.30	11.90	17.80
4	33.70	35.70	35.90	35.30	35.50	33.30	25.20	34.00	32.50	38.50	38.30	37.80
5	47.70	42.80	43.40	38.20	35.10	34.50	60.50	50.10	54.50	46.20	49.80	44.40
n	329	353	281	340	262	330	329	353	277	340	261	331
Chi-Sq. (p-value)	1.87 (p=.39)		3.23 (p=.20)		0.57 (p=.75)		7.98 (p=.02)		4.24 (p=.12)		4.31 (p=.12)	

Appendix B: Supplementary models for academic ambitions in Hungarian literature

Hungarian literature	Model 1				Model 2				Model 3				Model 4				Varying
	Θ (SD)	Credible from	Credible to	p-value	Θ (SD)	Credible from	Credible to	p-value	Θ (SD)	Credible from	Credible to	p-value	Θ (SD)	Credible from	Credible to	p-value	
Network (friendship dynamics)																	
Structural effects																	
Outdegree	**-2.45 (0.19)**	**-2.84**	**-2.11**	**.00**	**-2.38 (.20)**	**-2.80**	**-1.98**	**.00**	**-2.40 (.21)**	**-2.81**	**-2.00**	**.00**	**-2.41 (.20)**	**-2.81**	**-2.04**	**.00**	Yes
Reciprocity	**2.24 (.20)**	**1.85**	**2.65**	**1.00**	**2.23 (.20)**	**1.87**	**2.63**	**1.00**	**2.23 (.18)**	**1.88**	**2.58**	**1.00**	**2.20 (.18)**	**1.86**	**2.58**	**1.00**	Yes
Transitive triplets	**1.94 (.13)**	**1.69**	**2.19**	**1.00**	**1.96 (.13)**	**1.72**	**2.22**	**1.00**	**1.95 (.11)**	**1.72**	**2.16**	**1.00**	**1.94 (.12)**	**1.71**	**2.19**	**1.00**	Yes
Transitive reciprocated triplets	**-1.07 (.14)**	**-1.35**	**-.79**	**.00**	**-1.06 (.14)**	**-1.34**	**-.81**	**.00**	**-1.07 (.13)**	**-1.32**	**-0.81**	**.00**	**-1.05 (.13)**	**-1.31**	**-.81**	**.00**	Yes
Indegree popularity – sqrt	**-.33 (.07)**	**-.46**	**-.19**	**.00**	**-.35 (.07)**	**-.50**	**-.20**	**.00**	**-.35 (.08)**	**-.49**	**-.20**	**.00**	**-0.34 (.07)**	**-.49**	**-.20**	**.00**	Yes
Outdegree activity – sqrt	.02 (.04)	-.06	.11	.72	.02 (.05)	-.07	.11	.66	.02 (.04)	-.06	.11	.69	.03 (.04)	-.06	.11	.75	Yes
Alters aspirations					**.08 (.03)**	**.01**	**.14**	**.99**	.02 (.04)	-.07	.11	.69	.03 (.05)	-0.06	.12	.75	No
Similarity in aspirations					**.19 (.08)**	**.04**	**.35**	**.99**	-.09 (.08)	-.07	.26	.87	.08 (.08)	-.09	.24	.82	No
Alters academic achievement	**.06 (.02)**	**.02**	**.10**	**1.00**					**.05 (.03)**	**-.00**	**.10**	**.97**	**.05 (.03)**	**-.01**	**.10**	**.96**	No
Similarity in academic achievement	**.05 (.02)**	**.02**	**.08**	**1.00**					**.04 (.02)**	**.01**	**.08**	**.99**	**.04 (.02)**	**.01**	**.07**	**.98**	No
Similarity in failure experience													-.02 (.09)	-.20	.15	.42	No
Gender similarity	**.41 (.06)**	**.31**	**.53**	**1.00**	**.41 (.06)**	**.30**	**.52**	**1.00**	**.41 (.06)**	**.30**	**.52**	**1.00**	**.42 (.06)**	**.31**	**.54**	**1.00**	Yes
Similarity in parents' highest level of education													-.01 (.04)	-.09	.06	.37	No
Similarity in ethnic background													.00 (.08)	-.15	.15	.53	No

Behaviour (aspirations) dynamics																
Linear shape	.16 (.08)	.00	.32	.97	-.00 (.10)	-.21	.19	.51	-.01 (.10)	-.19	.21	.54	-.01 (.13)	-.27	.23	.50	No
Average similarity to friends' aspirations					**1.56 (.43)**	**.75**	**2.45**	**1.00**	**1.62 (.49)**	**0.70**	**2.61**	**1.00**	**2.04 (.54)**	**1.02**	**3.18**	**1.00**	No
Friends' average academic achievement	**.45 (.17)**	**.12**	**.78**	**1.00**					.06 (.21)	-.36	.46	.63	-.03 (.24)	-.51	.44	.45	No
Friends' average failure experience													.39 (.48)	- .53	1.35	.80	No
Academic achievement	**.34 (.09)**	**.16**	**.52**	**1.00**	**.47 (.09)**	**.29**	**.65**	**1.00**	**.47 (.11)**	**.26**	**.69**	**1.00**	**.42 (.13)**	**.17**	**.68**	**1.00**	No
Previously experiencing failure													-.07 (.22)	-.51	.35	.37	No
Parents' expectations													.12 (.12)	-.12	.36	.85	Yes
Being a girl													**.56 (.19)**	**.19**	**.94**	**1.00**	Yes
Parents' highest level of education													.32 (.26)	-.18	.85	.89	No
Being Roma													.01 (.20)	-.39	.41	.53	Yes
Interaction between ego's failure experience and their friends' average failure experience													-.30 (.99)	-2.22	1.66	.38	No

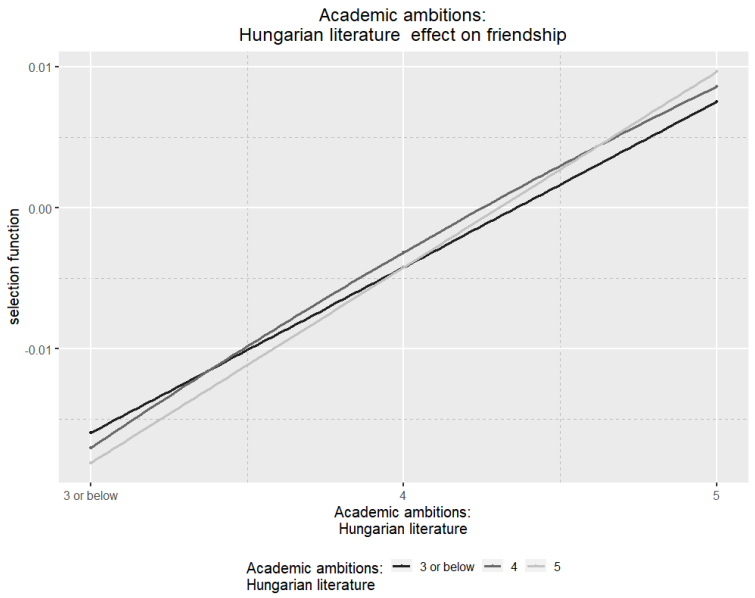
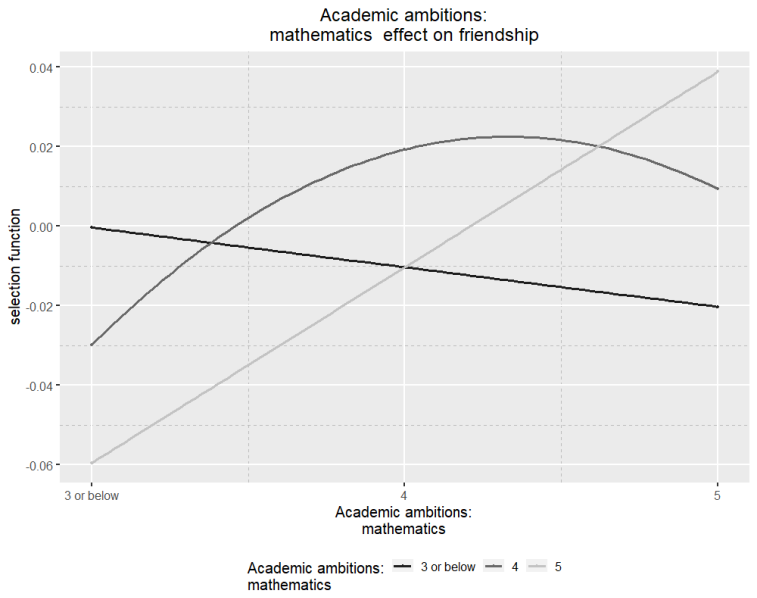
Notes. Posterior means and standard deviations. One-sided posterior p-values for testing whether the parameter is positive or negative. Values close to 1 indicate that the parameter is positive; values close to 0 indicate that the parameter is negative.

Appendix C: Supplementary models for academic ambitions in mathematics

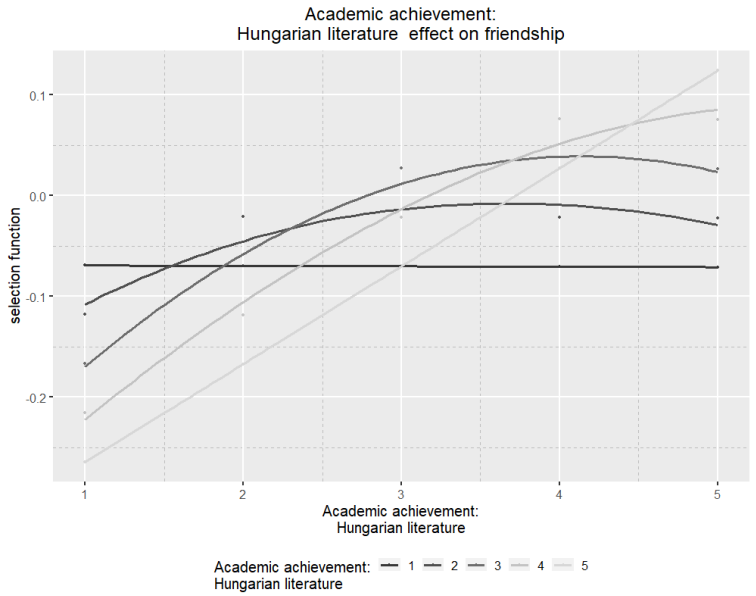
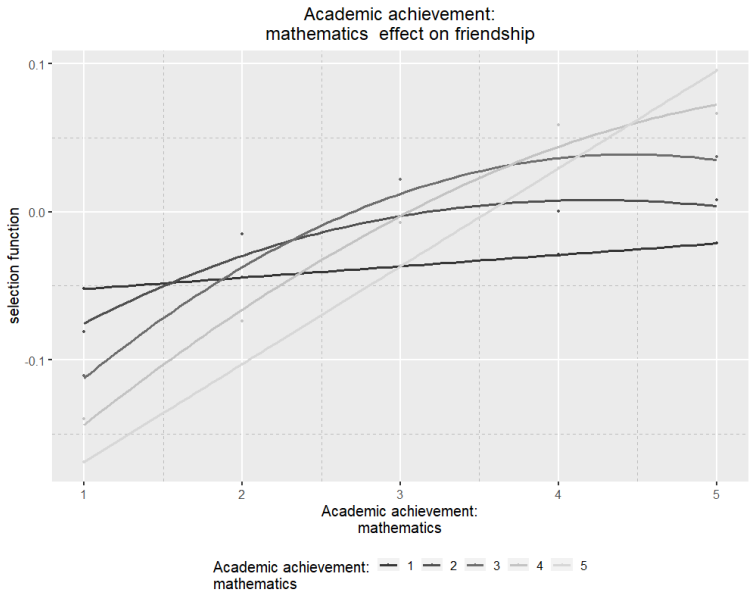
Mathematics	Model 1				Model 2				Model 3				Model 4				Varying across classes
	Θ (SD)	Credible from	Credible to	p-value	Θ (SD)	Credible from	Credible to	p-value	Θ (SD)	Credible from	Credible to	p-value	Θ (SD)	Credible from	Credible to	p-value	
Network (friendship dynamics)																	
Structural effects																	
Outdegree	**-2.35 (.20)**	**-2.76**	**-1.96**	**.00**	**-2.40 (.20)**	**-2.80**	**-2.02**	**.00**	**-2.35 (.19)**	**-2.72**	**-1.95**	**0.00**	**-2.36 (.20)**	**-2.75**	**-1.98**	**.00**	Yes
Reciprocity	**2.22 (.18)**	**1.89**	**2.60**	**1.00**	**2.22 (.19)**	**1.86**	**2.61**	**1.00**	**2.22 (.18)**	**1.87**	**2.58**	**1.00**	**2.17 (.17)**	**1.85**	**2.52**	**1.00**	Yes
Transitive triplets	**1.96 (.12)**	**1.74**	**2.20**	**1.00**	**1.94 (.11)**	**1.73**	**2.18**	**1.00**	**1.95 (.12)**	**1.73**	**2.19**	**1.00**	**1.94 (.11)**	**1.71**	**2.16**	**1.00**	Yes
Transitive reciprocated triplets	**-1.06 (.13)**	**-1.33**	**-0.82**	**.00**	**-1.05 (.13)**	**-1.32**	**-.80**	**.00**	**-1.05 (.13)**	**-1.33**	**-.80**	**.00**	**–1.03 (.12)**	**-1.27**	**-.80**	**.00**	Yes
Indegree popularity – sqrt	**-0.35 (.07)**	**-.49**	**-.21**	**.00**	**-.34 (.07)**	**-.47**	**-.20**	**.00**	**-.35 (.07)**	**-.49**	**-.22**	**.00**	**-.35 (.07)**	**-.49**	**-.21**	**.00**	Yes
Outdegree activity – sqrt	.01 (.04)	-.07	.09	.60	.02 (.04)	-.07	.10	.68	.01 (.01)	-.07	.10	.63	.02 (.04)	-.07	.11	.68	Yes
Alters aspirations					**.07 (.03)**	**.01**	**.13**	**.99**	.02 (.04)	.07	.11	.67	.03 (.05)	-.07	.12	.71	No
Similarity in aspirations					**.18 (.07)**	**.04**	**.32**	**.99**	**.24 (.08)**	**.08**	**.40**	**1.00**	**.24 (.09)**	**.07**	**.41**	**1.00**	No
Alters academic achievement	**.05 (.02)**	**.01**	**.08**	**.99**					.04 (.03)	-.02	.10	.91	.04 (.03)	-.02	.09	.90	No
Similarity in academic achievement	-.00 (.01)	-.03	.02	.39					**-.03 (.02)**	**-.06**	**0.01**	**.05**	–.03 (.02)	-.06	.01	.07	No
Similarity in failure experience													-.10 (.10)	-.29	.10	.15	No
Gender similarity	**.41 (.06)**	**.30**	**.53**	**1.00**	**.41 (.06)**	**.30**	**.53**	**1.00**	**.41 (.06)**	**.30**	**.52**	**1.00**	**.42 (.06)**	**.31**	**.53**	**1.00**	Yes

Similarity in parents' educational background													-.01 (.04)	-.09	.07	.39	No
Similarity in ethnic background													.02 (.08)	-.14	.18	.63	
Behaviour (aspirations) dynamics																	
Linear shape	**-.24 (.08)**	**-.41**	**-.08**	**.00**	**-.32 (.10)**	**-.51**	**-.14**	**.00**	**-.30 (.09)**	**-.49**	**-.12**	**.00**	**–.31 (.11)**	**-.52**	**-.12**	**.00**	No
Average similarity to friends' aspirations					**1.43 (.40)**	**.67**	**2.26**	**1.00**	**1.25 (.52)**	**.29**	**2.33**	**.99**	**1.55 (.54)**	**.50**	**2.67**	**1.00**	No
Friends' average academic achievement	**.48 (.15)**	**.19**	**.79**	**1.00**					.08 (.21)	-.33	.49	.64	-.05 (.27)	-.59	.47	.44	No
Friends' average failure experience													-.31 (.68)	-1.63	.97	.34	No
Academic achievement	**.40 (.10)**	**.21**	**.59**	**1.00**	**.52 (.10)**	**.33**	**.71**	**1.00**	**.51 (.11)**	**.30**	**.73**	**1.00**	**.44 (.14)**	**.17**	**.71**	**1.00**	No
Experiencing failure previously													-.14 (.26)	-.64	.36	.29	No
Parents' expectations													.11 (.13)	-.14	.35	.81	Yes
Being a girl													.19 (.18)	-.16	.55	.86	Yes
Parents' highest level of education													.25 (.24)	-.22	.72	.86	No
Being Roma													.04 (.22)	-.39	.46	.57	Yes
Interaction between ego's failure experience and their friends' average failure experience													.67 (1.16)	-1.5	3.02	.72	No

Appendix D: The effect of academic ambitions on friendships

	Hungarian literature	Mathematics
Academic ambitions		

Appendix E: The effect of academic achievement on friendships

	Hungarian literature	Mathematics
Academic achievement		

Appendix F: Grammar school preferences by data collection waves and by whether students' class was included in the analysis (%)

	Grammar school track preferences (%)			Having at least one parent with tertiary-level education (%)			Having a same-gender parent with tertiary-level education (%)			Average academic achievement		
	Class included in the analysis											
	Yes (n)	No (n)	Chi-Sq. (p)	Yes (n)	No (n)	Chi-Sq. (p)	Yes (n)	No (n)	Chi-Sq. (p)	Yes (n)	No (n)	Kruskal-Wallis Chi-Sq. (p)
Time 1	26.99 (415)	21.43 (336)	2.81 (0.09)							3.63 (416)	3.31 (339)	17.59 (<0.001)
Time2	25.43 (409)	21.38 (304)	1.36 (0.24)	27.83 (460)	19.89 (362)	6.5 (0.01)	22.39 (460)	12.71 (362)	12.16 (<0.001)	3.58 (409)	3.29 (305)	14.38 (<0.001)
Time 3	32.88 (356)	24.38 (283)	5.1 (0.02)							3.56 (369)	3.06 (287)	39.91 (<0.001)

Appendix G: Change of grammar school track preferences by whether students' class was included in the analysis (%)

	From time 1 to time 2				From time 2 to time 3			
	Changed from grammar school track preferences to other	Grammar school track preferences in both waves	Changed to grammar school track preferences	N	Changed from grammar school track preferences to other	Grammar school track preferences in both waves	Changed to grammar school track preferences	N
Class not included in the analysis	12.69	73.46	13.85	260	9.13	76.71	14.16	219
Class included in the analysis	13.17	74.46	12.37	372	8.96	73.13	17.91	335
		Chi-Squared=.31, p=.86				Chi-Squared=1.37, p=.50		

Appendix H: Similarity in friends` educational preferences as the share of all friendship ties (%) (excluding dyads with at least one NA value)

	Time1 (N=2293)	**Time2 (N=2291)**	**Time3 (N=2055)**
	Total sample		
Same preferences (Not grammar school)	50.24	55.83	48.08
Different preferences	40.47	34.53	34.06
Same preferences (Grammar school)	9.29	9.65	17.86
	Time1 (N=679)	**Time2 (N=589)**	**Time3 (N=675)**
	Ego (the sender of the friendship tie): Students with grammar school track preferences		
Same preferences (Grammar school)	31.37	37.52	54.37
Different preferences	68.63	62.48	45.63
	Time1 (N=1614)	**Time2 (N=1702)**	**Time3 (N=1380)**
	Ego (the sender of the friendship tie): Students with not grammar school track preferences		
Same preferences (Not grammar school)	71.38	75.15	71.59
Different preferences	28.62	24.85	28.41

Appendix I: Random coefficient multilevel Siena model results for vocational secondary and 'Don't know yet' behaviour (social selection) – Preliminary analysis

Network (friendship) dynamics	Don't know yet vs. other categories				Vocational secondary vs. other categories				Varying across classes
	θ (SD)	Credible from	Credible to	*p*-value	θ (SD)	Credible from	Credible to	*p*-value	
Structural effects									
Outdegree	**-2.38 (.19)**	**-2.73**	**-1.99**	**<.001**	**-2.38 (0.20)**	**-2.74**	**-1.97**	**0.00**	Yes
Reciprocity	**1.99 (.154)**	**1.70**	**2.29**	**>.99**	**1.97 (0.14)**	**1.70**	**2.25**	**1.00**	Yes
Transitive triplets	**1.86 (.113)**	**1.65**	**2.09**	**>.99**	**1.84 (0.11)**	**1.64**	**2.06**	**1.00**	Yes
Transitive reciprocated triplets	**-.8427 (0.1143)**	**-1.07**	**-.62**	**<.001**	**-0.83 (0.10)**	**-1.04**	**-0.63**	**0.00**	Yes
Indegree popularity – sqrt	**-.29 (.069)**	**-.43**	**-.16**	**<.001**	**-0.28 (0.07)**	**-0.43**	**-0.14**	**0.00**	Yes
Outdegree activity – sqrt	.01 (.039)	-.07	.09	.61	0.01 (0.04)	-0.07	0.09	0.58	Yes
Alters' preferences	-.103 (.056)	-.22	.004	.03	**0.15 (0.06)**	**0.03**	**0.26**	**0.99**	No
Similarity in preferences (EgoXAltX) (H3: Selection hypothesis)	**.34 (0.133)**	**.08**	**.61**	**>.99**	**0.33 (0.15)**	**0.04**	**0.62**	**0.99**	No
Alter's academic achievement	.03 (0.020)	.02	-.01	.07	0.04 (0.02)	0.00	0.08	0.96	No
Similarity in academic achievement (EgoXAltX)	-0.003 (0.018)	-.038	.03	.44	-0.002 (0.02)	-0.04	0.03	0.47	No
Alter`s parental background	.03 (.043)	-.06	.11	.72	0.04 (0.04)	-0.05	0.12	0.80	No
Similarity in parental background (EgoXAltX)	-.09 (0.067)	-.22	.04	.10	-0.08 (0.07)	-0.22	0.05	0.11	No
Gender similarity	**.39 (.06)**	**.28**	**.51**	**p>.99**	**0.39 (0.06)**	**0.28**	**0.51**	**1.00**	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 that the parameter is positive; values close 0 indicate that the parameter is negative.

Appendix J: Random coefficient multilevel Siena model results for vocational secondary and 'Don't know yet' behaviour (social influence) – Preliminary analysis

Behaviour (aspirations) dynamics	Don't know yet vs. other categories				Vocational secondary vs. other categories				Varying across classes
	θ (SD)	Credible from	Credible to	p-value	θ (SD)	Credible from	Credible to	*p*-value	
Linear shape	**-0.82 (0.13)**	**-1.08**	**-0.58**	**0.00**	**-0.43 (0.14)**	**-0.71**	**-0.17**	**0.00**	No
Friends' average aspirations (H1:Adjustment hypothesis)	-0.81 (0.81)	-2.44	0.75	0.16	**-3.39 (1.26)**	**-6.19**	**-1.23**	**0.00**	No
Friends' average academic achievement	0.29 (0.29)	-0.25	0.89	0.84	0.07 (0.29)	-0.48	0.65	0.59	No
Friends' average parental background (H2a: Instrumental resource hypothesis)	-0.35 (0.61)	-1.56	0.81	0.29	-1.06 (0.67)	-2.42	0.27	0.06	No
Academic achievement	**-0.45 (0.15)**	**-0.75**	**-0.17**	**0.00**	0.05 (0.15)	-0.24	0.34	0.64	No
At least one parent has a tertiary educational level	-0.26 (0.30)	-0.86	0.33	0.20	-0.39 (0.31)	-1.03	0.20	0.10	No
Being a girl	-0.47 (0.25)	-0.97	0.01	0.03	0.15 (0.27)	-0.37	0.67	0.71	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 that the parameter is positive; values close 0 indicate that the parameter is negative.

Appendix K: Random coefficient multilevel Siena model results part 1 (social selection with same-gender parent) - Preliminary analysis

Network (friendship) dynamics	Same-gender parent, average alter effects				Same-gender parent, maximum alter effects				
	θ (SD)	Credible from	Credible to	p-value	θ (SD)	Credible from	Credible to	p-value	Varying across classes
Structural effects									
Outdegree	**–2.41 (0.19)**	**-2.76**	**-2.04**	**<.01**	**–2.40 (0.18)**	**-2.75**	**-2.02**	**<.01**	Yes
Reciprocity	**1.97 (0.14)**	**1.68**	**2.25**	**>.99**	**1.96 (0.16)**	**1.68**	**2.26**	**>.99**	Yes
Transitive triplets	**1.85 (0.11)**	**1.64**	**2.07**	**>.99**	**1.84 (0.11)**	**1.63**	**2.07**	**>.99**	Yes
Transitive reciprocated triplets	**-0.83 (0.11)**	**-1.05**	**-0.62**	**<.01**	**-0.83 (0.11)**	**-1.04**	**-0.62**	**<.01**	Yes
Indegree popularity – sqrt	**–0.27 (0.07)**	**-0.41**	**-0.14**	**<.01**	**–0.27 (0.07)**	**-0.42**	**-0.14**	**<.01**	Yes
Outdegree activity – sqrt	0.01 (0.04)	-0.07	0.09	.62	0.01 (0.04)	-0.07	0.09	.63	Yes
Alters' aspirations	**–0.13 (0.06)**	**-0.24**	**-0.02**	**.01**	**–0.13 (0.06)**	**-0.24**	**-0.02**	**.02**	No
Similarity in aspirations (EgoXAltX)	**0.45 (0.14)**	**0.19**	**0.75**	**>.99**	**0.48 (0.14)**	**0.20**	**0.75**	**>.99**	No
Alter's academic achievement	**0.05 (0.02)**	**0.00**	**0.09**	**.98**	**0.04 (0.02)**	**0.00**	**0.09**	**.98**	No
Similarity in academic achievement (EgoXAltX)	–0.01 (0.02)	-0.04	0.03	.32	–0.01 (0.02)	-0.04	0.03	.30	No
Alter`s parental background	0.03 (0.04)	-0.05	0.12	.79	0.03 (0.04)	-0.05	0.12	.79	No
Similarity in parental background (EgoXAltX)	0.005 (0.08)	-0.16	0.14	.48	0.000 (0.07)	-0.15	0.14	.50	No
Gender similarity	**0.40 (0.06)**	**0.28**	**0.51**	**>.99**	**0.40 (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 that the parameter is positive; values close 0 indicate that the parameter is negative.

Appendix L: Random coefficient multilevel Siena model results part 2 (social influence with same-gender parent) - Preliminary analysis

Behaviour (aspirations) dynamics	Same-gender parent, average alter effects				Same-gender parent, maximum alter effects				
	θ (SD)	Credible		p-value	θ (SD)	Credible		p-value	Varying across classes
		from	to			from	to		
Linear shape	**–0.50 (0.15)**	**-0.79**	**-0.2**	**<.01**	–0.14 (0.27)	-0.68	0.39	.31	No
Friends' average aspirations	–1.35 (.97)	-3.36	0.49	.08					No
Friends' average academic achievement	0.08 (0.33)	-0.56	0.75	.59					No
Friends' average parental background	**1.67 (0.80)**	**0.14**	**3.29**	**<.99**					No
Friends' maximum aspirations					**–1.75 (0.64)**	**-3.09**	**-0.59**	**<.00**	No
Friends' maximum academic achievement					0.17 (0.32)	-0.43	0.82	.70	No
Friends' maximum parental background					*0.75 (0.47)*	*-0.12*	*1.74*	*.95*	No
Academic achievement	**0.62 (0.18)**	**0.28**	**0.98**	**>.99**	**0.66 (0.19)**	**0.29**	**1.04**	**>.99**	No
At least one parent has tertiary educational level	*0.52 (0.32)*	*-0.12*	*1.16*	*.95*	*0.52 (0.33)*	*-0.11*	*1.16*	*.95*	No
Being a girl	-0.05 (0.28)	-0.59	0.49	.43	-0.03 (0.28)	-0.56	0.51	.46	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 that the parameter is positive; values close 0 indicate that the parameter is negative.

Appendix M: Examples of average alter and maximum alter values in case of a binary variable

RSiena uses the grand mean centered version of individual behaviour and covariate variables for computations; in multigroup data (data containing multiple groups), the overall mean is subtracted from each value (Ripley et al., 2021). Average and maximum alter values (the average and maximum of students' friends' values) are computed based on the grand mean-centered values. Following, regarding binary variables (in this case, adolescents' educational preferences and parental background), maximum alter effects are a scaled version of average alter effects. If all students' friends had the same aspirations, the maximum alter and average alter of friends' educational aspirations would be the same. Otherwise, in each case of having at least one friend with grammar school aspirations, friends' maximum alter values would have a higher positive value than average alter values.

	Average alter value of ego's alters given	**Maximum alter value of ego's alters**
Example overall mean (in case of 0-1 variables, this is the overall share of 1s, in this case, grammar school aspirations)	.132	
Centered value for ego if ego takes the value 1 given an example, grand mean	.868 (equals 1 minus the overall mean)	
Centered value for ego if ego takes the value 0 given an example, grand mean	-.132 (equals 0 minus the overall mean)	
Ego has ten friends and among those…		
Example 1: 2 aspire for grammar school (2 friends (alters) take the value 1)	.068	.868
Example 2: 8 aspire for grammar school (8 friends (alters) take the value 1)	.668	.868
Example 3: 10 aspire for grammar school (10 friends (alters) take the value 1)	-.132	-.132
Example 4: 0 aspire for grammar school (0 friends (alters) take the value 1)	.868	.868

Notes. Own computation and examples-

Appendix N: Social selection in preliminary models with maximum alter effects

Network (friendship) dynamics	Maximum alter effects				Maximum alter effects with interactions				Varying across classes
		Credible				Credible			
	θ (SD)	from	to	*p*-value	θ (SD)	from	to	*p*-value	
Structural effects									
Outdegree	**–2.42 (0.20)**	**-2.80**	**-2.01**	**<.01**	**–2.40 (0.19)**	**-2.76**	**-2.00**	**<.01**	Yes
Reciprocity	**1.97 (0.16)**	**1.67**	**2.28**	**>.99**	**1.96 (0.16)**	**1.67**	**2.29**	**>.99**	Yes
Transitive triplets	**1.85 (0.11)**	**1.64**	**2.08**	**>.99**	**1.85 (0.11)**	**1.64**	**2.09**	**>.99**	Yes
Transitive reciprocated triplets	**-0.83 (0.11)**	**-1.06**	**-0.61**	**<.01**	**-0.83 (0.12)**	**-1.07**	**-0.61**	**<.01**	Yes
Indegree popularity – sqrt	**–0.27 (0.07)**	**-0.42**	**-0.14**	**<.01**	**–0.28 (0.07)**	**-0.43**	**-0.15**	**<.01**	Yes
Outdegree activity – sqrt	0.01 (0.04)	-0.07	0.09	.63	0.01 (0.04)	-0.07	0.09	.61	Yes
Alters' aspirations	**–0.13 (0.06)**	**-0.24**	**-0.01**	**.02**	**–0.13 (0.06)**	**-0.25**	**-0.02**	**.01**	No
Similarity in aspirations (egoXaltX) (H3: Selection hypothesis)	**0.49 (0.13)**	**0.23**	**0.75**	**>.99**	**0.48 (0.14)**	**0.20**	**0.75**	**>.99**	No
Alter's academic achievement	**0.04 (0.02)**	**0.00**	**0.09**	**.98**	**0.05 (0.02)**	**0.01**	**0.09**	**.99**	No
Similarity in academic achievement (egoXaltX)	–0.01 (0.02)	-0.04	0.03	.35	–0.01 (0.02)	-0.04	0.03	.35	No
Alter`s parental background	0.04 (0.04)	-0.04	0.12	.82	0.04 (0.04)	-0.04	0.12	.85	No
Similarity in parental background (egoXaltX)	–0.09 (0.07)	-0.23	0.04	.09	–0.09 (0.07)	-0.23	0.04	.09	No
Gender similarity	**0.39 (0.06)**	**0.28**	**0.51**	**>.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 that the parameter is positive; values close 0 indicate that the parameter is negative.

Appendix O: Social influence in preliminary models with maximum alter effects

Behaviour (preferences) dynamics	Maximum alter effects				Maximum alter effects with interactions				Varying across classes
	θ (SD)	Credible from	Credible to	p-value	θ (SD)	Credible from	Credible to	*p*-value	
Linear shape	–0.16 (0.27)	-0.69	0.40	.27	–0.23 (0.27)	-0.75	0.31	.19	No
Friends' maximum preferences (H1: Adjustment hypothesis)	**–1.76 (0.65)**	**-3.16**	**-0.59**	**<.01**	**–1.68 (0.61)**	**-2.94**	**-0.55**	**<.00**	No
Friends' maximum academic achievement	0.12 (0.32)	-0.49	0.76	.64	0.16 (0.31)	-0.43	0.82	.70	No
Friends' maximum parental background (H2a: Instrumental resource hypothesis)	**0.89 (0.52)**	**-0.03**	**2.02**	**.97**	*0.80 (0.48)*	*-0.12*	*1.81*	*.95*	No
Friends' maximum parental background X Ego's parental background (H2b: Instrumental resource hypothesis)					*1.37 (0.91)*	*-0.35*	*3.24*	*.94*	No
Academic achievement	**0.66 (0.19)**	**0.30**	**1.03**	**>.99**	**0.68 (0.19)**	**0.32**	**1.08**	**>.99**	No
At least one parent has a tertiary educational level	0.58 (0.32)	-0.06	1.20	.96	0.48 (0.78)	-0.83	2.25	.73	No
Being a girl	0.03 (0.28)	-0.52	0.56	.55					No
Being Roma	-0.06 (0.40)	-0.83	0.75	.43					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 that the parameter is positive; values close 0 indicate that the parameter is negative.

Appendix P: Results for the sub-models

	Models with stable friends	**Models with all friends**	**Stable friends with multiple imputation (log odds)**	**Stable friends, no experiment**	**Stable friends, experiment**
Previous preference: grammar school track (logit)	Average marginal effects	Average marginal effects	Log odds ratios	Average marginal effects	Average marginal effects
Parents' educational level:					
Not tertiary, but secondary	**-.21 (.05)*** **	**-.22 (.05)*** **	**-1.0 (.28)*** **	**-.21 (.07)** **	**-.19 (.07)** **
Below secondary	-.08 (.05)	-.07 (.05)	-.44 (.27)	-.12 (.07)	-.03 (.07)
Friends' previous secondary school preferences: grammar school track	.002 (.03)	.10 (.08)	-.06 (.48)	.06 (.03)	-.08 (.04)
Classmates' previous secondary school preferences: grammar school track	**.13 (.02)*** **	**.35 (.11)** **	**3.39 (.62)*** **	**.10 (.02)*** **	**.18 (.03)*** **
Constant (log odds)	.32 (.37)	.30 (.40)	**-.83 (.38)***	.40 (.53)	.10 (.58)
N students	438	463	663	218	220
Previous preference: don't know yet (logit)	Average marginal effects	Average marginal effects	Log odds ratios	Average marginal effects	Average marginal effects
Parents' educational level:					
Not tertiary, but secondary	.04 (.05)	.04 (.05)	.21 (.34)	.01 (.08)	.07 (.05)
Below secondary	**.15 (.05)** **	**.16 (.05)** **	**1.08 (.38)** **	**.14 (.07)***	**.16 (.08)***
Friends' previous secondary school preferences: don't know yet	**.04 (.02)** **	**.22 (.06)*** **	**.97 (.40)***	.04 (.03)	**.05 (.02)***
Classmates' previous secondary school preferences: don't know yet	**.05 (.01)*** **	**-.03 (.14)**	**2.66 (.91)** **	**.07 (.02)*** **	.03 (.02)
Constant (log odds)	**-2.59 (.54)*** **	**-2.51 (.52)*** **	**-3.24 (.53)*** **	**-2.2 (.76)** **	**-3.02 (.74)*** **
N students	438	463	663	218	220
GPA at the end of seventh grade (linear regression)					
Friends' GPA at the end of seventh grade	**.45 (.07)*** **	**.44 (.05)*** **	**.56 (.08)*** **	**.48 (.1)*** **	**.40 (.09)*** **
Classmates' GPA at the end of seventh grade	.04 (.05)	.03 (.05)	.13 (.10)	.05 (.07)	.03 (.07)
Parents' educational level:					
Not tertiary, but secondary	**-.54 (.1)*** **	**-.43 (.11)*** **	**-.37 (.08)*** **	**-.46 (.12)*** **	**-.61 (.16)*** **
Below secondary	**-.38 (.09)*** **	**-.42 (.09)*** **	**-.30 (.08)*** **	**-.35 (.15)***	**-.40 (.12)** **
Constant (log odds)	**.81 (.13)*** **	**.71 (.13)*** **	**1.50 (.39)*** **	**.72 (.18)*** **	**.87 (.19)*** **
N students	436	498	663	222	214
Friends' grammar school track preferences in their applications (linear regression)					
Friends' GPA at the end of seventh grade	**.35 (.06)*** **	**.36 (.07)*** **	**.20 (.03)*** **	**.39 (.09)*** **	**.35 (.10)*** **
Friends' previous secondary school preferences					
Grammar school track	**.36 (.06)*** **	**.33 (.06)*** **	**.20 (.07)*** **	.19 (.11)	**.50 (.05)*** **
Don't know yet	.07 (.05)	-.01 (.05)	.10 (.06)	.03 (.06)	.13 (.08)
Friends' parental background					
Share of parents with tertiary-level education	**.22 (.07)** **	**.23 (.06)*** **	**.25 (.08)** **	.22 (.12)	**.21 (.08)***
Share of parents with secondary-level education	-.01 (.06)	-.01 (.07)	-.02 (.07)	-.09 (.06)	.06 (.09)
Constant (log odds)	.01 (.07)	.001 (.07)	**-.63 (.11)*** **	-.07 (.11)	.09 (.08)
N students	442	527	663	224	218
Friends' GPA at the end of seventh grade (linear regression)					
Friends' parental background					
Share of parents with tertiary-level education	**.51 (.08)*** **	**.53 (.09)*** **	**1.03 (.16)*** **	**.61 (.14)*** **	**.41 (.07)*** **
Share of parents with secondary-level education	**.22 (.06)** **	**.19 (.08)***	**.50 (.13)*** **	**.25 (.09)** **	**.18 (.09)***

Constant (log odds)	.03 (.09)	<.001 (.09)	**3.35 (.09)*** **	.04 (.13)	-.03 (.11)
N students	445	530	663	226	219
Friends' previous secondary school preferences: grammar school track (linear regression)					
Friends' parental background					
Share of parents with tertiary-level education	**.54 (.08)*** **	**.52 (.09)*** **	**.54 (.08)*** **	**.51 (.12)*** **	**.57 (.10)*** **
Share of parents with secondary-level education	.09 (.08)	.06 (.09)	.11 (.07)	.05 (.09)	.14 (.13)
Constant	.001 (.09)	.01 (.09)	**.16 (.04)*** **	-.01 (.12)	.01 (.13)
N students	442	527	663	224	218
Friends' previous secondary school preferences: don't know yet (linear regression)					
Friends' parental background					
Share of parents with tertiary-level education	-.13 (.07)	-.21 (.07)**	-.12 (.06)	-.08 (.09)	-.18 (.11)
Share of parents with secondary-level education	**-.18 (.07)***	-.07 (.09)	**-.17 (.07)***	-.11 (.09)	**-.25 (.11)***
Constant	-.01 (.08)	-.01 (.09)	**.27 (.04)*** **	.03 (.1)	-.05 (.12)
N students	442	527	663	224	218
Classmates' grammar school track preferences in their applications (linear regression)					
Classmates' GPA at the end of seventh grade	**.33 (.1)** **	**.31 (.09)** **	**.19 (.06)** **	.17 (.16)	**.60 (.12)*** **
Classmates' previous secondary school preferences					
Grammar school track	**.32 (.1)** **	**.42 (.08)*** **	**.41 (.13)** **	**.50 (.21)***	.13 (.09)
Don't know yet	-.08 (.06)	-.04 (.06)	-.14 (.11)	-.07 (.08)	-.05 (.07)
Classmates' parental background					
Share of parents with tertiary-level education	**.26 (.09)** **	**.24 (.08)** **	**.35 (.12)** **	.24 (.13)	**.27 (.12)***
Share of parents with secondary-level education	-.04 (.08)	.004 (.07)	-.04 (.12)	.04 (.08)	-.08 (.12)
Constant	.0004 (.08)	<.000 (.07)	**-.57 (.15)*** **	-.05 (.12)	.07 (.09)
N students	556	534	663	296	260
Classmates' GPA at the end of seventh grade (linear regression)					
Classmates' parental background					
Share of parents with tertiary-level education	**.70 (.09)*** **	**.65 (.09)*** **	1.55 (.20)	**.81 (.18)*** **	**.61 (.10)*** **
Share of parents with secondary-level education	**.25 (.1)***	**.27 (.09)** **	.68 (.28)	.31 (.16)	.19 (.14)
Constant	.0004 (.1)	<.000 (.1)	3.02 (.10)	.03 (.16)	-.02 (.12)
N students	556	534	663	296	260
Classmates' previous secondary school preferences: grammar school track (linear regression)					
Classmates' parental background					
Share of parents with tertiary-level education	**.72 (.13)*** **	**.66 (.12)*** **	.73 (.13)	**.64 (.18)** **	**.78 (.16)*** **
Share of parents with secondary-level education	.02 (.12)	.03 (.08)	.02 (.14)	-.01 (.15)	.06 (.17)
Constant	.0003 (.11)	<.000 (.1)	**.12 (.04)***	-.01 (.15)	.003 (.16)
N students	557	534	663	297	260
Classmates' previous secondary school preferences: don't know yet (linear regression)					
Classmates' parental background					
Share of parents with tertiary-level education	**-.30 (.13)***	**-.26 (.1)***	-.19 (.08)	-.15 (.19)	**-.39 (.13)** **
Share of parents with secondary-level education	**-.37 (.16)***	-.17 (.12)	-.31 (.12)	-.4 (.3)	**-.39 (.14)** **

Constant	-.002 (.15)	<.000 (.12)	**.33 (.05)***	.04 (.22)	-.04 (.21)
N students	557	534	663	297	260

Notes. Standard errors in parentheses, * p < 0.05, ** p < 0.01, *** p < 0.001